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ABSTRACT INDEX

Listed numbers are abstract numbers.

A-1
GLOBAL ANALYSIS OF EXPRESSED GENES IN RENAL EPITHELIAL CELLS EXPOSED CALCIUM OXALATE CRYSTALS

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AIMS: Kidney stone formation is a complex process, and numerous genes concern in this cascade. The binding and internalization of calcium oxalate monohydrate (COM) crystals, the most common crystal in renal stones by renal epithelial cells may be a critical step leading to kidney stone formation. COM crystals exposure alter expression of some genes, however previous studies of gene expression have generally been limited. To obtain more detailed insight in to gene expression, we examined gene expression profiles in renal epithelial cells exposed COM crystals using cDNA macroarray.
METHODS: NRK-52E cells were exposed COM crystals for 120 minutes. Poly (A) + RNA was isolated and converts into 32P-labeled first-strand cDNA, then hybridize cDNA probe to the membrane. Hybridization images were scanned and the signal intensities were quantified. Expression of mRNA of 1176 genes were analyzed with global sum normalization methods.
RESULTS: COM crystals exposure induced alteration of expression of thirty genes, which have been reported in previous study. Furthermore, the present data selected novel genes. Eighteen genes were found to be at least 2-fold regulated.
CONCLUSIONS: We performed large-scale analysis of gene expression in renal epithelial cells exposed COM crystals, and identified thirty differentially regulated genes. cDNA macroarray is a useful tool to evaluate gene expression in the urolithiasis research.

A-2
DIRECT MEASUREMENTS OF THE INTERACTION FORCES BETWEEN THE CRYSTALS OF CALCIUM OXALATE MONOHYDRATE AND BIOLOGICAL CELLS AND THEIR ROLE IN KIDNEY STONE FORMATION

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AIMS: In an earlier investigation, we have examined effect of chemical composition of the urine on stability and interaction forces of the calcium oxalate monohydrate crystals.
In the present work, the interaction forces between COM crystals (or silicon nitride tip) and different grown epithelium cells are measured in artificial urine. The objective of this task is to study effect of some urinary species such as citrate, protein, and oxalate on such interactions and their role in kidney stone formation in human kidney.
METHODS: Using nanopure deionized water and reagent grade $CaCl_2$ and $K_2C_2O_4$, COM crystals were prepared by mixing these reagents over 22 hour at 37° C. The crystals were collected by vacuum filteration then spray dried. Three kinds of biological cells were cultured and prepared in the pathology department. These cells included LLCPK1 (pig epithelium), NRK (mixture of rat epithelium and glomerulus) and MDCK (dog epithelium).
Direct Measurements of Interaction forces were done using Nanoscope III (Digital Instruments) Atomic Force Microscope
RESULTS: Results show significant difference in interaction forces between the AFM tip and the cells; large and medium repulsive barrier for LLCPK1 and NRK, respectively, and large attractive force for MDCK cells. The results suggest possible formation of kidney stones on MDCK cells and not on LLCPK1 and NRK cells. Interaction forces between Calcium Oxalate Monohydrate (COM) crystals and various types of cells is currently under study and initial data confirm the results obtained with the AFM tip.
CONCLUSIONS: Depending on the type of cells, attractive or repulsive forces could be found between COM crystals and the biological cells in the kidney. The type of forces (repulsive or attractive) correlates with available data on positions in the kidney where stone forms. These AFM results may be used to propose that kidney stone may start by simple attachment of COM crystal to certain cells. Such crystals may act as seeds for subsequent nucleation, crystal growth, and/or aggregation of other crystals depending the most favorable mechanism under the specific conditions prevailing in different patients.

A-3
SIGNIFICANCE OF RENAL TUBULAR ALTERATION BY CRYSTALLURIA IN CALCIUM STONE FORMATION

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AIMS: The mechanism behind stone formation is still unclear. Physicochemical properties alone cannot explain why urinary stones form. Detection of cellular enzymes in the urine, papillary calcifications and the short transit time of the urine in the renal tubule are factors that do not permit crystals to grow to calculi and thus speak for an involvement of the renal tubule in the process of stone formation. In addition animal experiments with a rat model suggest that alteration of the distal renal tubular cell triggers stone formation.
METHODS: Experiments were done by means of a cell culture model (Madin Darby Canine Kidney cells, MDCK-cells). MDCK-cells were cultured in DMEM with 10% fetal calf serum (FCS) at 37 degrees Celsius and 5% CO_2. 100 U/ml penicillin, 100 µg/ml streptomycin and 2 mM glutamine were added. Subculturing was performed with 0.025% trypsin. Cultures were prepared by plating 2.5 × 104 cells/well in 96-well dishes. Calcium oxalate crystals (COC) with a diameter of 2 µm were added and cytotoxic effect was determined by photometrical measurement of Lactate-Dehydrogenase (LDH) in cell supernatant. In the study group parathormone (PH), vitamin D3 (VD), allopurinol, oxipurinol and selenium were added.
RESULTS: PH and VD had no altering effect on the tubule in contrast to the experimental findings from the animal model. On the other hand, a reproducible tubular cell impairment was induced with COC, expressed as a 27%-rise in the LDH concentration in the cell supernatant. Allopurinol, oxipurinol and selenium inhibited this effect. Oxalate concentration and pH did not influence renal tubular alteration by COC.
CONCLUSIONS: The observations show that COC in the urine can directly damage the renal tubule.These findings indicate that an interaction between COC and the renal tubular cell is significant for urinary stone formation. This effect was inhibited by allopurinol and selenium, a fact that may speak for the use of both substances in the scope of stone metaphylaxis.

A-4
INVOLVEMENT OF CALCIUM PHOSPHATE IN IDIOPATHIC CALCIUM OXALATE NEPHROLITHIASIS

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AIMS: Retention of crystals in the kidneys, a critical event in stone formation, is achieved by crystal attachment to an injured urothelium. Calcium phosphate (CaP) is common in human urine and is most likely to form in earlier segments of the nephron such as late proximal tubule and loop of Henle. It can also induce heterogeneous nucleation of CaOx in urine of the collecting ducts. We decided to investigate whether CaP can also injure the cells making them vulnerable to crystal attachment.
METHODS: Confluent cultures of LLC-PK1 and MDCK cells were exposed to 5, 15, 25, or 50 mg/cm^2 of brushite (Br) for 1, 2, 4 or 6 hours. Media was tested for LDH release. Since free radicals

have been shown to be involved in Ox and CaOx induced renal epithelial injury we also investigated the production of 8-Iso-prostane (8IP) as a marker of lipid peroxidation.
RESULTS: Exposure of both LLC-PK1 and MDCK cells to Br crystals resulted in significant increase in the release of LDH into the culture medium. LLC-PK1 cells appeared more sensitive to the exposure than MDCK cells. In addition, the exposure to Br crystals also resulted in significant increases in the production of 8-IP.
CONCLUSIONS: Results indicate that Br crystals are injurious to renal epithelial cells and that lipid peroxidation is involved. In addition LLC-PK1 cells, which are derived from proximal tubular epithelium, are more sensitive to crystal exposure than MDCK cells, which are of distal tubular and collecting duct origin. In all these respects Br crystals behave similar to CaOx monohydrate crystals. It has been suggested that Br crystals materializing in the late proximal tubules or loops of Henle can promote nucleation of CaOx in the collecting ducts. Recent studies have also shown that retention of CaOx crystals is promoted by injury to the renal epithelium. Based on data presented here we propose that CaP crystals may not only nucleate CaOx crystals but also promote their retention in the kidneys by injuring the renal epithelium.

A-5
EXPOSURE TO OXALATE AND CALCIUM OXALATE CRYSTALS INDUCES THE EXPRESSION AND PRODUCTION OF AN IMMUNOSUPPRESSIVE LIPOCALIN, ALPHA-1-MICROGLOBULIN IN LLC-PK CELLS VIA INTERMEDIATING REACTIVE OXYGEN

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AIMS: Nephrolithiasis is modulated by a number of macromolecules including osteopontin, prothrombin fragment-1 and members of the I-alpha-I family. Exposure to oxalate and calcium oxalate (CaOx) crystals influences the expression and production of these macromolecules. Alpha-1-microglobulin (A1M) belongs to a family of small secretary proteins called lipocalins. Its gene includes sequence for an unrelated Kunitz-type protease inhibitor, bikunin, and translates into alpha-1-microglobulin–bikunin precursor (AMBP) protein. This study was done to investigate AMBP gene expression and A1M protein production by cells exposed to oxalate and CaOx crystals.
METHODS: Confluent cultures of LLC-PK1 cells were exposed to various concentration of oxalate (Ox, potassium oxalate) and CaOx crystals (calcium oxalate monohydrate) for different lengths of time.
RESULTS: Potassium oxalate as well as CaOx crystals induced A1M protein in LLC-PK cells in a time- and concentration-dependent fashion. Ox concentrations as low as 30 micro M for two-hour exposure elicited more than 100 percent increase in A1M protein release into culture medium. Maximum A1M release in medium was achieved at 300 micro M concentration.CaOx crystals (150 micro g/cm^2) treatment, however, induced response faster than Ox treatment. Real time RT-PCR assay showed similar increases in AMBP gene expression. Catalase pretreatment abated the induction of A1M. As catalase functions as an important scavenger of cellular H_2O_2, its blocking effect on A1M induction indicated the involvement of reactive oxygen species. In situ hybridization and immunohistochemistry studies, in nephrolithic rats supported renal tubular expression of AMBP mRNA and A1M protein.
CONCLUSIONS: The actual function of A1M in kidney is not known yet, the hepatic A1M definitely has been reported to function as a vital immunosuppressor [Biochim. Biophys. Acta, 2000, 1482:172–184]. Results of our studies are first to show A1M induction by an extracellular stimulus in a non-liver or pancreatic cell-line.

A-6
RENAL TUBULAR EPİTHELİAL CELLS İNJURY BY OXALATE OR CALCİUM OXALATE AND CHEMOKINE EXPRESSION

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AIMS: We have demonstrated that exposure to oxalate solutions and calcium oxalate crystals result in renal tubular epithelial cell injury, and reported that citrate and/or glycosaminoglycans (GAGs), such as heparin sulfate, had an inhibitory effect against epithelial cell injury. Recent studies have shown that monocyte chemoattractant protein-1 (MCP-1) is related with the localized injury during the early stages of nephrolithiasis. We investigated the relationship between the inhibitory effect of citrate or magnesium and chemokine expression involved such as MCP-1.
METHODS: Confluent cultures of Madrin-Darby canine kidney (MDCK) cells were exposed to various concentrations of citrate or magnesium, known as low molecular weight inhibitor, subsequently, exposed to solutions or calcium oxalate crystals. The conditioned media were collected and total cellular RNA isolated from the cells and subjected to reverse transcribed-polymerase chain reaction (RT-PCR) to determine the expression, respectively.
RESULTS: MDCK cells expressed MCP-1 mRNA and protein, and these responses were significantly reduced following treatments with citrate.
CONCLUSIONS: Since MDCK cells express MCP-1 mRNA and protein, and their levels are altered following oxalate or calcium oxalate crystals exposure. The increase in MCP-1 contributes to the inflammatory responses, crystal-induced injury. Since citrate treatment reduced chemokine expression, we suggested that it plays an inhibitory role in the early stage of nephrolithiasis.

A-7
COM CRYSTAL-CELL INTERACTION INHIBITION BY XANTHINE OXIDASE INHIBITORS

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AIMS: It is known that oxalate and calcium oxalate crystal injure uroepithelium and one of the major injury factor is free radical. This cell injury was protected by antioxidants such as xanthine oxidase inhibitors. It is also reported that xanthine oxidase inhibitors protect ESWL induced kidney damage. However, the effect of xanthine oxidase inhibitor on crystal–cell interaction is unknown. Therefore we investigate whether xanthine oxidase inhibitor can inhibit the adhesion of COM on urothelial cells or not.
METHODS: The cell lines used were MDCK, LLCPK1 and HK-2. These cells were cultured to confluent on round glass cover slips in a 12-well culture plate in DMEM with 10% FCS at 37 degree Celsius and 5% CO_2. These cells were incubated at the presence or absence of 0.2 or 2 mmol of allopurinol or oxypurinol for four hours as a pretreatment. One mg/ml of 14C COM crystal suspension were added and incubated for 10 minutes. Non-adherent crystals were washed in PBS. The amount of adherent radioactive crystals were measured by liquid scintillation counter. The cytotoxicity induced by COM crystal and oxalate were measured by LDH release assays.
RESULTS: Allopurinol and oxypurinol significantly reduce the COM crystal adhesion in dose dependent manner. Inhibitory rate of 2 mmol of allopurinol or oxypurinol were up to 40% and that of 0.2 mmol were up to 20%. Allopurinol and oxypurinol did not prevent the release of LDH from COM crystal injured cell lines.
CONCLUSIONS: Xanthine oxidase inhibitors inhibit crystal–cell adhesion. One of the mechanisms for this inhibitory effect may be explained by the prevention of cell cytotoxicity. Therefore xanthine oxidative inhibitor such as allopurinol and oxypurinol may be expected as potent agents for urolithiasis.

A-8
CRYSTAL-INDUCED EXPRESSION OF MCP-1 IN RENAL EPITHELIAL CELLS IN CULTURE

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AIMS: Formation and deposition of crystals of calcium oxalate (CaOx), calcium phosphate (CaP) or urate (UA) in the kidneys results in the development of non-infectious kidney stones. Crystallization occurs in the renal tubules. Generally crystals move with the urine and are expelled from the kidneys. But some of them migrate into the interstitium where they become surrounded by monocytes/macrophages (M/M), a protective response. We have proposed that in response to crystal exposure renal epithelial cells produce chemokines with chemotactic activity towards M/M. We investigated the expression of monocyte chemoattractant protein-1 (MCP-1) mRNA and protein by NRK52E rat renal tubular epithelial cells exposed to CaOx, brushite (Br, a CaP), and urate crystals.
METHODS: A normal rat kidney epithelial cell line, NRK52E, was obtained from ATCC and maintained as continuously growing monolayers. Confluent cultures were exposed to CaOx, Br or UA at a concentration of 250 mg/ml (66.7 m g/cm^2). They were exposed for 1, 3, 6, 12, 24 or 48 hours for isolation of mRNA to determine changes in its cellular expression and 24 hours for ELISA to determine the secretion of protein into the culture medium. Since cells are known to produce free radicals on exposure to CaOx crystals we also investigated the effect of free radical scavanger, catalse on the crystal induced expression of MCP-1 mRNA and protein.
RESULTS: Exposure of cells in culture to all three types of crystals resulted in increased expression of MCP-1 mRNA and production of the chemoattractant. CaOx crystals were most provocative while UA the least. Treatment with catalase had a negative effect on the increased expression of both MCP-1 mRNA and protein, which indicates the involvement of free radicals in upregulation of MCP-1 production.
CONCLUSIONS: Exposure to both CaOx and CaP crystals stimulates increased production of MCP-1. Free radicals may be involved in this upregulation. Results indicate that elevated expression of MCP-1, which is often associated with localized inflammation, may be one of the chemokine mediators associated with the deposition of various urinary crystals in the kidneys during kidney stone formation.

A-9
RENAL TUBULAR INJURY INDUCED BY MASSIVE HYPEROXALURIA: EVALUATION OF APOPTOTIC CHANGES AND THE EFFECT OF ANTIOXIDANTS

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AIMS: Previous studies have demonstrated that renal tubular epithelium is a major target for oxalate induced free radical injury and provided evidence for involvement of lipid peroxydation in cellular injury. Again, apoptotic changes observed in renal tubular cells during hyperoxaluria supports the injury produced by free radicals. This study was performed to evaluate the apoptotic changes in tubular cells and the protective effects of some agents including antioxidants on these specific changes.
METHODS: Male, white New-Zealand rabbits (n:65) were divided into four groups (15 rabbits each) and animals in the first group (n:15) were administrated 0.75% Ethylene Glycol (EG) daily, in their drinking water. Animals in the second group (n:15) received K-citrate in addition to EG administration. While animals in the third group (n:15) received vitamin E, animals in the last group (n:15) received MgOH in addition to EG. 5 rabbits constituted the control group. Rabbits were sacrificed from after 3 days, 1 week 2 weeks and 4 weeks respectively. Deparrafinized 4 μm thick sections were stained with H.E. and apoptotic changes were evaluated by TUNEL method with Apoptag System. The presence, extent of apoptotic changes, together with the effect of protective agents have been quantitatively evaluated.
RESULTS: No crystal formation and limited degree of apoptotic changes were recorded in control group animals. While animals receiving EG demonstrated evident apoptotic changes in renal tubular cells during hyperoxaluric period, both crystal deposition and/or apoptotic changes found to be limited in animals receiving K-citrate and vitamin E in addition to EG administration. MgOH found to be less effective on this aspect.
CONCLUSIONS: Our results supported the hypothesis that apoptotic changes do occur during hyperoxaluric phase and these alterations may be a result of free radical formation during lipid peroxydation. Limitation of both crystal deposition and apoptotic changes by antioxidants as well as urinary inhibitors may contribute to the formation and prophylaxsis of urinary stones.

A-10
RISK OF CALCIUM OXALATE NEPHROLITHIASIS IN MALE ALBINO RATS OF WISTAR STRAIN AFTER STREPTOZOTOCIN AND SODIUM OXALATE SUPPLEMENTATION

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AIMS: The study was done to find out the risk of calcium oxalate nephrolithiasis in experimental models of male albino rats of wistar strain.
METHODS: This paper reports the findings of the study to demonstrate the histopatholigical changes in the kidney of rats on normal diet, calculogenic diet, diabetisation and diabetic rats on calculogenic diet. Diabetes was induced by intraperitoneal administration of streptozotocin (15 mg/kg body weight). The rats were made calculogenic by oral sodium oxalate. The experiments are continued for a period of three months. During the experimental period, 24 hour urine samples were collected and analysis of urine oxalate, uric acid citric acid, sugar and calcium were done.
RESULTS: The pathological changes recorded in kidneys of the calculogenised rats included renal injury, and accumulation of crystalline materials in the tubular lumen. Any substance that promotes or causes renal tubular epithelial injury is expected to produce/enhance the process of Urolithiasis. The presence of increased levels of promoters and decreased levels of inhibitors in presence of renal tubular injury indicate that streptozotocin hastens the process of crystallization. Maximum crystallization occurred in diabetic rats on calculogenic diet followed by calculogenic rats and diabetic rats in that order.
CONCLUSIONS: Diabetised rats had enhanced crystallizing potential. Diabetic state of the urine in presence of promoters would enhance the process of aggregation of crystals.

A-11
HISTOPATHOLOGICAL CHANGES IN DIABETIC RATS ON HIGH OXALATE DIET AND THE EFFECTS OF 'KALLURIKKI' (SCOPARIA DULCIS) ON THE PROCESS OF UROLITHIASIS

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AIMS: The study was done to find out the effects of diabetisation and calculogenicity on renal tissues and the changes occurring following the oral administration of 'Kallurikki' (Scoparia Dulcis).
METHODS: Two sets of rats (six each) were diabetised by intraperitoneal alloxan (150 mg/kg). Calculogenecity was induced by oral sodium oxalate. One group of rats was sacrificed after three months and renal tissues were taken for histopathological analysis. The other set was given oral Scoparia Dulcis for two more months and analysed for histopathological changes.

RESULTS: Renal tissues of diabetic calculogenic rats on high sodium oxalate showed gross loss of architecture with glomerular necrosis, chronic inflammatory cells in the interstitium as well as in the perivascular and periglomerular space, varying degrees of tubular destruction and tubular dilatations. Large masses of calculi were noticed in many parts of the entire section. Most of the calculi formed were in the interstitium of cortico medullary junction. Crystal masses were seen to be protruding in to the tubular lumen. The Scoparia dulcis treated rats showed disruption of the architecture with marked tubular dilatation, tubular dilatation and tubular destruction in certain areas. Two rats showed remnants of calculous material in the interstitium of pyramidal region. In the remaining four rats the calculi were washed out completely.
CONCLUSIONS: Diabetisation is a risk factor in urolithiasis and the calculogenic effects can be prevented using Scoparia dulcis plant extract.

A-12
ROLE OF NANOBACTERIA IN THE DEVELOPMENT OF KIDNEY STONES

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AIMS: The role of infection for struvite stone is well known. Recent studies have suggested that calcium-based stones might also have an infectious origin. Nanobacteria are unconventional agents 100-fold smaller than common bacteria. Kajander and co-workers first discribed this bacterium. Their study on the relationship of nanobacterium with kidney stone introduced this topic to world's attention. Nanobacteria are capable of forming a calcium phosphate shell, and thus could serve as a nidus for renal calculi formation. In this study we assessed the presence of nanobacteria antigens in the serum samples of the patients with kidney stone in Kocaeli.
METHODS: 58 patients included in the study were divided in two groups. 46 patients with kidney stones in the first group, 12 patients without any stone history in the families were planned as second group for control. Blood samples were taken from all patients. Nanocapture E101 (Nanobac, Oy-Finland) kit was used for detection of the antigen of nanobacteria in the serum by Elisa technique. Mc Nemar and Chi square tests were used with SPSS 9.0 for statistical evaluation
RESULTS: Nanobacteria antigen was positive in 16 patient\'s serums (%26.7) in the first group and in 1 patient's serum (%8.3) in the second group. This result was statistically significant (p: 0.0019).
CONCLUSIONS: We thought that nanobacteria can be an etiological reason for our patients, therefore we planned to keep on researches for nanobacteria.

A-13
CRYSTALLIZATION OF CALCIUM OXALATE CRYSTALS ON MOLECULARLY IMPRINTED POLYMER SURFACES

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AIM: To show that the functional monomer, 6-methacrylamidohexanoic acid, when imprinted and polymerised with calcium oxalate monohydrate (COM), directs specific nucleation of these crystals.
METHODS: A molecularly imprinted matrix was prepared using 6-methacrylamidohexanoic acid as a functional monomer, capable of forming non-covalent interaction to the template (COM) suspended in chloroform prior to polymerisation. Following co-polymerisation of these solution complexes with a crosslinker, divenylbenzene, and subsequent removal of the template by washing with acidified methanol (2M HCl), recognition sites were left in the polymer which were compatible in shape and functionality to the COM crystals. Crystallization of COM was then initiated in the presence of the polymer but under conditions in which nucleation of COM was not spontaneous. Polymers and embedded crystals were examined by high resolution SEM, FT-IR spectroscopy, X-ray powder diffraction and AA.
RESULTS: Analysis showed the presence of COM crystals in the imprinted polymer.
CONCLUSION: This study has demonstrated that recognition sites on the polymer can preferentially direct the formation of COM crystals. As such, the possibility exists that such polymers may have an application in diagnostic kits for the early detection of urinary stone risk factors.

A-14
THE RELATIONSHIP BETWEEN CRYSTALIURIA AND SIALIC ACID IN HYPERCALCIURIC AND HYPEROXALURIC RATS

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AIMS: Glycosaminoglyicans play as promotor and inhibitor in some phases of stone formation. Sialic acid (SA) is a low molecular weight aminosaccarid found in the molecular sructure of glycosaminoglyicans. We studied the relationship between calcium oxalat crystalization and free and complex sialic acid and the effect of potasyum citrat on this relationship.
METHODS: 3 groups including 30 Winstar female rats in each group were formed. 0.12 ml %5 etilen glikol dissolued in water given through the feeding tube 2 times a day in group 1 and 0.5 mikrogram vitamin D3 mixed to their drink every other day was given to get them hypercalciuric and hyperoxlaluric, respectively. 5 mg/day K-Sitrat was also put into the drink of group 2 rats. Group 3 was fed normally. 24 hour urine and plasma was taken by using metabolic cage at 30. days. Free and total SA levels were measured by Warren's method defined by technique of measuring thiobarbituric acid as mmol/litre. In statistical analysis one way ANOVA test was used.
RESULTS: Plasma and urine calcium and urine oxalate levels were found higher in group 1 and 2 than group 3 and this was statistically significant. Plasma free and total SA levels were normal in 3 groups but free SA was lower in group 1 and 2 than the control group and was statistically significant. Urine total and complex SA levels were found low in group 1 and 2 as compared to group 3. Although this was statistically significant, there was no statistical significance between group 1 and 2. There was no statistical significance found at urine free SA levels among 3 groups.
CONCLUSIONS: A significant correlation is found between crystaluria and urine and plasma SA levels. Potasyum citrate does not have any significant effect on urine and plasma SA levels.

A-15
SIGNIFICANCE OF URINARY CRYSTAL STUDIES IN CENTRIFUGED DEPOSITS OF STAT SAMPLES FROM PEDIATRIC STONE FORMERS

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AIMS: Value of crystalluria was evaluated in stat urine samples from stone formers and control siblings.
METHODS: Stat urine samples were collected in an out-patient setting from 74 pediatric stone formers and 56 siblings. Urine was collected, centrifuged and deposits observed for crystalluria, crystal aggregates and types of crystals by light and polarizing microscopy.
RESULTS: Crystalluria was seen in 43 (58%) of the patients and 33 (59%) of the siblings. Crystal aggregation was observed in 13 (23%) of the patients with crystalluria as compared to 1 (2%) in siblings ($P = 0.002$). The common crystal type was Calcium Oxalate Monohydrate (COM) 33% in patients vs 10% in siblings

(P = 0.007). In contrast the common type in siblings was Calcium Oxalate Dihydrate (COD) 38% vs 18% in patients (P = 0.03). Uric Acid crystals were observed in 35% patients and 15% siblings. Three patients with Xanthine and two with Cystine stone passed stone specific crystals. Crystalluria was observed in 70% of the Calcium Oxalate stone formers with COM in 55%, COD 11% and Uric Acid 21%.In patients with Ammonium Acid Urate stones crystalluria was seen in 68%, AAU crystals in 16%, COD in 31%, COM in 11% and Uric Acid in 26%.
CONCLUSIONS: Crystalluria studies in the Out Patients Clinic in pediatric stone formers are a useful diagnostic tool specially, where 24 hours collections are difficult.Crystal study can be used in half of the patient to correlate with radiological and ultrasound findings in planning management strategy.

A-16
PROTECTIVE AND PROPHYLACTIC EFFECT OF AQUEOUS EXTRACT FROM HERNIARIA HIRSUTA ON EXPERIMENTALLY INDUCED CALCIUM OXALATE NEPHROLITHIASIS RATS

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AIM: Urolithiasis constitutes a major public health problem since it is characterized by high recurrence. In spite of tremendous progress in the field of medicine, there is no satisfactory drug for the treatment of kidney stones. An important number of patients still have to undergo surgery or lithotripsy to be relieved from this painful disease. Unfortunately, beside their high cost, these means remain in most cases invasive and with side effects. In this regard, in Morocco, a large number of patients use the aerial parts of Herniaria hirsuta in the treatment of kidney stones. The aim of the present study is to evaluate the effectiveness of herb extract obtained from the plant as a preventive and/or prophylactic agent on nephrolithic rats.
METHODS: Three of 6 wistar rat groups were housed in metabolic cages individually. Group I was used as control; group II was given ethylene glycol (EG) 0.75% plus 1 ml/day of water; and group III was given EG 0.75% plus 1 ml/day of extract. The 24 h urine samples were collected weekly for urinary chemistry analysis. After 3 weeks, all animals were sacrificed for analyzing their kidneys by histology.
RESULTS: The results showed that for both protocols, preventive or curative, crystalluria in non treated rats was constantly predominated by big calcium oxalate monohydrate (COM) and the presence of some calcium oxalate dihydrate (COD) crystals. However, in treated rats, crystalluria was characterized by the presence of large amount of small COD and few numbers of COM crystals. Histological slides showed clearly that the plant has a considerable antilithiasic effect. This effect was very important for rats belonging to curative protocol. Such effect did not seem to be mediated by biochemical alteration nor by diuretic process. Methanolic fraction obtained from the plant appeared to be responsible for the beneficial effect of the plant.
CONCLUSIONS: We conclude that plant extract of Herniaria hirsuta is efficient to eliminate the pre-existing stones than to prevent them. It is probable that the plant has substances that can prevent the formation of crystals and dissolve them.

A-17
INTRA-TUBULAR CRYSTALLISATION OF INDINAVIR REVISITED – THE INFLUENCE OF BODY TEMPERATURE

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AIMS: The authors have previously shown that indinavir (IND) is likely to precipitate in the loop of Henlé (LH) at plasma concentrations of 8 mg/L. This resulted in recommendations of drug dosage adjustments. However, those experiments were performed at room temperature. Given the influence of temperature on crystallisation in general, and solubility of IND in particular, we repeated the experiments under physiological body temperature conditions.
METHODS: Test solutions contained IND concentrations (CIND) of 100–750 mg/L at ionic strengths (IS) varying from 0–800 mmol simulating conditions in the proximal tubule (PT) and the LH. Solutions were titrated with base (NaOH) to find the pH value where nucleation starts within one minute. Each measurement was repeated three-fold and the average values were used for analysis. Experiments were conducted at room temperature (20°C) and repeated under a constantly monitored temperature of 37°C.
RESULTS: Results at 20°C were similar to our previous experiments. At body temperature, the relationship between pH and CIND remained inversely proportional. Again, results confirmed the site of IND crystallisation in the LH. Precipitation occurred already at lower CIND of 100 mg/L, as compared to 125 mg/L at 20°C, corresponding to a lower plasma CIND of 6.41 mg/L, as compared to 8.01 mg/L at 20°C. Precipitation at 37°C occurred at lower pH-values (6.67–7.26 versus 7.23–7.44). Precipitation under PT conditions corresponded to 64.1 mg/L plasma concentration, which cannot be reached in vivo under current dosage regimens.
CONCLUSIONS: This study confirms that the most likely place for IND crystallisation is the LH. It precipitates at lower concentrations and pH at 37°C. Therefore, the corresponding plasma CIND leading to IND crystallisation is even lower than previously reported by us. We therefore like to emphasize the importance of adjusting IND dosage regimens in a way that avoids excessive peak values yet remains well above the effective plasma CIND. Since precipitation at 37°C occurred at very low CIND, a rest-risk of stone formation cannot be excluded even in patients where this adjustment has been achieved.

A-18
A SECOND HIT NECESSARY FOR RENAL LITHOGENESIS? THE POSSIBLE ROLE OF INDUSTRIAL NEPHROTOXINS AND RENAL TUBULAR APOPTOSIS

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AIMS: Calcium nephrolithiasis (CN) is a multifactorial disorder in which environmental and dietary factors play a major role. Environment and diet clearly affect urine supersaturation; however, this is not sufficient to induce CN. Crystal attachment to the tubular lumen is now considered to be necessary for CN formation. However, it is hard to devise how environment and diet can affect the process of crystal attachment to the tubular epithelium. We verified the hypothesis that in the presence of mild urine supersaturation, the contemporaneous damage of the tubular epithelium, which is known to enhance crystal attachment, increases the risk of severe crystalluria.
METHODS: To cause urine supersaturation, hyperoxaluria was induced in male Wistar rats by oral ethilen glycole (EG) in tap water (0.50%) for 15 days; to cause the tubular damage, hesachloro-1:3-butadiene (HCBD), 10, 25, 50 mg/kg, was i.p. administered on day 7. Adequate control groups were considered. HCBD is an industrial nephrotoxin largely diffused in the environment. In reference to the EG and HCBD concentrations, they were chosen to span from sub-optimal to very low dosages as far as effects on crystalluria and tubular epithelial damage respectively are considered. Enzymuria, proteinuria, oxaluria, crystalluria and renal pathology were investigated.
RESULTS: Even the lowest HCBD dosage was effective in increasing crystalluria; cylinder-shaped crystal clusters were occasionally observed. Interestingly, crystalluria was induced also at the lowest EG concentration which by its own is not sufficient (it just induced very mild hyperoxaluria, and no damage of the tubule was evident at the electron microscope).

Of interest, HCBD induced apoptosis of the renal epithelium, and a correlation was shown between crystalluria and apoptosis of the proximal tubule.
CONCLUSIONS: The study suggests that: (1) an apoptotic tubular toxic agent can be necessary for crystallogenesis in borderline metabolic condition for crystalluria; (2) apoptosis may be relevant for nephrolithiasis as suggested in vitro; (3) CN may need a 2nd hit (further to the metabolic predisposition, 1st "hit") to occur; (4) the 2nd hit could be an environmental pollulant.

A-19
EFFECTS OF OXALATE ON RENAL EPITHELIAL CELLS AND FIBROBLASTS

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AIMS: Most renal stones in humans are composed of calcium oxalate. An increase in urinary oxalate levels has been shown to result in renal epithelial cell damage and crystal retention. However, the underlying mechanisms are unclear.
Which cell type plays the pivotal role in stone formation is unknown, but renal epithelial cells and interstitial cells seem to be involved in this process. Aim of this study was to evaluate the effects of oxalate on distinct renal epithelial cells and fibroblasts.
METHODS: LLCPK1, MDCK and renal fibroblast cell lines were cultured under standard conditions. The pH value was adjusted to 7.4. Part 1: cells were grown until confluent layers were achieved. Ammonium oxalate was added at final concentrations of 1, 2 and 4 mM on apical or basolateral side (plain medium was added to the contralateral). The free oxalate concentrations were obtained by EQUIL program. After 1, 2 and 4 hours cell survival was assessed microscopically by trypan blue staining. The influence of oxalate on proliferation and apoptosis induction was additionally examined. Part 2: MDCK and LLCPK1 cells were grown in 6-well plates until confluent layers were achieved. Ammonium oxalate was then added in same amounts as in part 1, either on apical or basolateral side, plain medium was added on the other. The further protocol was identical to part 1.
RESULTS: Part 1**:** Ammonium oxalate led to a time- and concentration-dependent decrease in cell survival that was most prominent the in LLCPK1 group. This was reflected by significant impairment in cell proliferation. No induction of apoptosis was observed in any cell line. Part 2: Both cell lines were more vulnerable to oxalate on basolateral side. This effect was more pronounced in LLCPK1 cells.
CONCLUSIONS: Our results show that ammonium oxalate has a negative effect on growth and survival of renal epithelial cells as well as on fibroblasts. As no induction of apoptotic processes was observed, this might be due to a direct cell toxic effect. We also demonstrated that this noxious effect is related to cell polarity. Cells are apparently more resistant on the apical (=tubular) side.

A-20
THE LEVEL OF THE UPPER URINARY TRACT OBSTRUCTION INFLUENCES THE SEVERITY OF THE INFLAMMATORY COMPLICATIONS OF STONE DISEASE

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AIMS: To investigate the urodynamic factors that may play role in inflammatory complications of stone disease is the aim of this paper.
METHODS: The results of treatment of 45 patients with occlusive stone disease and pyelonephrithis were analyzed. Conservative treatment had success in 19 of them, 26 patients needed the operative treatment.
RESULTS: Analysis of the stones localization in the upper urinary tract showed that in the most patients who were cured conservatively stones were situated in the lower ureteral parts. Only 1 patient had renal stones (5.3%), 7 – had stones in the middle (36.8%), and 11 – in the lower ureter (57.9%). In those patients who had inflammatory complications of stone disease and demanded open surgical management, occlusive stones were situated in the upper parts of the urinary tract more often. Stones of the upper ureter were found in 17 (65.4%) of them. We explain the different development of the stone disease inflammatory complications by involving of the different compensatory mechanisms. The disturbed urine transport during occlusive stone disease is compensated by intrarenal mechanisms such as pelvic reabsorption, and pyelo-renal, pyelo-venous, pyelo-lymphatic refluxes. Also the elasticity of the upper urinary tract plays role in compensation of the disturbed urine transport. These mechanisms are switched on in both cases of obstructive uropathy – when obstruction is situated in the upper as well as in lower parts of the urinary tract. However in the cases of the lower urinary tract obstruction the additional ureteral contractile function compensatory mechanisms are included – the high contractile activity of the ureteral wall.
CONCLUSIONS: The role of the ureteral contractile function changes in the compensation of the disturbed urine flow are discussed in the light of appearance of the inflammatory complications and patient rehabilitation in the course of treatment.

A-21
RENAL ANATOMIC FACTORS FOR LOWER CALYCEAL STONE FORMATION

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AIMS: The pathogenesis of urolithiasis was mainly explained with metabolic disorders. However metabolic disorders alone are not sufficient to explain the pathology. We investigated in a prospective study the effect of lower pole renal anatomy on renal stone formation. In present study anatomycal differences on both the stone and normal side were examined on excretory urography (IVU).
METHODS: Between July 1999 and July 2002 thirty patients (22 men and 8 women) with 16 mm or less of nonobstructed solitary lower pole stones were studied. Mean age was 45.28 years. The ureteropelvic angle (UPA), infundibulopelvic angle (IPA), lower pole infundibular length and width of the stone bearing calix were measured as described initially by Bagley and Rittenberg. The renal length and width and the number of major and minor calices were noted. The data of the stone forming and non stone forming contralateral side were compared. Statistical analysis was performed by student-t test.
RESULTS: The mean infundibular length of stone forming side was 30.10 ± 5.79 mm. and that non stone forming side 25.26 ± 5.46 mm. The differrence between mean infundibular length values of the two groups was statistically significant (t:3.32, $p < 0.005$). The mean IPA and UPA of stone forming side was more acute than the non-stone forming side, but there were no statistically significant differences. The differerences of renal length width and the number of major and minor calices between stone forming and non-stone forming side were not statistically significant.
CONCLUSIONS: Anatomycal disorders of lower pole collecting system may be considered as factors contributing to stone formation. The infundibular length is a significant risk factor, which predisposes to lower calyceal stone formation.

A-22
URINARY OSMOLALITY – A RELIABLE MARKER OF THE CALCIUM OXALATE CRYSTALLIZATION RISK?

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AIMS: Osmolality (OS) is a well known parameter to describe the concen1tration of all substances in a solution; a high urinary OS is generally considered to be a risk factor, being an indicator of insufficient fluid output. We investigated the relation of OS with respect to the BONN-Risk-Index (BRI) and the urinary calcium oxalate (CaOx) supersaturation (RS), and related the ratio of the urinary concentration of free calcium (Ca^{2+}) and OS to BRI and RS. Ca^{2+}/OS has been suggested as possible parameter to describe CaOx formation risk.
METHODS: From 154 native 12h-urine samples taken from CaOx stone formers and healthy subjects, OS, Ca^{2+}, BRI and RS were determined. The Ca^{2+}/OS–ratio was calculated.
RESULTS: Plotting logBRI vs. log(Ca^{2+}/OS) revealed a considerable linear regression coefficient $r = 0.72$. Neither regression analysis of logBRI vs. OS ($r = 0.24$) nor the analyses of RS vs. Ca^{2+}/OS ($r = 0.24$), and RS vs. OS ($r = 0.47$) revealed r-values that explain much of the variation.
CONCLUSIONS: As no large correlation between crystallization risk and OS was observed, it can be concluded that OS is not a reliable indicator of CaOx crystallization risk. This can be understood by the fact that OS does not take into account the individual chemical properties and interactions of the urinary constituents. The correlation between OS and BRI is even lower than that to RS, although BRI determination takes into account all the urinary constituents and the crystallization properties of the sample. Reflection of this in a stronger correlation of both parameters would have been expected if OS is an important parameter. This clearly shows: the risk of stone formation cannot be evaluated by a simple non-substance specific concentration measurement (OS) but may require crystallization experiments which allow the substance-specific consideration of all the urinary constituents in their particular native chemical environment. The BRI method meets this requirement.The notable non-linear correlation between logBRI and log(Ca^{2+}/OS) can be explained by the mathematical coupling between the variables involved and can not be taken as evidence that Ca^{2+}/OS is a good, independent indicator of the risk of CaOx stone formation.

A-23
PROTEIN KINASE C – INTRACELLULAR REGULATOR OF CARRIER MEDIATED OXALATE TRANSPORT IN THE PROXIMAL TUBULE

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AIMS: A defect in the renal oxalate transport has been proposed to play a major role in the pathogenesis of calcium oxalate stone disease. In previous studies we were able to characterize the transcellular oxalate transport at the renal proximal tubule. In our cellular model oxalate is transported at the luminal membrane by a sodium-oxalate (sulfate) cotransport and a chloride/oxalate (formate) exchange. The goal of the present study was to identify the intracellular signals, which are involved in the regulation of renal oxalate transport processes.
METHODS: Luminal transport was characterized in vivo (rat model) at the proximaltubule using the in-situ-stopped flow microperfusion method. For a time period of 2–3 minutes basolateral preperfusion with different concentrations of the selective protein kinase C (PKC) inhibitior staurosporine or phorbol, PKC stimulator, was performed. Then luminal transport of 14C-oxalate, 35S-sulfate and 14C-formate was investigated by micropuncture studies.
RESULTS: Luminal 14C-oxalate transport (EC50 10–7 mol/l) and 14C-formate transport (EC50 10-5 mol/l) were significantly stimulated in a concentration dependent manner by activation of the PKC. Luminal 35S-sulfate transport (EC50 10–7 mol/l) significantly decreased, when PKC was activated. In contrast, after PKC inhibition 14C-oxalate transport (EC50 10–8 mol/l) as well as 14C-formate transport (EC50 10–7 mol/l) were significantly reduced, whereas 35S-sulfate transport (EC50 10–7 mol/l) increased.
CONCLUSIONS: PKC influences both luminal oxalate carriers at the proximal tubule. Our results indicate that PKC lowers the activity of sodium-oxalate (sulfate) cotransport and simultaneously stimulates chloride/oxalate (formate) exchange. These are the first insights in the regulation processes of oxalate transport in the proximal tubule obtained in an in-vivo-model.

A-24
THE IMPACT OF CARBONIC ANHYDRASE ON THE REGULATION OF TRANSCELLULAR OXALATE TRANSPORT IN THE PROXIMAL TUBULE

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AIMS: Elevated urinary oxalate levels increase markedly the risk of calcium oxalate stone formation. In previous studies we characterized the carrier mechanisms of transcellular oxalate transport at the renal proximal tubule. In this cellular model we found evidence for a link between oxalate excretion and renal acidification mechanisms. Carbonic anhydrase plays an important role for the acid-base-equilibrium in the proximal tubule and may hence regulate oxalate excretion.
METHODS: Clearance studies were carried out in male Sprague-Dawley rats. First,the animals underwent implantation of a jugular vein and a suprapubic bladder catheter. Then, saline solution (0.9%) was perfused continuously. After 1 hour of equilibration 2 control periods followed. Intravenous bolus administration of acetazolamide (ACA, 2 mg) was followed by 5 clearance periods, 15 minutes each. To assess kidney function and the luminal oxalate carriers 14C-oxalate, 35S-sulfate, 14C-formate and 3H-inulin was added to the solution in different experiments. Renal fractional clearances and excretion rates
RESULTS: Carbonic anhydrase inhibition increased significantly the renal oxalate excretion rate (control: 43.47 ± 4.34 pmol/min vs. ACA: 62.15 ± 2.81 pmol/min, $p < 0.001$). The activity of luminal Na+-SO42-(oxalate) cotransport was reduced while Cl/oxalate (formate) exchange rose. Carrier activity was measured by the fractional clearances of 14C-oxalate (control: 1.38 ± 0.06 vs. ACA: 1.62 ± 0.04, $p = 0.002$), 35S-sulfate (control: 0.13 ± 0.02 vs. ACA: 0.09 ± 0.01, $p = 0.056$) and 14C-formate (control: 0.04 ± 0.00 vs. ACA: 0.06 ± 0.00, $p < 0.001$).
CONCLUSIONS: Renal oxalate excretion could be influenced by the activity of the carbonic anhydrase in the proximal tubule. The local control of tubular oxalate excretion by carbonic anhydrase seems to be an interesting target for a new pharmacological approach in the treatment of calcium oxalate stones.

A-25
DOES RENAL TUBULAR OXALATE EXCRETION DEPEND ON ACID–BASE-EQUILIBRIUM?

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AIMS: Elevated urinary oxalate levels increase markedly the risk of calcium oxalate stone formation. In recent studies we were able to clarify the cellular mechanisms of the transcellular oxalate transport at the renal proximal tubule and to develop a cellular model consecutively. As the oxalate transport in the proximal tubule was indirectly coupled to a Na+/H+-exchanger, we suggested that proximal tubular acid excretion could influence the oxalate transport processes. This hypothesis was now tested in a whole-animal-study.
METHODS: Clearance studies were carried out with male Sprague-Dawley rats. All animals received a jugular vein catheter and a suprapubic bladder catheter. In the control period a

physiological sodium chloride solution was perfused. Afterwards a mild acid load was administered with a HCl solution (pH 3.7). To assess kidney function and oxalate excretion 14C-oxalate and 3H-inulin was added to both solutions. After 1 hour of equilibrium 3 clearance periods were performed 15 minutes each. Urinary pH-levels, renal fractional oxalate clearance and renal oxalate excretion were investigated.
RESULTS: A significant correlation between the urinary pH and the renalfractional oxalate clearance ($p < 0.001$) was observed. Comparing the control with the acid load period there were significant differences in the urinary pH (6.17 vs. 5.98, $p < 0.022$), the renal fractional oxalate clearance (1.52 vs. 1.77, $p < 0.003$) and the renal oxalate excretion (68.84 pmol/min vs. 142.42 pmol/min, $p < 0.001$). Moreover the correlation between the change from baseline of urinary pH and renal oxalate excretion was also significant ($p < 0.001$).
CONCLUSIONS: Renal tubular oxalate transport changed under acid load conditions. Low urinary pH levels increased the renal oxalate excretion. Thus, a mild acid load within the physiological range may markedly influence the urinary supersaturation level for calcium oxalate. In contrast, alkalization reduced the amount of excreted oxalate – this could be one of the beneficial effects of alkali citrate therapy in calcium oxalate urolithiasis.

A-26
HYDROXYPROLINE METABOLISM TO GLYCOLATE AND OXALATE IN HEP G2 CELLS

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AIMS: The catabolism of 4-hydroxyproline in liver and kidney cells produces pyruvate and glyoxylate as end-products. The objective of this investigation was to determine the metabolic fate of the glyoxylate produced by this metabolism in Hep G2 cells, a line of human hepatic cells.
METHODS: Hep G2 cells were incubated in DME + 10% FBS containing varying concentrations of hydroxyproline for varying amounts of time. Glycolate, glyoxylate, and hydroxyproline in media and cells were measured by HPLC, and IC was used to measure oxalate.
RESULTS: The excretion of glycolate and oxalate into the medium increased with the time of incubation (time-dependent). The amounts excreted increased with increasing hydroxyproline in the medium (dose-dependent). The ratio of glycolate to oxalate was a constant 25:1 over this concentration range. The intracellular content of hydroxyproline increased 300-fold, glycolate 3-fold, glyoxylate 2-fold, whereas oxalate remained unchanged.
CONCLUSIONS: These results indicate that there is a competition for glyoxylate in these cells between glyoxylate reductase and lactate dehydrogenase and that both reactions respond similarly to increases in glyoxylate concentration. The results further suggest that hydroxyproline catabolism may make a substantial contribution to endogenous oxalate production by the liver.

A-27
THE EFFECT OF (L)-CYSTEINE ON THE PRODUCTION OF ENDOGENOUS OXALATE IN HEP G2 CELLS

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AIMS: Excessive endogenous oxalate synthesis is important in the pathophysiology of the primary hyperoxalurias and may also contribute to idiopathic calcium oxalate stone formation. This study investigated the utility of cysteine and cysteine precursors in reducing endogenous oxalate synthesis in a human hepatoma cell line, Hep G2.
METHODS: Hep G2 cells were incubated in Dulbecco's Modified Eagle Media with hydroxyproline to induce endogenous oxalate synthesis. Subsequently, nothing, cysteine, N-acetylcysteine, or 2-oxothiazolidine-4-carboxylate was added to the media. Oxalate levels in the media were measured by ion suppressed chromatography. Trichloroacetic acid cell extracts were used to measure cysteine levels. These samples were prepared using a new method for amino acid analysis (EZ:faast) that utilizes gas chromatography.
RESULTS: In the presence of 10-mM hydroxyproline oxalate synthesis increased 17.5 fold, from 0.8 nmol/mg protein/day to 13.2 nmol/mg protein/day. Cysteine was rapidly taken up and metabolized by Hep G2 cells. An inverse correlation between the intracellular cysteine concentration and oxalate production from hydroxyproline was observed. Maximal inhibition (68% ± 7%) was observed with 5-mM cysteine. However, N-acetylcysteine and 2-oxothiazolidine-4-carboxylate did not increase intracellular cysteine levels and had no inhibitory effects.
CONCLUSIONS: Cysteine has a concentration dependent inhibition of hydroxyproline induced oxalate synthesis in this cell model, whereas both N-acetylcysteine and 2-oxothiazolidine-4-carboxylate did not. Increasing cysteine levels in hepatocytes could potentially be an effective method of modulating endogenous oxalate synthesis.

A-28
RELATIVE OXALOGENESIS OF INTRAVENOUS OXALATE PRECURSORS IN RATS

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AIMS: Urinary oxalate plays an important role in calcium oxalate stone formation, and approximately 50 to 60% of urinary oxalate derives from endogenous metabolism of glyoxylate. Therefore, we measured urinary oxalate, glycolate, and citrate after administration of various oxalate metabolic precursors in rats to study their roles in oxalate metabolism.
METHODS: Male Wistar rats (approximately 200 g) were divided into 6 groups for each substance. Anesthetized rats in each group were intravenously administered various oxalate precursors including glyoxylate 2 mg, glycolate 10 mg, ethylene glycol 20 mg, hydroxypyruvate 100 mg, L-hydroxyproline 100 mg, sodium pyruvate 100 mg, glycine 100 mg, L-ascorbate 100 mg, and xylitol 200 mg. Hourly urine specimens were collected by bladder puncture just prior to and every 1 hour after each dosage up to 5 hours. Urinary oxalate, glycolate, and citrate were measured by capillary electrophoresis (HP3D capillary electrophresis, Hewlett-Packard).
RESULTS: Hourly oxalate and glycolate excretion in urine peaked at 1–2 hour after each dosage.Urinary oxalate production was high in glyoxylate, glycolate, and hydroxypyruvate, hydroxyproline groups, showing increasing tendency in this order. Urinary oxalate recovery of administered dose (mol/mol) was approximately 22% of glyoxylate, 9.8% of glycolate, 0.49% of ethylene glycol, 0.35% of hydroxypyruvate, and 0.26% of hydroxyproline. Only small increase of oxalate excretion was observed in sodium pyruvate and glycine groups and no oxalate increase was observed in xylitol and ascorbate groups.
CONCLUSIONS: Oxalate precursors including glyoxylate, glycolate, ethylen glycol, hydroxypyruvate, and hydroxyproline given intravenously in rats increased urinary oxalate and glycolate excretion in 5-hour urine collection. Various oxalate precursors seem to increase endogenous production of oxalate resulting in increasing urinary oxalate excretion, so the risk of increasing oxalate excretion must always be aware of upon intake or administration of these substances. (e.g. J Am Soc Nephrol 10:s341–s344, 1999, Mol Urol 4:341–347, 2000)

A-29
EFFECTS OF MAGNESIUM AND CALCIUM ON GASTROINTESTINAL ABSORPTION AND URINARY EXCRETION OF OXALATE IN RATS.

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AIMS: To study the effects on oxalate absorption and its urinary excretion of an acute magnesium load, or calcium followed by a dose of oxalic acid via a gastrostomy.
METHODS: Male Wistar rats weighing 180–200 g were randomly divided into 4 groups. All animals were fasted for about 24 hours, anesthetized, and intravenously hydrated with normal saline at 3–4 ml/hour. Then the animals were given normal saline (Control), 10 mg of oxalic acid (Ox alone), equimolar calcium followed by 10 mg of oxalic acid (Ca + Ox), or equimolar magnesium followed by 10 mg of oxalic acid (Mg + Ox). All treatments were administered via a gastrostomy. Urine samples were collected by bladder puncture just before administration and at hourly intervals up to 5 hours afterwards, and the urinary oxalate level was measured by capillary electrophoresis.
RESULTS: Urinary oxalate excretion peaked at 1 hour in the Ox alone group, while it peaked at 2 or 3 hours in the Ca + Ox, and Mg + Ox groups. Urinary oxalate excretion decreased significantly when 10 mg of oxalic acid was administered immediately after the administration of equimolar calcium, or equimolar magnesium. The cumulative urinary oxalate excretion up to 5 hours was approximately 15.9%, 2.8%, and 2% in the Ox alone, Ca + Ox, and Mg + Ox groups, respectively.
CONCLUSIONS: This study demonstrated that both the magnesium and calcium salts could decrease the gastrointestinal oxalate absorption and its subsequent urinary excretion. And, a long-term practice of magnesium and/or calcium intake with oxalate rich diets may reduce the risk of CaOx stone formation as well as its recurrence.

A-30
FAT MAL-ABSORPTION INDUCED BY GASTROINTESTINAL LIPASE INHIBITORS LEADS TO AN INCREASE IN URINARY OXALATE EXCRETION

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AIMS: Unabsorbed fatty acids may react with calcium in the intestinal lumen forming "soaps" that limit the amount of free calcium to bind with oxalate thereby raising intestinal oxalate absorption and leading to hyperoxaluria.
AIM: To evaluate whether Orlistat (Xenical), a gastrointestinal lipase inhibitor that reduces dietary fat absorption indicated for obesity control, might increase urinary oxalate (uOx), in an experimental model in rats.
METHODS: Forty (40) male adult Wistar rats were fed a standard diet alone (Control) or supplemented with either 2% sodium oxalate (NaOx) or 3.2 ml of soy oil (Soy Oil) in order to provide 35% of energy as fat, or both (NaOx + Soy Oil) during 8 weeks, being Orlistat (16 mg/day) administered from the 5th to the 8th week. Feces, for percentage of fat measurement, and 24 hr urine samples were collected at baseline, after 4 and 8 weeks for oxalate (uOx), calcium (uCa), magnesium (uMg) and citrate (uCit) determination.
RESULTS: The % of fecal fat increased 7 and 9% respectively, with Soy Oil or NaOx + Soy Oil diets alone, and further to 23 and 35% after Orlistat confirming fat malabsorption. After 8 weeks, Orlistat induced a significant increase in urinary oxalate compared to baseline in the groups Oil (0.82 ± 0.26 vs. 0.44 ± 0.23 mg/24 hr) and NaOx (2.48 ± 0.80 vs. 0.57 ± 0.27 mg/24 hr), being the most marked increase observed in NaOx + Oil group (3.87 ± 0.74 vs. 0.47 ± 0.08 mg/24 hr). All groups except for the control presented a significant reduction on the urinary excretion of calcium (Oil: 0.38 ± 0.07 vs. 0.50 ± 0.07; NaOx: 0.08 ± 0.05 vs. 0.39 ± 0.16; NaOx + Oil: 0.16 ± 0.08 vs. 0.38 ± 0.09 mg/24 hr) and magnesium (Oil: 1.56 ± 0.62 vs. 2.48 ± 0.91; NaOx: 0.54 ± 0.23 vs. 1.90 ± 0.58; NaOx + Oil: 1.01 ± 0.38 vs. 2.15 ± 0.47 mg/24 hr), but did not alter citrate excretion with Orlistat use.
CONCLUSIONS: These data suggest that the use of lipase inhibitors, mainly when associated to a diet rich in fat and oxalate may lead to an increase in urinary oxalate. The imbalance between promoters and inhibitors of urine crystallization, such as calcium and magnesium, may further contribute to the increase on the risk of stone formation.

A-31
HYPERURICOSURIC CALCIUM STONE DISEASE IN OUR STONE CLINIC

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AIMS: We present a trend of hyperuricosuric calcium stone disease in 2 community hospitals.
METHODS: A total number of 384 patient with upper urinary tract calcium stone was selected at our stone clinic. Hyperuricosuria (24-hour urinary excretion of uric acid above 800 mg in man and 750 mg in female) was observed in 62 patients. The patients were divided into 2 groups,hyperuricousuric calcium stone group (HUC group, 62 patients) and non-hyperuricosuric calcium stone group (Non-HUC group, 322 patients). Gender, age, stone component, stone size, previous stone history and 24-hour urinalysis were retrospectively evaluated.
RESULTS: There were no statistical differences of age and stone size between HUC and Non-HUC group. Male-female ratio was more predominant in HUC group (58/4) compared with Non-HUC group (252/70) ($p = 0.005$). Body mass index was 24.9 in HUC group and 22.8 in Non-HUC group ($p = 0.003$).Twenty-four hour urinalysis showed more excretions of oxalate, calcium, citrate, magnesium and uric acid in HUC group than in Non-HUC group (50 mg vs. 42 mg, 291 mg vs. 221 mg, 511 mg vs. 412 mg, 104 mg vs. 85 mg and 939 mg vs. 577 mg, respectively).
CONCLUSIONS: Many of hyperuricosuric calcium stone patients were male and fatty patients. They had hyperuricosuira in addition to hyperoxaluria and hypercalciuria, which also seemed to be contributing factors of stone formation.

A-32
THE INTESTINAL OXALATE ABSORPTION AND THE IMPORTANCE OF EXOGENOUS OXALATE AND CALCIUM INTAKE FOR CALCIUM OXALATE STONE NEPHROLITHIASIS- MEASURED WITH THE STABLE ISOTOPE 13C

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AIMS: Oxalate excretion is one of the most important promoters for calcium oxalate (CaOx) nephrolithiasis. Oxalate is either synthesized within the body or it is absorbed from foodstuffs within the gastrointestinal tract. The [$13C_2$] oxalate absorption test is a standardized, harmless and radioactivity-free test. Patient's risk of absorbing dietary oxalate was tested. Also, the influence of the calcium (Ca) content of diet was investigated.
METHODS: The [$13C_2$] oxalate absorption test was carried out over two days. The 24 h urine was collected and an identical standard diet with 800 mg Ca per day was maintained. In the morning of day two, a capsule containing 0.37 mmol sodium [$13C_2$] oxalate was ingested with water. Under these conditions, 120 healthy volunteers (60m, 60f; aged 18–56) and 120 patients with idiopathic CaOx nephrolithiasis (90m, 30f; aged 17–77) were tested. Eight healthy volunteers (5m, 3f, aged 20–59) were each tested thrice with Ca intakes of 370, 600, 1200, and 1800 mg/d.
RESULTS: The mean intestinal oxalate absorption of the volunteers was 8.0 ± 4.4%, and of the patients 10.2 ± 5.2% ($p \leq 0.001$). Both groups had identical absorption kinetics. The total amount of oxalate excretion was not significant different between the groups, however the exogenous part was ($p \leq 0.001$).

The mean absorption values between the male and female persons within both groups were not significantly different. There were significant correlations between the oxalate absorption and excretion ($p \leq 0.01$). Increased Ca intake decreased absorption and vice versa (up to 80%).
CONCLUSIONS: In healthy volunteers, oxalate absorption was significantly lower than in CaOx stone patients. An absorption >10% was found in 45.8% of the patients and in 28.3% of the volunteers. Ca related malnutrition leads to a considerable increase, while Ca supplementation results in a marked decrease of oxalate absorption. Sufficient Ca supply (1000 mg/d) is important for all patients suffering from CaOx nephrolithiasis. In case of hyperoxaluria Ca supplements with meals should be considered. As a routine test within a metabolic evaluation, this test can identify patients with higher oxalate absorption and individual therapy can be recommended.

A-33
ABSOLUTE GASTROINTESTINAL OXALATE ABSORPTION DOES, HOWEVER,PER CENT OXALATE ABSORPTION DOES NOT DEPEND ON THE OXALATE TEST DOSE

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AIMS: The dependence or independence of the measured oxalate absorption from the size of the test dose of sodium oxalate should be established over the range of test doses corresponding to dietary oxalate intake values.
METHODS: Gastrointestinal oxalate absorption was measured by the [$13C_2$] oxalate absorption test (J. Chromatogr. B 716: 343, 1998). Six healthy volunteers were tested under standardized dietary conditions with 63 mg oxalate and 800 mg calcium per day. These volunteers were tested thrice each with sodium oxalate doses of 25 mg, 50 mg, 200 mg, and 600 mg. Additionally, doses of 400 mg, 800 mg, and 1000 mg oxalate were applied once to three of these volunteers.
RESULTS: The oxalate absorption of the six volunteers tested thrice under the standardized conditions with 50 mg sodium [$13C_2$] oxalate and 800 mg calcium per day was 7.2% ± 2.62% (mean ± SD), similar to the total group of 120 volunteers tested previously (J. Urol. 169: 687, 2003): 8.0% ± 4.4% (mean ± SD). The tests with sodium [$13C_2$] oxalate doses in the range 25 to 1000 mg gave similar per cent oxalate absorption values.
CONCLUSIONS: In healthy volunteers, the amount of oxalate absorbed in the gastrointestinal tract increased proportional to higher test doses of oxalate. However, per cent oxalate absorption remained unchanged in the physiological range.

A-34
INFLUENCE OF MAGNESIUM ON ABSORPTION AND EXCRETION OF OXALATE

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AIMS: In urine, there is a series of substances, which can prevent urinary stone formation. Magnesium is one of these inhibitors. By the existing contradictory results of the metabolism and the mode of action of magnesium in calcium oxalate stone disease magnesium treatments are discussed controversially. The aim of this study was to investigate the influence of magnesium supplementation on oxalate absorption in healthy subjects.
METHODS: Six healthy volunteers have participated in this study. The volunteers had to spare two days for each [$13C_2$] oxalate absorption test: thrice each without supplement under standardized conditions (750 mg magnesium and 800 mg calcium), thrice with 243 mg/d magnesium supplement and thrice with 486 mg/d magnesium supplement.
RESULTS: The mean intestinal oxalate absorption of all volunteers of the standard test (without supplement) was 8.6 ± 2.83%. Under 243 mg magnesium supplementation the oxalate absorption decreased significantly on 5.2 ± 1.40%. The mean oxalate absorption decrease under 486 mg magnesium supplementation was 5.5 ± 1.62% and also significant. The magnesium excretion increased in both magnesium supplementations significantly from 162 ± 55.7 to 216 ± 86.5, and 217 ± 54.0 mg/d, respectively.
CONCLUSIONS: The results show that magnesium administration has significant effects on oxalate absorption. Also a significant increase in urinary magnesium excretion and decrease in oxalate excretion were shown. Consequently magnesium supplementation can be an effective therapy on recurrent calcium oxalate stone formers.

A-35
EXPERIENCE WITH A THREE-STEP SEQUENTIAL CRYSTALLISATION SYSTEM TO MIMIC CALCIUM SALT PRECIPITATION IN THE NEPHRON

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AIMS: Previous studies have suggested that precipitation of calcium phosphate at high nephron levels might play an important role in calcium oxalate stone formation. A sufficiently high supersaturation with calcium oxalate is established only in collecting duct urine and it is postulated that the nucleation of calcium oxalate at this nephron level is facilitated by the dissolution of calcium phosphate that occurs in acid urine. This series of experiments was designed to mimic the three important steps in such a crystallisation process.
METHODS : A three-step microplate analytical procedure was developed. In crystallisation systemp A, precipitation of calcium phosphate was accomplished by mixing 200 µl of 5 mmol/L $CaCl_2$ with 100 µL of 100 mmol/L Na_2 HPO_4 and 50 µL or urine or another additive (pH = 7.0). After 60 minutes 250 µL of the crystal suspension from experiment A was transferred to another microplate well containing 100 µL of 3.0 mmol/L sodium oxalate (system B). After 20 minutes this solution was acidified to pH 5.7 by addition of a small aliquot of HCl (Step C). The crystallisation was recorded by measuring the absorbance at 655 nm.
RESULTS: In the presence of a 14% concentration of urine a rapid precipitation of calcium phosphate was recorded in system A. During an observation period of 10 minutes in system B the absorbance remained stable or decreased, whereas an increased absorbance was observed following acidification (system C). An increased absorbance in sample B was obtained only when sodium phosphate had been omitted from the solution in step A. Urinary citrate had a pronounced influence on the crystallisation in step A as well as in step B.
CONCLUSION: The three-step crystallisation system described was designed in order to roughly mimic the series of events that are considered important for the development of calcium oxalate crystals. Further experiments with urine from stone-formers and normal subjects will show whether this dynamic approach can be of diagnostic and predictive value.

A-36
PROTEIN, MINERAL, AND THE SUSCEPTIBILITY OF URINARY CALCIUM OXALATE CRYSTALS TO PROTEOLYTIC DIGESTION

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INTRODUCTION: We have shown that proteins associated with calcium oxalate (CaOx) crystals deposited from human urine are intra-crystalline, and proposed that they contribute to stone prevention by facilitating the comminution and dissolution of crystals internalised by renal epithelial cells. Because the efficiency

of this mechanism must depend on the ratio of protein to mineral, the aim of this study was to determine the effect of intracrystalline protein concentration on the proteolytic digestion of CaOx crystals.
METHODS: CaOx crystals were deposited, by the addition of oxalate, from ultrafiltered (10 kDa) human urine supplemented with organic matrix isolated from demineralised CaOx crystals generated from healthy urine, at final protein concentrations of 0, 0.05, 0.5, 1.0 and 5.0 mg/L. Crystals were washed, dried and fractured to enable visualization of their interior structure and incubated in buffered saturated CaOx solutions of cathepsin D (Sigma; pH 6.0) or Proteinase K (Roche; pH 7.5) for 16 hours at 37°C. They were dried, examined by field emission scanning electron microscopy and their intracrystalline proteins analysed by SDS-PAGE and Western blotting for osteopontin (OPN) and prothrombin fragment 1 (PTF1).
RESULTS: Irrespective of protein concentration, all crystals that had not been subjected to proteolytic digestion had smooth, surfaces devoid of erosion and pitting. Crystals precipitated at protein concentrations of 0 and 0.05 and 0.1 mg/L and treated with protease, were also smooth. In contrast, protease-treated crystals deposited at concentrations of 1 and 5 mg/L showed significant surface erosion and degradation, with both effects being considerably more marked in the latter. Western blotting confirmed that the amount of intracrystalline OPN and PTF1 increased in relation to the concentration of added crystal matrix, indicating that the extent of crystal damage induced by protease correlated directly with the amount of protein interred into the mineral.
CONCLUSION: The vulnerability of urinary CaOx crystals to proteolytic attack depends upon the ratio of protein to the amount of mineral precipitated. If urinary concentrations of proteins are too low to ensure that intracrystalline proteins are distributed from the crystal core to the surface, the structure will be enveloped in a solid shell of homogeneous mineral that will resist invasion by intracellular proteases and consequently, be more refractive to comminution, removal or dissolution.

A-37
ANALYSIS OF BONN RISK INDEX IN CALCIUM OXALATE STONE FORMERS

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AIMS: To assess the value of Bonn Risk Index in Calcium Oxalate stone formers before and after stone removal.
METHODS: Twenty four hours urinary samples were collected from 38 patients with Calcium Oxalate stones, 23 age matched siblings and 22 of the 38 patients one month after stone removal with dietary and medical interventions. BRI was estimated in 2 ml of native urine at 37°C. Ammonium Oxalate 40 mmol/L was added at minute interval with constant mixing in 0.050 ml increments and absorbance measured at 620 in spectrophotometer. Nucleation was recorded with the increase of absorbance. Ionic Calcium was measured by an Ion selective electrode. BRI was calculated by the formula: BRI = [Ca + 2] mmol/L / [Ox–2]. BRI > 1/L was taken as risk and BRI of < 1/L as low to no risk for stone formation.
RESULTS: The mean BRI of 38 patients was 2.4 ± 1.8/L as compared to siblings where BRI was 0.6 ± 0.8/L ($P < 0.002$). BRI was done post operatively in 22 patients with a mean value of BRI 1.4 ± 1.4/L. This reduction was statistically significant ($P = 0.03$). Mean urinary calcium concentration of patients was 1.4 ± 0.8 mmol/L vs 0.5 ± 0.3 in siblings ($P = 0.0003$). Mean Oxalate added for nucleation in patients\' urine was 0.7 ± 0.3 vs 1.2 ± 0.5 mmol/L in siblings ($P = 0.001$).
CONCLUSIONS: BRI is a valuable tool to assess risk of Calcium Oxalate stone formation and clearly differentiates stone formers from non-stone formers. It can be used to monitor effects of dietary and medical interventions.

A-38
TOTAL ANTIOXIDANT STATUS AND LIPID PEROXIDATION IN NEPHROLITHIASIS

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AIMS: Occurring at low levels in all cells, the peroxidation process involves the oxidative conversion of unsatured fatty acids to lipid hydroperoxides togheter with a variety of secondary metabolites. An excess of lipid peroxidation is thought to be involved in the pathogenesis of a large number of diseases. For nephrolithiasis, current research suggests that lipid peroxidation could result in tubular damage which is thought to initiate the formation of calcium renal stones. This process is counteracted by the antioxidant system which is composed of a number of enzymes and small molecules acting in concert against the effect of peroxidation. The aim of this study was to measure malondialdehyde (MDA) as an indicator of lipid peroxidation togheter with total antioxidation status (TAS) in renal stone formers and controls.
METHODS: We considered three groups of subjects: 19 calcium stone formers (age 28–68 yrs), 11 uric acid stone formers (45–80 yrs) and 24 healthy controls (33–56 yrs). A blood sample was taken from each of subjects and a 24 hour dietary recall was used to evaluate their diets.
RESULTS: Levels of MDA were found to be significantly higher in calcium renal stone formers (1.18 + /–0.30 micromol/L) compared to uric acid stone formers (0.93 + /–0.28) and controls (0.86 + /–0.41). When a subgroup of younger calcium renal stone formers (28–37 yrs) was considered, MDA levels (1.12 + /–0.25) remained significantly higher than in controls of the same age group (0.78 + /–0.33). No significant decrease of TAS levels was found in calcium renal stone formers and no correlation of TAS levels with intakes of main nutrients were observed.
CONCLUSIONS: Renal stone formation may be related to increased rates of lipid peroxidation. In fact renal epithelial cells are particularly susceptible to oxidant injury given their high metabolic rates. On the other hand the oxidatively challenged cells bind and retain calcium oxalate crystals.

A-39
URODYNAMIC FACTORS THAT INFLUENCE THE STONE DISEASE TREATMENT RESULTS

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AIMS: The problem of pathogenesis of urolithiasis includes two main groups of factors – metabolic and urodinamic disorders. To clarify the role of the ureteral contractile function disorders that can influence the stone disease treatment process is the aim of this paper.
METHODS: Ureteral peristalsis was investigated before treatment by multichannel impedance ureterography with special electrode inserted into the upper urinary tract. Computer program was used for monitoring its contractile function. Investigated patients (9) had renal stones and different degree of the upper urinary tract obstruction. They were cured by percutaneous pyelonephrolithotomy, stent indwelling, ESWL. Long-term follow-up was evaluated in two years period.
RESULTS: Contractile function of the ureter was essentially disturbed in all patients despite of the stone size and the degree of obstruction. High amplitude of the upper ureteral contractions was registered in 23% of patients. Fast simultaneous upper ureteric contractions of low amplitude were seen in 45% of patients. Retrograde peristaltic waves were seen in 17% patients. Weak peristaltic appearance and high tone which was characteristic for the functional stricture was registered in the whole ureter of 1 patient and only in the lower ureter of 2 patients. Results showed that the patients with high ureteral tone had the recurrent stone

formation, the repeated ESWL were provided in them. Inflammatory complications were seen in the patients with high-amplitude and retrograde contractions, especially appearing in the upper ureter. Patients with functional ureteric strictures needed the supplementary upper urinary tract drainage procedures.
CONCLUSIONS: The contractile function of the ureter is the vastly important factor for stone passage after treatment and the prognosis for the stone recurrence.

A-40
HOLMIUM LASER TRANSFECTION OF RENAL TUBULAR CELLS FOR CAUSAL TREATMENT OF CYSTINURIA

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AIMS: Cystinuria is a rare hereditary disease resulting in recurrent stone formation and the need of repeated invasive interventions. As medical metaphylaxis is often insufficient, renal function gradually deteriorates. So far, two responsible genes have been identified and gene therapy may offer a causal treatment of this disease. Our aim was to evaluate the possibility of laser transfection of proximal tubular cells.
METHODS: LLCPK1 cells were grown in T-75 flasks until a confluence of 70–80% was achieved. After trypsinization, centrifugation and resuspension in FCS, the cells were counted. Concentration was adjusted to 3.5 million/ml. 1 ml cell suspension and 200 µg/ml vector pEGFPN1 as a reporter gene (QIAfilter Plasmid Giga Protocol) were mixed. A Holmium:Yttrium-Aluminium-Garnet laser (Ho:YAG; Wavelight Lasertech, Germany) with a 0.220 µm fibre was used for transfection. Energy was set to 2000 mJ and 10 Hz. FACS analysis (FACScalibur, BD Biosciences, Belgium) and fluorescence microscopy (Leica, Germany) were performed to determine the transfection rate.
RESULTS: Laser application on LLCPK1 cells resulted in energy-dependent transfection with GFP. A maximal dose of 200 pulses led to a transfection rate of about 35%. Higher doses up to 500 pulses resulted in decreasing transfection rates, obviously due to cell damage.
CONCLUSIONS: Our investigations demonstrate that transfection of renal tubular cells by Ho:YAG laser application is possible in an energy-dependent manner. The Ho:YAG laser, which is practical for use in flexible renoscopes, has strong ballistic effects. Endoscopic in vivo transfection in patients with cystinuria is therefore conceivable, but must be confirmed in further investigations.

A-41
CORRELATION BETWEEN ASYMPTOMATIC MICROSCOPIC HEMATURIA AND URINARY LITHIASIS

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AIM: Asymptomatic microscopic hematuria (AMH) is a common cause of urologic referring, that may be due to a variety of underlying conditions ranging from insignificant to potentially life threatening lesions. We survey the underlying causes of AMH in the patients refered to our clinic.
METHODS: We study all of the patients refered to Urologic clinic that hematuria was found in their urine incidentally from March 20 2000 to March 20 2001. These patients had no urologic symptoms or signs.investigations useful in the diagnosis were through u/a, u/c, cbc, serum urea and creatinine, coagulation tests, sonography and IVU, CT scan, cystoscopy and ureteroscopy have been selected for the patients that were not diagnosed through the primary evaluation.
RESULTS: 167 patients evaluated for AMH. 78 (46.7%) were males and 89 (53.3%) were females.in 148 patients of 167 patients that have been evaluated, one etiology for AMH was obtained (88.6%). In 19 patients (11.6%) no pathologic cause was found that from these 31.6% were males and 68.4% were females. The most common cause of AMH in 0-19 y/o, 20-39 y/o, 40-59 y/o, and in 60 y/o and over age group were: UTI(28.6%), stone (46.4%), stone (48.1%) and tumour (31.3%) respectively.
CONCLUSIONS: Etiologies of AMH are: Stone, UTI, and bladder tumour, respectively. The most common cause of AMH are urinary stone and UTI in males and females, respectively. The importance of diagnosis and follow up in AMH is very high , because in the great percent of our patients one etiology for AMH have been found (88.6%).

A-42
THE VALUE OF HEMATURIA TESTING WITH DIPSTICK ANALYSIS IN

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AIMS: In the diagnostic algorithm of renal colic, one of the most important steps is the search for hematuria. Recent studies suggest that hematuria may not be a consistent finding in cases of renal colic, reporting a negative urinalysis for blood in 16–20% of these patients. We tried to investigate whether the same results appear when a sample of urine is tested with a urine dipstick at the time of the examination.
METHODS: Data from patients with suspected renal colic, examined at the emergency department of our hospital from September, 1, 2001 to August, 31, 2002 was reviewed. Only patients with a KUB film positive for stones >3 mm, or an ultrasound showing obstruction in the urinary tract -or both exams positive-were included in the study. All patients collected a urine sample, which was immediately tested with a urine dipstick, and in most cases with a formal rinalysis. Patients with negative imaging studies or with significant alternative diagnoses were excluded from the study. Dipstick analysis was considered positive when, at least, traces of blood were found. The sensitivity of dipstick analysis was calculated.
RESULTS: 609 patients were included in the study, with a mean age of 49.2 years (range from 18 to 92). In these patients, the dipstick analysis was positive for hematuria in 566/609 (92.9 %). A urinalysis was performed in the same urine sample in 17.8 % of the patients- mostly in cases where the results of dipstick analysis were negative or unclear- and verified the presence of hematuria.
CONCLUSIONS: The sensitivity of hematuria on dipstick analysis of urine in cases of renal colic, using the presence of stone(s) in the urinary tract as the reference standard, was 92.9 %. The presence or absence of hematuria in a urine specimen examined at the emergency department has a high degree of accuracy in detecting renal colic, and should be used as a first-line examination with a low cost. However, in cases where the analysis is negative or unclear, a microscopic analysis should follow on the same sample.

A-43
THE COST OF DIAGNOSIS IN PATIENTS WITH UROLITHIASIS

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AIMS: To determine the diagnostic cost of the patients who are following up with urolithiasis in our clinic to design the definitive therapy.
METHODS: 103 patients, followed with urolithiasis between the dates of February 2001 and December 2002, were evaluated retrospectively. The relation between total diagnostic cost needed for definitive therapy and patient age, sex, presence of urinary dilatation, stone localization and size was evaluated. The costs were calculated in euro. In statistical analyses independent samples t test and one-way ANOVA were used. The dates were showed mean (standard deviation).

RESULTS: The diagnostic costs in euro for age groups (0-18, 19-50 and + 50), sex (male and female), presence of urinary dilatation (positive and negative), stone localization (renal, upper and lower ureter, and bladder) and stone size (< 10, 10-19 and > 20 mm) were found as 148 (55), 149 (64) and 141 (60) ($p > 0.05$); 142 (62) and 155 (58) ($p > 0.05$); 160 (58) and 115 (55) ($p < 0.001$); 150 (60), 119 (56), 166 (60) and 101 (45) ($p < 0.05$); 131 (73), 158 (54) and 148 (54) ($p > 0.05$),and respectively. The average cost was 147 (60) €.
CONCLUSIONS: While the patient age, sex and stone size had no effect on the diagnostic cost, the presence of urinary system dilatation statistically was increased it. When we regard to the stone localization, the diagnostic cost was increase in the lower ureter but it was also statistically decrease in bladder. In consideration of high morbidity and increased complication rates because of delayed diagnosis, we believe that the mean diagnostic cost for urolithiasis isn't expensive, and so required diagnostic instruments are not begrudged from these patients.

A-44
THE EFFECTS OF CRYSTALLISATION METHODOLOGY ON CALCIUM OXALATE NUCLEATION AND GROWTH

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AIMS: The range of techniques used to investigate the interactions between urinary macromolecules and calcium oxalate (CaOx) is extremely diverse. Often, differences in CaOx crystal morphology and hydromorph stabilisation are attributed to urinary macromolecules rather than the method employed. The aim of this study was to investigate how the crystallisation procedure may also affect crystal properties.
METHODS: Six 24-hr blood free samples from healthy controls were combined. Six protocols of Ca and oxalate (Ox) additions were simultaneously applied to this pooled urine. Following incubation, crystals were harvested by centrifugation, rinsed in methanol, dried and stored at 4°C and analysed using a range of techniques.
RESULTS: Crystals grown in high supersaturation (SS) CaOx in which the Ca and Ox were added slowly were smooth and irregular with no common distinct morphology and found to be CaOx monohydrate (COM). High SS urine in which Ca and Ox were added immediately consisted of aggregates of CaOx dihydrate (COD) and CaOx trihydrate (COT). Addition of 6mM Ca and 3mM Ox produced irregular distorted dipyramids when the oxalate was added at the start of the experiment, and regular dipyramids when the oxalate was added as three separate loads at hourly intervals. A majority were COD, with a small amount of COM. At the lowest SS tested, 2mM Ca and 3mM Ox, platy rhomboid crystals were produced when the oxalate was added at the start of the experiment and blocky pinacoidal crystals when it was added as three loads at hourly intervals. In both cases the crystals were almost pure COT.
CONCLUSIONS: CaOx hydromorphs and their morphologies varied greatly when either oxalate load varied or when different oxalate addition timings were used. The purpose of growing CaOx in urine is usually to study the effects of macromolecules on growth and morphology. Here we show, by using the same urine throughout, that typical experimental protocols result in very different products. Therefore many morphology/phase differences seen in different CaOx experiments may be attributable to physical growth conditions and not necessarily urinary macromolecules.

A-45
EFFICIENCY OF HYDRATION, DIETARY MANAGEMENT AND K-CITRATE IN THE PREVENTION OF STONE RECURRENCE IN CHILDREN

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AIMS: Taking the high stone regrowth and recurrence rates after certain types of management in pediatric urolithiasis into account; in this study we aimed to evaluate the preventive role of water intake, dietary management and K-citrate therapy on the stone regrowth as well as recurrence rates in children with stone disease.
METHODS: Totally 30 children were included in to the study program. Age range was between and years. (mean years). Children were divided into three groups and children in each group received different forms of preventive measures (water in take, dietary management and K-citrate medication). Apart from spontaneous passage, all children were comparatively evaluated for the regrowth and recurrence rates under afroementioned treatment modalities. Children were followed for a minimum period of 48 months.
RESULTS: Comparative evaluation of follow-up data demonstrated following findings: High water intake was found to be most effective method in the prevention of stone regrowth and recurrence. While only 1 child did demonstrate stone regrowth, no recurrence could be documented in these children.Study results with respect to certain parameters in each group are given in Table 1

	Residuel stone	Stone recurrence	Stone regrowth	Stone free	Spontaneous passage
Group I	2/10	–	2/10	8/10	2/10
Group II	3/10	2/10	1/10	5/10	–
Group III	2/10	–	–	6/10	3/10

CONCLUSIONS: There is a great choice of different treatment modalities regarding the management of stone formers for metaphylaxis. The physicians have to decide about the mode of treatment based on metabolic evaluation, stone analysis data as well as frequency of stone events. Among the treatment alternatives evaluated in our study, we could demonstrate that high fluid intake should be the first general advice for stone formers in the prevention of stone recurrences. However, we believe that a sufficient dietary advice should also be added high fluid intake regimen in an attempt to get satisfactory results.

A-46
EFFECTS OF SHOCK WAVE LITHOTRIPSY ON PLASMA AND URINARY CONCENTRATIONS OF NITRIC OXIDE AND ADRENOMEDULLIN

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AIMS: Despite its clinically proven effective and successful results; ESWL has been found not to be completely free of side effects. Clinical and experimental studies have demonstrated a number of morphologic and functional alterations after shockwave application in the treated kidneys. In this prospective clinical study, we aimed to determine whether Extracorporeal Shockwave Lithotripsy (**SWL**) has any spesific effect on plasma as well as urinary Nitric Oxide (**NO**), Adrenomedullin (**AM**) concentrations and to investigate whether these two peptides can be used as a marker for detecting shockwave-induced renal vascular and functional alterations.
METHODS: A total of 20 patients with renal pelvic or caliceal stones $\leq$ 2 cm undergoing anesthesia- free SWL without auxiliary measures were included in this study program. The plasma and urinary concentrations of NO and AM were measured by specific methods described in the literature before and 7 days after SWL. Relative urinary NO and AM concertrations were expressed as the ratio of both peptides to creatinine (mg. cre) levels. While the median plasma NO levels before and after SWL procedures were 29.5 and 40.0 μmol/mg.cre respectively ($P < 0.01$), these values

were found to be 0.235 and 0.265 μmol/mg.cre for urinary levels ($p > 0.05$). Again while the median plasma AM values before and after SWL were 20.14 and 31.22 pmol/mg.cre respectively ($p < 0.01$), median urinary levels of AM were detected as 14.06 and 21.56 pmol/mg.cre before and after the procedure ($p > 0.05$).
RESULTS: With respect to the baseline and 1-week plasma levels of both markers (NO and AM) there was an increase which was found to be statistically significant ($p < 0.01$). On the other hand, comparative evaluation of urinary levels of both NO and Adrenomedullin levels before as well as 1-week after SW application revealed an increase related with both markers which was found to be statistically insignificant ($p > 0.05$).
CONCLUSIONS: Increase in plasma levels of both NO and AM may suggest an intrarenal regulation of ERPF by these two peptides in an attempt to relieve the possible adverse effects of transient ischemia occuring during SWL.

A-47
EVALUATION OF ADRENOMEDULLIN EXPRESSION IN RENAL PARENCHYMA SUBJECTED TO SHOCKWAVE LITHOTRIPSY

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AIMS: Despite its safety and efficacy, the short- and long-term adverse effects of high-energy shock waves (HESWs) on renal morphology and function have yet to be elucidated. In contrast to renal blood flow evaluation after shock wave treatment, ischemic development at tissue level has not been well evaluated to date. As a renoprotective peptide Adrenomedullin (AM) a potent vasorelaxing, natriuretic and cell growth–modulating pepide, is thought to act as an autocrine/paracrine regulator in renal glomeruli and tubules. In this experimental study, renal parenchymal adrenomedullin levels were assessed in an attempt to evaluate the protective effects of AM against the adverse reactions of transient ischemia occuring during SWL in rabbit model.
METHODS: Eighteen white New Zealand rabbits, each weighing 3–5 kg were included in the study program. The animals were divided into three main groups and varying numbers of shock waves (1000–1500–2000) were applied to the same kidney of all animals, under fluoroscopic localization. Ketamine HCl anesthesia was administered (15–20 mg/kg) and all of the procedures were performed with Multimed 2000 lithotriptor. Untreated contralateral kidneys were evaluated as control kidneys. Following HESW application, treated and untreated kidneys of each animal were removed through bilateral flank incisions under Ketamine HCl anesthesia after 24 h and 7 days, respectively. Tissue adrenomedullin levels were assessed with immunohistochemistry by using the method described in the literature.
RESULTS: During early follow-up period (24-hour) both treated and untreated kidneys demonstrated evident degree of positivity. The number of tubules stained with adrenomedullin increased as the number of shock waves are increased. Again the positivity of Adrenomedullin was closely related to the number of shock waves applied. As the number of shock waves increased, reduction became evident possibly due to a higher degree of tissue damage. On the other hand again contralateral kidneys also demonstrated a certain degree of positivity, although it was not as evident as the treated kidneys. Assessment of tissue adrenomedullin levels after 7 days in both kidneys demonstrated moderate or limited degree of positivity in the treated kidneys. Limited or no positivity could be demonstrated in contralateral kidneys during this period.
CONCLUSIONS: As a hypotensive and renoprotective peptide, increase in AM levels in renal parenchyma subjected to shock waves (as shown in our study) suggested the possible regulatory effect of this peptide as a response to transient ischemia occuring during SWL.

A-48
EFFECT OF CITRATE ON NUCLEATION & CRYSTAL GROWTH OF CALCIUM OXALATE MONOHYDRATE

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AIMS: The approach in this integrated project involves several tasks such as role of biopolymers in the crystallization process, nucleation and crystal growth studies, particle/particle interaction measurements, particle/cell interaction measurements and characterization, aggregation/dispersion characterization studies, nucleation and crystal growth rates, dispersion characteristics of calcium oxalate monohydrate (COM) crystals under the urinary environment.
METHODS: 1. Measurements of Weight and Size: Distribution of COM Crystals: In this phase of research, the effects of three variables, including citrate, oxalate, and protein concentrations were studied using statistical experimental designs.The response variables included weight of formed crystals and their size distribution. Laser light scattering technique was used for particle size distribution measurements.
2. Absorbance Measurements: After mixing solutions containing the required supersaturation and concentration of citrate, light absorbance was measured immediately using (Perkin/Elmer Lambda 800 UV/VIS) Spectrophotometer. The absorbance values were plotted as a function of time and the induction times were estimated, which were used to estimate the interfacial energy of COM, critical nucleus size, and crystal growth rates of COM under different conditions.
RESULTS: The results showed that, the induction time decreased exponentially with increasing the supersaturation ratio. Interestingly, with addition of the citrate, the crystals mean and median diameters were found to decrease. The inhibition efficiency was calculated and correlated with the thermodynamic properties of the system.
CONCLUSIONS: Citrate increased the induction time at all the supersaturation ratios studied. Nucleation rates were increased in the presence of citrate as compared to the baseline. The critical nucleus diameter and hence size was smaller with addition of citrate. The crystal growth rate was generally lower at lower supersaturation ratio with and without the addition of citrate. On the other hand, high oxalate levels increased crystal size. No effect of Mucin on nucleation/crystal growth could be observed in the system studied.

A-49
URINE CITRATE AS AN INHIBITOR OF CALCIUM STONE FORMATION IN IRANIAN PATIENTS

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AIMS: The aim of this study was to determine urinary citrate level and hypocitraturia prevalence in calcium stone formers.
METHODS: From Jan. 2002 till October 2002 72 patients (51 males and 21 females), with a mean age of 37 years who had at least two episodes of calcium stone formation, enrolled in our study. Their 24-hour urine citrate, calcium, uric acid, oxalate and Mg were measured.
RESULTS: Mean 24-hour urine citrate was 139.2 (± 165.1) mg. We found hypocitraturia in 90.2% of patient. In 65 patients who had hypocitraturia prevalence of other metabolic abnormalities were as follows: 36.9% hypercalciuria, 13.8% hyperoxuluria, 12.3% hypomagnesuria and 13.8% hyperuricosuria. In 46% of hypocitraturic patients, there was not any other metabolic abnormalities. There was a significant positive correlation between urine citrate and urine calcium and oxalate.

CONCLUSIONS: We found hypocitraturia and isolated hypocitraturia more than whatever reported previously in the literature. Coincidence of hypocitraturia and other metabolic abnormalities shows that stone formation is a multifactorial process. Significant positive correlation between urine citrate and urine promotors of stone formation (calcium, oxalate), suggests the probability of increased excretion of urine citrate in response to elevated level of urine promotors of stone formation.

A-50
THE INHIBITORY EFFECT OF ORANGE, LEMON AND GRENADE JUICE ON IN-VITRO CALCIUM OXALATE CRYSTALLIZATION

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AIMS: The study of the inhibiting effect of some natural substances on oxalocalcic crystallization highlighted several natural inhibitors such as the juices, plants or others. We tested various solutions in presence and absence of the juices in order to evaluate their effects. In parallel, we used a microscope to follow the nature and the frequency of the formed crystals.
METHODS: **a-Turbidmetric method**
The model used to follow the calcium oxalate crystallization in aqueous solution supersaturated with 37°C.
b-Microscopy
The morphology and the nature of the crystals were examined by microscopy with light polarized at the court of crystallization.
RESULTS: In the presence of all compounds studies, on the kinetics of CaOx crystal growth was proportional to the concentration of different juices. Within a 10% of juice lemon, the percentage of inhibition is 34.7%. The effect of juice orange was evaluated. The slope of CaOx crystal growth decreased for the two types of juices. It passed from 10% without inhibitor to 2% with the presence of orange juice to 0.9% for lemon juice. On contrary, we didn't observe any a inhibition effect of grenade juice. In the synthetic urine, the inhibiting effect of the lemon juice with respect to the calcium oxalate crystallization was evaluated. We notice that the percentage of inhibition increases gradually with the concentration into citron. In the first minutes, and without inhibitors, we observed a quasi total frequency of small crystals of mono hydrated calcium oxalate (C1) and some aggregates of C1, 4 minutes later, we observed some crystals of dihydrated calcium oxalate (C2) and trihydrated (C3). In the presence of inhibitors, the distribution was not affected. Always C1 are most frequent, however one noticed a light reduction in the frequency of these various crystals.
CONCLUSIONS: With a weak concentration, the lemon juice is endowed with an inhibiting capacity significant more important than orange juice. On contrary, we didn't observe any a inhibition effect of grenade juice. Their activities will be evaluated in-vivo in order to judge their potentiality and their interest private clinics.

A-51
OSTEOPONTIN HAVE A PROTECTIVE EFFECT OF RENAL EPITHELIAL CELLS AGAINST EXCESSIVE OXALATE EXPOSURE

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AIMS: Kidney stone formation is the result of a cascade of events, including cell injury, nucleation, growth, aggregation and retention of crystals in the renal tubules. We previously reported strong expression of osteopontin (OPN) on renal tubular cells in the stone-forming kidney, and importance of OPN in crystal-cell interaction. Excess oxalate ions (OX) stimulate an array of responses inducing localized injury and inflammation in the kidneys. Oxalate-induced OPN expression in kidney cell lines is reported, and we predict a protective effect of osteopontin against cell injury. In the present study we examined the biological consequences of inhibition of OPN expression at the translational level on the cell injury from oxalate.
METHODS: We synthesized antisense OPN expression vector (pTet-OPNas) using the Tetracycline-Regulated Expression System. The pTet-OPNas was constructed using a mouse OPN cDNA sequence in an inverted (antisense) orientation. Two clones (NRK-52E/ASs) were identified by transfection of pTet-OPNas into NRK-52E cells, and they showed a marked reduction of OPN synthesis in the absence of tetracycline. Confluent cultures of NRK-52E/ASs were exposed to OX (125 to 4000 micromol/L), for 1 to 72 hours under serum free conditions, with or without tetracycline. Cell death was determined by the MTT assay.
RESULTS: NRK52E cells express OPN mRNA and protein, and the level of their expression significantly increases following treatments with OX in a time and excessive concentration dependent manner. The NRK-52E/ASs with depressed OPN synthesis by the expression of antisense OPN were injured dependent on OX concentration, more severely than intact NRK-52E cells and tetracycline-treated NRK-52E/ASs by MTT assay.
CONCLUSIONS: The results suggest that OPN had a protective effect of renal epithelial cells against excessive OX exposure. We suggest that even though OPN expression protects renal epithelial cells from excessive OX concentration in urine, OPN plays a role in the adhesion of CaOX crystals to renal tubular cells. We suspect that in this way OPN changes its role in stone formation from defense to formation.

A-52
STUDIES OF GLYCOSAMINOGLYCANS WITH THE MSMPR CRYSTALLIZER & ITS IMPLICATIONS ON RENAL STONE DISEASE

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AIMS: Acidic matrix macromolecules, present in many mineralized tissues, are thought to be involved in controlling crystal formation. This work is aimed at studying the major family of acid macromolecules found in urine, the glycosaminoglycans (GAGs) that may control crystal formation from calcium and oxalate ions in the renal tubular environment.
METHODS: To conduct the investigation of the effect of the macromolecules on the crystallization of calcium oxalate – a Mixed Suspension Mixed Product Removal (MSMPR) crystallizer was established. Two identical MSMPR vessels were set-up to contain 20 mL of either artificial urine or ultrafiltered urine (clarified human urine (pH 5.8) prepared at a nominal cut-off of 10 kDa) with the other vessel serving as a control. Using this system we could determine nucleation rate and the growth rate of calcium oxalate crystals using the Coulter Multisizer counter.By introducing various concentrations (similar to that found in human urine) of GAGs such as chondroitin sulphate (CS), heparan sulphate (HS) and hylauronan (HA) into the test vessel – we could determine the effect of these components on the crystallization of calcium oxalate in terms of nucleation and growth rate.
RESULTS: It was found that HS enhanced nucleation rate and suppressed the growth rate on crystallization. Dermatan sulphate inhibited the growth of crystal but enhanced nucleation at low concentration. The CS and HA gave contradictory results between low and high concentrations. Chondroitin sulphate promoted growth at low concentration but not in high concentration. The reverse was seen for HA and at high concentrations, it suppressed the nucleation and promoted the growth of calcium oxalate crystallization. These results are consistent with our reported findings using another method for the crystallization of calcium oxalate.
CONCLUSIONS: This suggests that stone-formers excrete significant proportions of crystal-active HA not normally found in urine and that the urinary HA may be a consequence of active turnover of renal epithelial tissue in the diseased state.

A-53
CHINESE HERBAL MEDICINES AND THEIR EFFICACY IN TREATING RENAL STONES

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AIMS: To treat kidney stones herbally, anti-lithics are used to "dissolve" the stones or aid their passing and to guard against further deposits. Diuretic action is also needed to increase the amount of fluid going through the kidneys and thus to flush out deposits. Herbal medicines contain diuretic plants that increase excretion and flow of urine. Previous results based on clinical studies have shown that kampou medicine (from China) such as Takusya (Alismatis Rizoma), Chorei (Polyporus), Bukuryo (Hoelen), Kasseki (Talcum Crystallium), Kinsensou (Desmodii Herba) and Kagosou (Purunellae Spica) could be used to inhibit calcium oxalate crystallization. However, the pharmacodynamics and in-vitro effects of such medicines have not been established.
METHODS: Six herbal medicines were selected based on their use in treating stone disease both locally and in China. A 96-well plate was used to study oxalate-induced turbidity in artificial urine and to evaluate the effectiveness of the extracts of different herbal medicines on calcium oxalate crystallization. The metastable limit was determined and the nucleation rate was derived from 12 minute time-course measurement of turbidity at OD 450 nm. Phase-contrast microscopy was used to visualize the crystals.
RESULTS: The results showed that with increasing concentration of herbal extract, smaller calcium oxalate crystals were observed. Overall, the herbal extracts were found to promote nucleation of calcium oxalate crystals while at the same time decreasing the size. It can be inferred that the herbal medicines contain substances that inhibit calcium oxalate crystal growth and aggregation.
CONCLUSIONS: These properties of Chinese herbal medicines might be beneficial in preventing renal stone formation and aid the stone-formers to expel or discharge the crystals easily.

A-54
THERAPEUTIC INHIBITORS OF MACROSCOPIC STONE GROWTH IN VITRO

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AIMS: There has been recent interest in the use of medical treatments for the prevention of stone recurrence following minimally invasive procedures. European multi-centric trials using citrate following ESWL are currently in progress. Phytate has also been shown to be an inhibitor of Calcium Oxalate crystal formation. The aim of these experiments was to use a technique of growing macroscopic stones in vitro to test the effects of these two agents.
METHODS: Stone fragments of approximately 100 mg were suspended in crystallization chambers under simulated physiological conditions. Artificial urine supersaturated with calcium oxalate was pumped through the chambers continuously. In the citrate experiment, stones were grown either in 6 mM citrate, or in the control concentration of 2 mM. For the phytate experiment, stones were grown in 6 μM of Phytate or with no phytate for the control. To simulated biological urine, the experiments were repeated with the inclusion of urinary macromolecules(UMM). The growth rate of the stones were determined by daily recordings of the stone weight. pH and Ca^{2+} trends within each chamber were also recorded throughout the experiment.
RESULTS: *CITRATE EXPERIMENT* – After 30 days the mean stone weights were 141.6 mg (+/−4.1 s.e.) for stones grown in 6 mM citrate and 294 mg (+/−28.8 s.e.) for those grown in 2 mM citrate ($p < 0.001$). With the inclusion of UMM, the mean stone weights were 127.2 mg (+/−3.9 s.e.) and 169.9 mg (+/−10 s.e.) for 6 and 2mM citrate concentrations respectively after 33 days. ($p < 0.001$).
PHYTATE EXPERIMENT – After 26 days, the mean stone weights were 112.53 mg (+/–2.01 s.e.) for stones grown in 6uM phytate and 218.34 mg (+/–19.38 s.e.) without phytate.
CONCLUSIONS: These results show that the commonly accepted inhibitory effect of citrate and phytate on calcium oxalate crystals can be applied to actual stone growth. Physiological urinary concentrations resulted in a significant (> 50%) inhibition. This provides support for the prophylactic use of citrate and phytate in calcium oxalate stone disease.

A-55
URINE MG AS AN INHIBITOR IN IRANIAN CALCIUM STONE FORMERS

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AIMS: The aim of this study was to determine urinary Mg level and hypomagnesuria prevalence in calcium stone formers.
METHODS: From Jan. 2002 till October 2002, 72 patients (51 males and 21 females), with a mean age of 37 years who had at least two episodes of calcium stone formation, enrolled in our study. Their 24-hour urine Mg calcium, uric acid, citrate and oxalate were measured.
RESULTS: Mean 24-hour urine Mg was 99.8 (± 41.8 mg). We found hypomagnesuria in 12.5% of patients. In 9 patients who had hypomagnesuria, prevalence of other metabolic abnormalities abnormalities were as follows: 11.1% hypercalciuria, 11.1% hyperuricosuria 22.2% hyperoxaluria and 88.8% hypocitraturia. We did not find hypomagnesuria as an isolated abnormality. There was a significant positive correlation between urine Mg and urine oxalate, uric acid and calcium levels.
CONCLUSIONS: We found hypomagnesuria more than whatever reported previously in the literature. Significant positive correlation between urine Mg and urine promotors of stone formation (oxalate, calcium, uric acid) suggest the probability of increased excretion of urine Mg in response to elevated level of urine promotors of stone formation. Coincidence of hypomagnesuria and other metabolic abnormalities shows that stone formation is a multifactorial process.

A-56
INHIBITORY ACTIVITY OF URINE FROM BLACK AND WHITE SOUTH AFRICAN MALE SUBJECTS

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AIM: To investigate the inhibitory activity of whole and ultrafiltered urine from black and white South African males.
METHODS: 24 hr urines were collected from 5 black and 5 white healthy males. Urines were ultrafiltered. Metastable limits (MSL) and ^{14}C deposition kinetics (to measure crystal nucleation and growth respectively) were determined. In addition, sedimentation rates (to measure aggregation) of calcium oxalate crystals were determined in the presence of urine from both race groups. Deposited crystals were examined by scanning electron microscopy (SEM).
RESULTS: The metastable limits of blacks were higher than those of whites. There was no significant difference between urine fractions. Sedimentation and ^{14}C experiments did not reveal any significant differences between the race groups. However, SEM showed that the degree of aggregation of calcium oxalate crystals in urines from black subjects was lower than that in whites.
CONCLUSIONS: The higher metastable limits of whites could be attributable to a deficiency of inhibitors in the white race group or the presence of inhibitors in the black group. ^{14}C and aggregation experiments were inconclusive. However, our MSL and SEM results suggest that nucleation and aggregation mechanisms may play a role in the low incidence of stones in black subjects

A-57
INHIBITORY EFFECT OF URINARY ALBUMIN FROM BLACK AND WHITE SOUTH AFRICANS ON CALCIUM OXALATE MONOHYDRATE CRYSTAL AGGREGATION

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AIM: Urolithiasis is extremely rare in South African Blacks. This study was undertaken to compare the in vitro inhibition of COM crystal aggregation by albumin isolated from urine of normal black (BA) and white (WA) subjects relative to each other and to that of commercial human serum albumin (HSA).
METHODS: Albumin was isolated from the urine of healthy black and white South Africans. The purity of each protein was checked using SDS-PAGE and Western blotting. Aggregation inhibition of COM crystals by BA, WA and HSA was studied in vitro using zeta potentials and sedimentation rates. Five independent experiments were performed for each protocol. Commercial HSA was obtained from Sigma.
RESULTS: The negative charge (zeta potential) of COM crystal slurries increased in the presence of all three proteins. Values followed the sequence BA (–19.3 mV), WA (– 16.9 mV), HSA (–14.2 mV) and COM control crystals (–13.0 mV). The percentage inhibition of COM crystal aggregation by HSA and WA, as determined from the sedimentation experiments, was not significantly different, (31.3% and 35.1% respectively). However, inhibition of COM crystal aggregation by BA was significantly higher (50.6%).
CONCLUSION: The results of the zeta potential measurements demonstrate that BA carries a more negative charge than WA. As such, the former will exert stronger repulsive forces and is likely be a superior inhibitor of crystal aggregation. Our sedimentation data have confirmed this to be true. Thus we conclude that albumin may be a key factor in providing the South African black population with its apparent stone immunity, by virtue of its superior inhibitory action towards COM crystal aggregation.

A-58
INTRACRYSTALLINE UPTF1 IN STONE-PRONE & STONE-FREE SOUTH AFRICANS: DOES IT DECIDE THEIR FATE?

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AIM: Black South Africans' apparent immunity to kidney stone formation compared with a 12% incidence amongst whites is unexplained. This study investigated the relationship between calcium oxalate (CaOx) urine crystal morphology and a potent crystallisation inhibitor, urinary prothrombin fragment 1 (UPTF1), to ascertain whether such a relationship might provide insight into the black group's low stone incidence.
METHODS: Calcium oxalate monohydrate (COM) and dihydrate (COD) crystals were precipitated from black and white subjects' urine by the adjustment of the calcium concentration. Crystal structures were confirmed by x-ray powder diffraction and scanning electron microscopy. The UPTF1 content of the crystals was determined by western blotting. Crystals prepared from urines with unadjusted calcium concentrations were included as control samples.
RESULTS: Crystals from the black and white group's control samples were composed of mainly COM and COD respectively. Pure COM and COD crystals were prepared from both race groups' urine by adjustment of the calcium concentration to 0.5 and 12 mM respectively. A significant amount of UPTF1 was included in COM with undetectable amounts in COD crystals. The black group's COM crystals contained more UPTF1 per mg CaOx than those of the white group's.
CONCLUSIONS: The inclusion of UPTF1 in COM rather than COD may be due to the unique crystal structure of COM and the conformation that UPTF1 adopts at lower calcium concentrations. The greater amount of UPTF1 in the black group's COM suggests that their urine composition may be more favourable for UPTF1 binding than the whites. Also, the greater amount of intracrystalline UPTF1 from the black group may further promote the dismantling of crystals by the action of urinary proteases and thus play a protective role.

A-59
IDENTIFICATION OF THE CITRATE TRANSPORTER NADC-3 IN THE RENAL TUBULE OF THE RAT BY IN SITU HYBRIDIZATION

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AIMS: Citrate excretion is an essential factor in preventing crystallization of calcium salts in the kidney (nephrocalcinosis). In the renal tubule citrate and calcium form soluable complexes. The active transport of citrate is mediated by the sodium-coupled dicarboxylate transporters NaDC-1 and NADC-3 located in the luminal and basolateral membranes of proximal tubule cells, respectively. To study the influence of the citrate transporter NaDC-3 on nephrocalcinosis expression of NaDC-3 mRNA was measured by in situ hybridization (ISH).
METHODS: The experiment was carried out on male Wistar rats (weight: 160 to 200 g). Perfusion fixation of the kidney was made with 2% paraformaldehyde in PBS under general inactivation anaesthesia. Kidney specimens were fixed in 4% paraformaldehyde/0.1 M sodium phosphate buffer and embedded in paraffin. 4 µm tissue sections were dewaxed and hybridized basically. Hybridization mixture contained either the 35S-labeled RNA antisense or sense control NADC-3 probe (500 ng/ml) in 10 mM Tris HCl, pH 7.4/50% (vol/vol) deionized formamide/600 mM NaCl/1 mM EDTA/0.02% polyvinylpyrrolidone/0.02% Ficoll/0.05% bovine serum albumin/10% dextrane sulfate/10 mM dithiothreitol/denatured sonicated salmon sperm DNA at 200 µg/ml/rabbit liver tRNA at 100 µg/ml. Hybridization with RNA probes proceeded at 42°C for 18 hr. Slides were then washed in 2x standard saline citrate. Nonhybridized single-stranded RNA probes were digested by RNase A (20 µg/ml) at 37°C for 30 min. Tissue slide preparations were autoradiographed and stained with hematoxylin/eosin. Radioactive signals were evaluated on the basis of microscopic pictures.
RESULTS: Expression of NaDC-3 could be demonstrated in proximal tubule cells.
CONCLUSIONS: On the basis of the demonstration of the citrate transporter NaDC-3 by means of the ISH technique it is possible now to carry out further investigations on the development of nephrocalcinosis and especially on the significance of the tubular function for the pathogenesis of stone formation.

A-60
METABOLIC EVALUATION OF PATIENTS WITH CaOx UROLITHIASIS AND PREUROLITHIASIS

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AIMS: Prevalence of urolithiasis (UL) in Uzbekistan is 4.5%, and frequency both of UL and pre-urolithiasis (PUL) achieves 16%. Overwhelming majority of these patients has CaOx stones. PUL considered to be a stone-free stage of the disease and subsequently in most cases UL occurs. Optimal way to decrease frequency of UL is preventive therapy at the PUL stage. For this purpose it is necessary to carry out a metabolic evaluation of transition period from PUL to UL to study comparatively a status of urinary risk factors in patients with CaOx UL and PUL.
METHODS: One hundred and fifty patients with CaOx stones were studied: 89 (59.33%) with uncomplicated UL and 61 (40.67%) having PUL. Metabolic evaluation was carried out according to

the Recommendations of Conciliatory Conference ABEUR (Mannheim, 1999). Data of 10 healthy persons served as a control.
RESULTS: In patients with PUL there were found metabolic disturbances (in Ca, Mg, P, pH and D exchange) as hard as in UL. Uric acid (Ur) and citrate (Citr) excretion disturbances are of the greatest interest. In patients with UL excretion of Ur increased to 44% while of Citr it reduced to 40.3% (in comparison with control group). In patients with PUL excretion of Ur and Citr increased to 10.8% and 34.7%, respectively. There was a significant difference between pointed data in PUL and UL ($p < 0.05$).
CONCLUSIONS: The changes In Ur and Citr saturation appeared to be the most important factors of the CaOx stone formation, which must be taken into consideration in the complex preventive measures at the stone-free stage of the disease. Further study of lithogenic indices transformation mechanisms will allow to develop purposeful improvement of metabolic disorders and can become the main point in the prevention of UL.

A-61
TWENTY FOUR HOUR URINE BIOCHEMISTRY IN CHEMOPROPHYLAXIS OF URINARY STONE PATIENTS

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AIMS: This study was performed to assess the utility of the various investigations in deciding chemoprophylaxis. Various biochemical parameters were performed for the identification of metabolic cause for stone formation. These include 24 hour urine estimation for calcium, phosphorus, magnesium, creatinine, uric acid, citrate and oxalate and serum calcium, phosphorus, uric acid, creatinine and magnesium.
METHODS: A random group of 500 patients was studied for the utility of the various parameters for deciding chemoprophylaxis. The utility of the values in deciding chemotherapy/chemoprophylaxis was assessed.
RESULTS: It was observed that elevated urine oxalate (58%), high urine uric acid (47%), high serum uric acid (23%), elevated urine calcium (7%) and various indices were the most useful tools in the decision making of prophylaxis. Other indicators for decision making were relevant only in selective cases with specific metabolic problems like renal tubular acidosis, medullary sponge kidney, aminoaciduria, etc.
CONCLUSIONS: It is concluded from the study that even though it is mandatory to perform all possible biochemical investigations, the clinical relevance may be limited to a few investigations, which are pertinent to the metaphylactic advice advocated by the centre. This gains importance in the light of the fact that the vast majority of drugs administered to patients have many deleterious effects, doing more harm than good. Further, stone disease can be prevented by controlling some of the metabolic abnormalities so that the summation effect can be avoided.

A-62
METABOLIC EVALUATION AND STONE RISK ANALYSIS IN URINARY TRACT STONE PATIENTS

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AIMS: Urolithiasis is the 3rd most common disorder of genitourinary tract following urinary infections and prostate diseases. In our study, 109 urinary tract stone patients who were followed up and treated between May 2000 and January 2002 have undergone a standard metabolic evaluation protocol and according to the results, we revealed a risk profile for each patient.
METHODS: 70 male and 39 female, a total 109 urinary stone patients were involved in the study. Mean age was 44.57. Without restricting dietary and social habits, we applied 24 hour urine analysis, urine culture, blood chemistry and hematologic tests to the patients. We compared the metabolic differences between the patients.
RESULTS: 46 patients (42.2%) were recurrent while 63 patients (57.8%) were primary. 31 patients (28%) have multiple calculi while 78 patients (72%) have unique stone. 59 patients (54%) have stones bigger than 1. cm while 50 patients (46%) have stones smaller than 1 cm. In the general metabolic profile of the patients, we revealed 67% hypocitraturia, 47.7% hyperoxaluria, 12.8% hypercalciuria, 59.6% hypomagnesüria, 15.6% hypophosphaturia, 35.7% hypernatriuria, 14.7% hyperuricuria. In this group of patients we encountered that hypocitraturia, hypomagnesuria and hyperoksaluria were more common and this result was statistically significiant ($p < 0{,}001$). We found that recurrent patients have 80% hypocitratüria and 60% hypomagnesuria. In recurrent patients hypocitraturia has a higher incidence and this is statistically significant. However no statistically significant difference was found among the patients who have stones bigger than 1 cm or smaller ($p > 0.05$). The results of the analysis of 67 stones that were 3% (2) sistin, 13.4% (9) mix, 74.6% (50) ca-oxalate, 3% (2) were struvite and 6% (4) were ca-phosphate.
CONCLUSIONS: In our study, hypocitraturia, hypomagnesuria and hyperoxaluria were found as important risk factors in recurrent stone formation. Patients with multiple calculi and with hypocitraturia, hypomagnesuria and hyperoxaluria are under the risk of recurrent stone formation. The patients should be evaluated carefully for metabolic aspects and stone risk profile to prevent recurrent stone formation.

A-63
METABOLIC DIFFERENCES BETWEEN PRIMARY AND RECURRENT STONE FORMERS: AN ENDEMIC AREA RESULTS

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AIMS: To compare the metabolic profiles of primary and recurrent stone formers in the endemic area of Southeast Turkey.
METHODS: Consecutive 15 adult cases who were firstly diagnosed as a urinary stone (primary stone formers), and 44 adults who had one or more stone recurrences after the first stone diagnosis (recurrent stone formers) were taken to the study. The age, gender, body mass index (weight/height $\times$ height) and daily fluid intake of the patients were recorded. In 24 hours urine samples of all patients, total volume, protein, kreatinine, sodium, calcium, phosphate and magnesium levels; in serum samples, kreatinine, sodium, calcium, phosphate, magnesium and uric acid levels were studied. In statistical analyses, Mann-Whitney U and chi-square tests were used.
RESULTS: Mean ages were 33 (20–65) in the primary stone former group, and 37 (22–74) in the recurrent stone former group ($p > 0.05$). The male to female ratios were 10/5 in the primary stone former group, and 32/12 in the recurrent stone former group ($p > 0.05$). Among the metabolic parameters, only serum sodium (higher in the primary stone formers) and serum uric acid (higher in the recurrent stone formers) levels were statistically different between the primary and recurrent stone former groups.
CONCLUSIONS: According to our study, although our study included limited number of the patients, it can be concluded that one of the probable underlying factors playing role in etiology of the recurrent urinary stone disease may be dietary habits of the inhabitants living an endemic area regarding urolithiasis.

A-64
THE RESULTS OF METABOLIC EVALUATION OF RECURRENT UROLITHIASIS CASES IN KOCAELI

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AIMS: In order to assess the metabolic causes of recurrent urolithiasis in Kocaeli, we evaluated the metabolic analysis of urine collected in 24 hours in patients with recurrent urolithiasis.
METHODS: 80 cases with a history of recurrent urolithiasis (first group) and 26 cases without a history of urolithiasis (second group) have been included in the study. Intravenous urograms are evaluated to rule out predisposing anatomical pathology. The patients who were under medical therapy, which may affect the evaluation, were excluded. 24 hours urine sample analysis has been performed for all patients. The samples were evaluated according to volume, density, calcium, uric acid, citrate, oxalate and sodium excretion. The cut points for metabolic disorders were: Hypercalciuria (B > 250 mg/d, @ > 200 mg/d), hyperuricosuria (> 600 mg/d), hypocitraturia (< 320 mg/d), hyperoxaluria (45 mg/d), increased urine sodium excretion (> 200 mEq/d).
RESULTS: The 24 hours urine analysis of the patients revealed hypercalciurea in 15 (14%) cases (13 in first and 2 in second group), hypocitraturia in 26 (24.5%) cases (22 in first, 4 in second group),hyperoxaluria in 13 (12%) cases (9 in first 4 in second group), hyperuricosuria in 24 (23%) cases (17 and 7 in first and second group respectively). The mean 24 hours urine volume was higher in the study group (1805.56 ± 837.54 versus 1109.17 ± 186.13). Mean value for urine density was 1019 ± 5.66 and 1021 ± 3.95 (group 1 and group 2 respectively). Multivariate analysis using logistic regression showed that hypocitraturia was the only significant etiological factor.
CONCLUSIONS: In our city hypocitraturia has been found as the major etiological factor for recurrent urolithiasis. Hyperuricosuria was also common but it was not statistically significant as predisposing metabolic factor for recurrent urolithiasis.

A-65
CLINICAL SIGNIFICANCE OF URIC ACID DIHYDRATE IN URINARY STONES

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AIMS: Uric acid crystallizes as an anhydrous compound, a dihydrate or a mixture of both. About 20% of uric acid stones contain a significant amount (> 20%) uric acid dihydrate. It is believed that uric acid dihydrate crystallizes under very acid conditions (urine pH < 5.0). The clinical significance of this uric acid compound is not understood so far.
METHODS: n = 85 patients with pure uric acid calculi were studied. Stone analysis was performed using a x-ray diffractiometry. According to the stone analysis, they were divided in two groups: 1. > 20% uric acid dihydrate, 2. < 20% uric acid dihydrate. In all patients the following parameters were examined: age, sex, number of recurrences, body weight, height, body mass index, blood, creatinine, uric acid, calcium, urine, pH-profiles, volume, calcium, uric acid, citrate, ammonia, urea.
RESULTS: Group 1 (> 20% dihydrate) consisted of n = 68, group (< 20% dihydrate) of n = 17 patients. Between these groups, there was a significant difference concerning the number of recurrences and the urinary excretion of calcium. Patients with > 20% dihydrate had a mean number of recurrences of 0.23 +– 0.44 and a calcium excretion of 4.65 +– 2.70 mmol/24h, whereas those with < 20% dihydrate had 1.00 +– 1.29 recurrences and a calcium excretion of 2.97 +– 1.93 mmol/24 h. All the other parameters tested, were not significantly different.
CONCLUSIONS: Our examinations demonstrated for the first time metabolic data in uric acid patients with a significant amount of dihydrate. The comparison between this group and those patients with < 20% dihydrate showed, that the first group is less prone to develop recurrences. This is relevant difference concerning the necessity of metaphylactic measures. We could not confirm that in patients with dihydrate the urinary pH is more acid than in those with insignificant amounts of dihydrate. The higher excretion of the calcium in the dihydrate group may be of pathophysiological relevance and requires further attention.

A-66
VARIATIONS IN TUBULAR CRYSTALLIZATION CONDITIONS

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AIM: To calculate what effect acute changes in plasma composition have on the risk of crystallization in the renal tubules.
METHODS: A model has been made, based on literature data, that describes how composition of the fluid changes as it travels through the nephrons. With this model it was calculated what effect acute changes in plasma composition have on the risk of crystallization in the nephron. Specifically oxalate, phosphate, total calcium and ultrafiltrable calcium were considered.
RESULTS: Seemingly small changes in the load of calcium, oxalate and phosphate that are filtered at the glomerulus cause significant changes in the fluid conditions as they exist in the nephron. After an acid load the release of calcium from the albumin-bound pool leads to a transient significant increase in the filtered load of calcium and thereby of the crystallization risk in the nephron. As the body directly counteracts this rise in plasma free calcium by lowering PTH this effect is very short-lived, minutes. When the acid load is due to a dietary load that and is accompanied by diet induced increases in the filtered load of phosphate and oxalate, a short lived significant increase in the risk of crystallization is the result.
CONCLUSIONS: Transient increases in plasma filtered loads of calcium, phosphate and oxalate can occur due to dietary influences. These changes increase the risk of crystallization also transiently. Because these changes occur in a acute manner, they will be missed when patients are investigated over longer time courses like a day or even an hour. To exactly establish the risk that a specific diet poses to a specific person one should measure the reactions in plasma and urine composition to a dietary load in a short term loading test.

A-67
EVALUATION OF URINARY ELEMENTS IN 100 PATIENTS WITH NEPHROLITHIASIS

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AIMS: For many years interest has been focused on events leading to the renal stone formation. Because of it's high incidence in different groups of people, many investigators have been attempted to find predisposing factors in the formation of renal stones.
METHODS: In this study the relationship between urinary enzymes, gamma glutamyl transpeptidase (GGT) and alkalin phosphatase (ALP) and formation of renal stones was determined, in addition urinary elements and protein (Pr) were also estimated. The study was carried out 100 patients with renal stone and 100 healthy individuals, as control group. The patient's ages were matched with those of the controls. The mentioned parameters were also studied in 10 stone free patients.
RESULTS: In the patients group, the rate of hematuria, pyuria and crystaluria were 52%, 54% and 51% respectively. In 89% of patients at least one the above conditions was observed. It should be noted that crystaluria was also found in 20% of the control group. However the crystaluria in the patients group was significantly higher than that of control group. Comparing serum ALP and GGT activities of patients with those of controls showed marked elevation in the serum ALP. But no significant differences in GGT activities were noticed. Highly significant differences in urinary ALP/cr, GGT/cr and protein/cr between patients and controls were found. Levels of GGT/cr and ALP/cr were higher in patients with bacteriuria comparing with another patients. The

difference between urine GGT/cr levels of stone free patients and controls was not significant but it was significantly marked in the ALP/cr and protein/cr. A positive correlation between urinary GGT/cr- ALP/cr- protein/cr and ALP/cr protein/cr was noticed. Urinary GGT/cr and WBC/hpf was also correlated, but no significant correlation between urinary GGT/cr, ALP/cr, protein/cr and the type of stone compositions was observed.
CONCLUSIONS: As a conclusion, there was no significant difference between urinary GGT/cr of stone frees patients and control group. But there was significant difference in urinary ALP/cr and Pr/cr between two groups. Also urinary patient was significantly different. This may be due to urinary trauma of stone results. Therefore it is estimated that the background of stone formation could primarily caused by high ALP.

A-68
EVALUATION OF A CITRATE LOAD TEST IN PATIENTS WITH CALCIUM UROLITHIASIS

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AIMS: Oral alkali citrate therapy in hypocitraturic patients do not show an adequate increase in citrate excretion in some stone formers. Since these patients will have no benefit from an alkali citrate prophylaxis, we tried to detect these patients through our citrate load test.
METHODS: 22 hypocitraturic stone formers were investigated. The citrate load was administered orally in an 8 g single dose of a potassium-, sodium-, magnesium citrate granulate (Lithurex®, Phönix, Germany) dissolved in 500 ml of water. To analyse both citrate creatinine clearance and metabolic changes in stone formation parameters, serum samples were taken and 2-hour fasting urines and 4-hour loading urines were collected.
RESULTS: The clearance decreased in 1 patient (–45.8%) and rose in the other 21 patients by 206.7 ± 137.0% ($p < 0.0001$). Urine values prior to and after load revealed an increase in the urine pH from 6.13 ± 0.79 to 7.14 ± 0.93 ($p < 0.0001$) and a decrease in calcium, anorganic phosphate, and magnesium (mmol/l) from 2.34 ± 1.83 to 1.02 ± 0.88 ($p < 0.005$), 16.18 ± 10.08 to 7.80 ± 6.22 ($p < 0.005$), and 2.30 ± 1.91 to 1.11 ± 1.46 ($p < 0.05$), resp. Uric acid did not change significantly. In serum the pH value increased from 7.42 ± 0.04 to 7.44 ± 0.04 ($p < 0.05$). Ionized calcium decreased from 1.27 ± 0.05 to 1.25 ± 0.005 mmol/l ($p < 0.005$), uric acid from 5.28 ± 0.98 to 5.08 ± 0.94 mg/dl ($p < 0.05$), and sodium from 141.29 ± 1.90 to 140.14 ± 1.82 mmol/l ($p < 0.001$).Changes in citrate, total calcium, anorganic phosphate, magnesium, and potassium were statistically insignificant. Blood gas analysis showed an increasing base excess (ecf) from 3.84 ± 5.27 to 5.54 ± 5.31 ($p < 0.0001$).
CONCLUSIONS: This citrate load test will be useful for detecting hypocitraturic stone formers which do not respond to oral alkali citrate therapy and therefore have no benefit from prophylaxis with alkali citrate. These patients may have a disordered citrate metabolism, i.e. citrate excretion is not regulated by acid-base balance as usual. To avoid side effects by alkali citrate prophylaxis, patients with persistent hypocitraturia should not receive long-term medication with alkali citrate.

A-69
INTERVENTIONAL STUDY OF UROLITHIASIS PATIENTS ON CHEMOTHERAPY AND DIET CONTROL

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AIMS: 200 proved urinary patients were studied to assess the effect of diet control and combination chemotherapy using allopurinol and pyridoxine for eight months on urine biochemistry and symptoms.
METHODS: Patients were randomly divided into two groups i.e. patients on diet control alone and those receiving both diet control and combination chemotherapy. An interventional study was conducted after 8 months to study the changes in urine biochemistry and relief in symptoms. The pre and post treatment values were analysed using student t test.
RESULTS: Appropriate drug restriction produced statistically significant reduction in stone promoters namely urinary oxalate and uric acid. The dietary intake of calcium, oxalate, uric acid and citrate affected corresponding biochemical values in urine in the study. A high dietary intake of calcium increased its urinary excretion. The intake of oxalate rich foods as leafy vegetables and tea and coffee produced increased urinary oxalate levels and thus played an important role in stone formers. The extent of symptoms and stone incident rate were lower during combination of chemotherapy and dietetic therapy. The reduction of symptoms was more pronounced during chemotherapy than with dietetic therapy.
CONCLUSIONS: Proper chemotherapeutic and dietetic prophylactic regimes will prevent the progression of urinary stone disease to a significant extent.

A-70
THE VALUE OF URINARY CITRATE EXCRETION MIGHT BE NOT LIMITED TO STONE DISEASE

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AIMS: Several authors have observed that idiopathic calcium stone formers can develop osteoporosis which, as in normal subjects, is frequently complicated by low trauma fractures. Citrate salts are widely used in the treatment of urolithiasis for their inhibitory action on urinary crystalization and urinary citrate excretion represents an useful marker of the activity of this disease. Moreover alkali salts have been shown to increase bone mass. In a previous work we have demonstrated that urinary citrate excretion decreases after menopause and that it is positively correlated with bone mineral density. The aim of this work was to evaluate whether urinary citrate excretion was related to vertebral fractures.
METHODS: Forty-nine postmenopausal osteopenic women, with no history of renal stones, were consecutively enrolled in this study. Thirty-two of them presented at least 1 vertebral fracture, while 17 had none. Blood and urine metabolites and densitometric parameters were measured.
RESULTS: Among fractured women, 22 showed urinary citrate levels < 400 mg/24 h and the remaining had higher values. In the group of non fractured females 2 were hypocitraturic, 15 were not. Fractured women showed significative higher values of PTH and lower levels of citraturia, GFR, bone mineral content and bone mineral density. Stepwise logistic regression was performed in order to find the biochemical parameter which best related with vertebral fractures. Citrate showed the highest statistic significance ($p = 0.001$), with PTH and Body Mass Index showing a significant p-value. Fisher's exact Test showed that the higher number of fractured women was within the hypocitraturic group ($p = 0.0001$). Urinary citrate excretion was positively correlated with densitometric values and GFR, while a negative correlation was found between urinary citrate excretion and PTH ($r = -0.32$ $p = 0.025$). A negative correlation was also observed between GFR and PTH ($r = -0.30$ $p = 0.03$).
CONCLUSIONS: In conclusion, notwithstanding it must be confirmed by larger studies, low urinary citrate excretion could be considered a possible prognostic marker for vertebral osteoporotic fractures in postmenopausal women.

A-71
DETERMINATION OF URINE PYROPHOSPHATE CONCENTRATION BY ION CHROMATOGRAPHY

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AIMS: Techniques for pyrophosphate determination are often time consuming and/or expensive. We propose a new direct HPLC procedure for measuring quantitatively pyrophosphate in urine.
METHODS: A 3 ml urine sample was acidified with pure HCl and then diluted 1/20 with 0.3 M boric acid. Then, 50 microliters of diluted urine were injected into a Dionex DX500 ionic chromatography system equipped with an AG 11 guard column, an AS 11 analytical column (250 × 4mm) and an electrochemical detector ED 40. The elution was performed with a NaOH gradient. Calibration curves were obtained from tetrasodium pyrophosphate (Ref P9146, Sigma, USA) aqueous solutions. In this preliminary study, pyrophosphate was measured in first or second morning urine samples from 26 children (18 boys and 8 girls) and 28 adults (15 males and 13 females) stone formers (SF).

As control, pyrophosphate was measured in second morning urine sample from five males and six females of the staff. Results are expressed as pyrophosphate concentration in micromol/L and as pyrophosphate to creatinine ratio in micromol/mmol.
RESULTS: Calibration curve was linear between 0 to 100 micromol/L. According to our operative conditions, retention time for pyrophosphate was 13.4 mm. The limit of detection was below 1 micromol/L. In children SF, mean (± SD) pyrophosphate concentration was 29.8 ± 27.3 micromol/L in boys and 18.9 ± 7.94 micromol/L in girls. In adult SF, pyrophosphate concentration was 25.3 ± 32.2 micromol/L in males and 16.9 ± 19.1 micromol/L in females. In male and female controls, pyrophosphate was 30.2 ± 29.9 micromol/L and 10.33 ± 8.78 micromol/L respectively. Pyrophosphate to creatinine ratio was in children 6.67 ± 5.65 for boys, 3.28 ± 2.38 for girls, and in adult patients 2.22 ± 2.13 for males and 2.01 ± 3.16 for females. In controls, the ratio was 1.58 ± 1.95 in males and 1.28 ± 0.88 in females. Comparison between children and adult SF showed the ratio (5.62 ± 5.08 vs 2.20 ± 2.64) was significantly higher in the former ($p < 0.01$).
CONCLUSIONS: Determination of urine pyrophosphate by ion chromatography is a suitable sensitive and fast method easy to perform in routine analysis.

A-72
HISTOLOGICAL CHANGES PRODUCED BY DIABETES MELLITUS ON EXPERIMENTAL UROLITHIASIS

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AIMS: The present study was done to find out the tissue changes produced by diabetes mellitus on the kidneys of different groups of experimental rats.
METHODS: Six groups of Male albino rats consisting of five each (control, diabetic noncalculogenic, nondiabetic calculogenic, Diabetic calculogenic, controlled diabetic and controlled diabetic calculogenic) were used. Diabetes was induced by intra peritoneal alloxan. Control of Diabetes was obtained by *Lente insulin*. *The rats were made* Calculogenic by Oral sodium oxalate. The rats were sacrificed after 3 months and kidneys were subjected to histopathological/sem examination. The crystals were studied using polarizing microscope. Crystals were classified as minimal, moderate and severe.
RESULTS: Non diabetic calculogenic rats showed Grade I crystals, Controlled diabetic calculogenic rats showed Grade II crystals and Diabetic calculogenic rats showed Grade III crystals. Under SEM, diabetic non calculogenic rats showed occasional glomerular sclerosis and interstitial inflammation, non diabetic calculogenic rats showed dilated tubules with crystals and epithelial debris and the Diabetic calculogenic rats showed renomegaly, glomerular basement membrane thickening, interstitial inflammation and tubules dilated with crystals. The typical Amorphous debris in renal tubules and Papillary processes in the glomeruli of diabetic calculogenic rats showed that diabetes enhances calculogenic changes in the rat kidneys.
CONCLUSIONS: It is surmised that diabetes is likely to enhance calculogenic status in human kidney also.

A-73
PERCUTANEOUS NEPHROSTOLITHOTOMY (PCNL) IN CHILDREN

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AIMS: Extracorporeal shock wave lithotripsy (ESWL) and percutaneous nephrolithotomy (PCNL)are approved treatment for renal stones in adults. Although ESWL has been widely used in children, few cases of PCNL in children have been reported. In this study we have presented the results of treating children's renal stones with PCNL.
METHODS: A group of 15 children with renal stones underwent PCNL from September 1995 to September 1999. In 6 cases (40%), the patients had unsuccessfully undergone ESWL. The group consisted of 9 girls (60%) and 6 boys (40%). Their ages varied between 3.5 to 13 years . in 9 cases , there were single pelvic stone. In 3 cases, there were staghorn stones and in 3 cases, there were multiple stones. All Patients had an IVP. They all underwent general anesthesia, and with a fluoroscopic guide and through the lateral side of the sacrospinal muscle, We reached the kidney. The tract was dilated to 28Fr, nephroscopy and lithotripsy with ultrasound and electohydraulic lithotripsy where Performed.
RESULTS: Out of 15 cases treated with PCNL, in 11 cases the stones were pulverized with ultrasound, in 4 cases electrohydraulic lithotripsy was employed because of the hardness of the stone. In 11 (73.3%) , the stones were completely removed (stone free). in 3 cases that had staghorn, there were residual stones after PCNL, and the patients underwent ESWL . In cases with multiple Atones, the largest stones were removed and the patients received ESWL to remove the residual stones. In 3 cases, there were complications, which were treated with appropriated therapeutic treatments.
CONCLUSIONS: Our experience with PCNL in adults and children shows that it is an effective treatment in adults and children with the least complications.

A-74
PERCUTANEOUS NEPHROLITHOTOMY FOR PEDIATRIC STONE DISEASE: OUR EXPERIENCE WITH ADULT-SIZED EQUIPMENTS

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AIMS: We have evaluated the outcomes and complications of percutaneous nephrolithotomy operations performed on pediatric patients by using adult sized surgical equipment in our center.
METHODS: Medical and surgical records of 23 children who underwent 25 percutaneous nephrolithotomy operations by using 24 or 26 F rigid nephroscope were evaluated retrospectively; noting stone burden, surgical time and complications, details of recovery, success, residual fragments and auxiliary procedures commited for them, and follow-up details. Patients were grouped according to the age limit of 7 years to evaluate the effects of adult-sized equipments.
RESULTS: Success in a single session was 70.8% and increased to 91.6% with auxiliary procedures. Complications during and in early postoperative period were excessive bleeding and transfusion in two, hydro-pneumothorax in one, perforation of the collecting system in three and urinoma in one patients. Complications were more common in children less than seven years of age or with staghorn stones. Mean time to catheter re-

moval was 3.4 days and mean hospitalization time was 4.8 days. Idiopathic hypercalciuria, hypocitraturia, cystinuria, and hyperoxaluria were diagnosed in 2, 2,1 and 3 patients, respectively.
CONCLUSION: Percutaneous nephrolithotomy with adult sized equipments has significant complications if performed for children under seven years of age or having staghorn stones. Otherwise, it is a safe and effective modality of treatment in children.

A-75
THE PERCUTANEOUS NEPHROLITHOTOMY IN THE PEDIATRIC AGE GROUP

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AIM: Owing to the rising incidence of nephrolithiasis in Turkey, the interventions aiming to reduce the morbidity of the operations in pediatric nephrolithiasis patients have been more popular recently. In this study, the effectiveness and complication rates of the percutaneous nephrolithotomy (PNL) operations performed in pediatric patients with nephrolithiasis are investigated.
MATERIAL AND METHOD: Between 1990 and 2002 , 12 of 15 pediatric patients received a single-session of PNL operation and the remainder 3 received double sessions of PNL, a total number of 18 operations. 60% of patients received unsuccessful interventions (7 ESWL, 2 open-surgery), whereas 40% had a history of nephrolithiasis. During the operation, the tract was dilated with 24–30 F catheters, amplatz cover was placed, 26 F nephroscope and/or 8.5–10.5 F uretherorenoscope were used. Stone-free or leaving clinically insignificant residual fragment (CIRF) (< 4 mm) was accepted as success.
RESULTS: The mean age of 6 male and 9 female patients was 12.3 (2–16). 67% of the stones were found in multiple localizations and the average of the stone-loads of the patients was 6.2 (1-13.6) cm^2. The mean operation time, scopy time and hospitalization time were 92 min, 10.8 min and 6.8 days in order.

Patients no	15
Av. age (years)	12.3 (2–16)
Gender	
• Female	9 (60%)
• Male	6 (40%)
Side	
• Right	6 (40%)
• Left	9 (60%)
Mean operation time (min.)	92 (45–150)
Mean scopy time (min.)	10.8 (6–15)
Mean hospitalization time (days)	6.8 (3–18)
Result	
• Stone-free	9 (60%)
• CIRF	4 (27%)*
• Unsuccessful	2 (13%)

*2 patients ESWL with CIRF

In 2 of 4 unsuccessful (27%) patients were treated with ESWL and their stones became CIRF; the other 2 were followed up. 5 patients (33%) suffered from per- or postoperative complications (hemorrhage in 3 patients, pelvic laceration in one patient, hepatic flexure injury in one patient).
CONCLUSION: In pediatric age group , when there is a large stone and/or where ESWL is unsuccessful, PNL can be considered as the primary treatment or a part of the combination treatment.

A-76
PERCUTANEOUS NEPHROLITHOTOMY IN CHILDREN WITH ADULT SIZE DEVICES

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AIMS: We evaluated the efficacy and safety of percutaneous nephrolithotomy (PCNL) in pediatric patients weighting 20 kg and over with adult devices.
METHODS: The data from the prospective follow-up files of the 13 percutaneously treated patients were evaluated. The age of the patients ranged from 4 to 16 (mean 10) years old. The mean stone size was calculated as 305 mm^2 (186–590). All of the accesses were done under fluoroscopic control and the tracts were dilated up to 26F with Amplatz dilators. Ultrasonic and pneumatic lithotriptors were used for in situ lithotripsy.
RESULTS: The mean operation time was 111 minutes (85-150 min.). Three patients needed more than 1 access. There were no preoperative or postoperative major complications. The fluoroscopy time ranged from 2 to 10 minutes with a mean of 7. Mean hemoglobin drop was 1.25 g/dl (0.2–4.8) and only 1 patient needed blood transfusion. The median postoperative hospitalization period was 4 days (3–19). Stone free rate was calculated as 85% with 4 mm residuel fragments. ESWL was required for only one patient at the early postoperative period. All of the patients were stone free at discharge.
CONCLUSIONS: PCNL is an effective and safe mode of therapy in pediatric stone disease. Adult devices could be used effectively in children over 20 kg without increased morbidity

A-77
PERCUTANEOUS NEPHROLITHOTRIPSY (PCNL) VERSUS EXTRACORPORIAL SHOCH WAVE LITHOTRIPSY (ESWL) FOR THE MANAGEMENT OF PEDIATRIC RENAL STONES.

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AIMS: Minimally invasive techniques for the treatment of renal stones is highly indicated because the more incidence of recurrence. This study was retrospectively done to evaluate the safety, efficacy and morbidity associated with the two modalities PCNL and ESWL used in children with renal stones.
METHODS: During the last 4 years, all children (166) with a renal stone burden less than 20 mm treated with either the first group {PCNL (94 renal unit)} or the second ESWL group (83 renal unit) were retrospectively analyzed in three centers. The mean follow up of PCNL group cases was 9 months while for ESWL was 14 months.
RESULTS: The mean age of children was 10.8 and 9.2 years in first and second groups. The mean operative time was 104 and 48 minutes respectively. There was no significant difference between hospital stay in both groups. The complications of bleeding, urinary tract infection, renal obstruction, residual fragments and stienestrasse were more significant in the ESWL group (12%). The stone free rates after 3 months of follow-up were significantly more in the PCNL group (95%) while it was 74% in the other group. The re-treatment rates were 8 and 16% for the first and second groups respectively. The overall doctor and patient satisfaction was more prevalent in the PCNL group patients.
CONCLUSIONS: In the view of the fore-mentioned data, PCNL appears to be a more suitable, effective and safe procedure for the treatment of renal stones (20 mm or less) in children and has less complications and re-treatment rates when compared to ESWL.

A-78
PCNL OF ISOLATED LOWER POLE STONE

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AIMS: Evaluation of PCNL and ESWL of lower pole stones.

METHODS: Of 234 patients who admitted in endourology ward for PCNL 38 had isolated lower pole stone; 16 of them had history of failed ESWL. Stones measuring 12–24mm. (mean ~16). All underwent PCNL without postop. nephrostomy tube. Uretric stent and urethral catheter also removed 24 hours postoperatively.
RESULTS: All pts. were stone-free and no any complication seen, intra or postoperatively.
CONCLUSIONS: Lower pole stones have poor response to ESWL, but PCNL can render them stone-free without problem.

A-79
QUALITY OF LIFE IN PATIENTS UNDERGOING PERCUTANEOUS SURGERY FOR CALYCEAL DIVERTICULUM AND DEEP LOWER POLE RENAL STONES – ARE WE ON THE RIGHT TRACK?

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AIMS: The treatment of calyx diverticulum and deeply secluded lower pole stones is controversial. Small calyceal and diverticular stones may cause more symptoms than previously anticipated. Treatment often yields frustrating results and ESWL is not an option. The question arises whether and when to treat. 89% of these stones will eventually require intervention within 10 years. What are the goals of treatment and how do these impact on patients quality of life?
METHODS: Eighteen patients were asked to fill in a standardized validated questionnaire (SF-36) before and 6 weeks after PCNL.
RESULTS: 83% of patients were rendered completely stone free. As to quality of life, the most significant findings were a reduction in symptoms interfering with performance at work in 40% of patients, an improved general health by 33%, an increase in the feeling of accomplishment by 22%, and a reduction in interfered social activities by 25%. There were increases in general performance (17%) and concentration (17%). Out of three patients with severe pain, only one was left with the same pain after PCNL.
CONCLUSIONS: Owing to difficult access, PCNL of calyx diverticulum and secluded lower pole stones is without doubt challenging whereas a stone-free status could still be achieved in 83% of cases, this is only technical. At the most, less than half of patients did subjectively benefit from the procedure, hence patients should be made aware of the limited impact of surgical treatment on quality of life. Non-symptomatic cases can be given the option of a watchful waiting approach.

A-80
PERCUTANEOUS MANAGEMENT OF CALCULI WITHIN HORSESHOE KIDNEYS.

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AIMS: Percutaneous management of calculi within horseshoe kidneys can be challenging due to the altered anatomic relationship in the retroperitoneum. We performed a multi-institutional review to assess the safety and efficacy of this minimally invasive technique.
METHODS: Of 37 patients identified with calculi in horseshoe kidneys from three institutions, 24 (65%) underwent PNL as primary treatment. Average age was 48.4 years and 75% of the patients were males. While 3 patients had staghorn calculi, the mean stone size as measured by computed digitized stone surface area was 448 square mm. Mean follow-up was 5.8 months. Stone-free rate, complication rates, need for secondary procedures and stone composition were evaluated.
RESULTS: Renal access was obtained through an upper pole calyx in 63%, lower calyx in 25%, middle calyx in 4%. Access location was not documented in 1 (4%) patient. 21/24 patients (87.5%) were rendered stone free after primary or second look procedures. Flexible nephroscopy was used in a majority (84%) of cases. Minor complications occurred in 4 (16.7%) whereas 3 patients (12.5%) experienced major complications, including significant bleeding necessitating early cessation, nephropleural fistula and pneumothorax. No deaths occurred as a result of this treatment choice. Stone analysis was available for 21 (87.5%). Calcium stones predominated (87.5%) followed by uric acid (9.5%) and struvite (4.8%).
CONCLUSIONS: Percutaneous management of renal calculi in patients with horseshoe kidneys is technically feasible, usually requiring an upper pole access and flexible nephroscopy due to the altered anatomic relationships of the fused renal units. The success rate, based on stone free results, and a relatively low incidence of major complications suggests that this minimally invasive management option is an effective means of stone management for this patient population.

A-81
PERCUTANEOUS NEPHROLITHOTOMY IN PATIENTS AGED 60 YEARS OR OLDER

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AIMS: To evaluate the success of percutaneous nephrolithotomy (PNL) performed in patients aged 60 years and older.
METHODS: Retrospective review of 97 PNL procedures performed on 50 female and 42 male patients aged 60 years and older (mean 64.8) was compared with the data of the remaining 595 PNL procedures performed on younger patients in our clinic between December 1997- October 2002.
RESULTS: The presence of complete staghorn calculi (17/97, 18 % v 105/595, 18%; $p = 0.577$) and average stone size (623 mm^2 versus 739 mm^2, $p > 0.05$) were similar for two groups. Transfusion was necessary in 19 of 97 RU (20%) of older patients, and in 118 of 595 RU (20%) of younger patients ($p = 0.955$). The success rates (stone-free patients and patients with residual stones < 4 mm) were similar, being 95% for the elderly group and 96% for the younger patients ($p > 0.05$). No significant complication was observed in this elderly group. Renal deterioration was not detected in the follow-up of patients with solitary kidney.
CONCLUSIONS: The stone-free rate in the elderly group was similar to that obtained in the younger patients, without any higher rates of complication or blood transfusions. Percutaneous nephrolithotomy is a safe and effective method of stone treatment in the elderly, even if they have a solitary kidney or complex calculi.

A-82
INFECTION IN PATIENTS WHO UNDERWENT PERCUTANEOUS NEPHROLITHOTOMY

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AIMS: To evaluate the infectious complications, microorganism distribution and antibacterial treatment in patients who underwent percutaneous nephrolithotomy (PCNL).
METHODS: Three-hundred thirty-eight patients which were 17 years age or older patients who underwent PCNL has been evaluated retrospectively. Eighty-two patients who has been consulted to Section of Infectious Disease because of infected urine preoperatively and/or postoperative fever (58 males, 24 females, mean age: 45.5 years, mean postoperative hospital stay: 6.1 days) were included in the study.
RESULTS: Twenty-eight (34%) patients had positive urine cultures preoperatively, 14 (17%) had positive urine culture preop-

eratively and 47 (57%) had positive stone cultures. Patients with positive preoperative urine cultures received antibiotic treatment until they had sterile urine preoperatively, cases which failed to have sterile urine despite the antibiotic treatment underwent the procedure with appropriate antibiotic suppression. Eighty patients (97.5%) had body temperatures over 38°C postoperatively. The urine and blood cultures taken during the febrile period were positive for 28 (35%) and 10 (12,5%) patients, respectively. Fifty-four patients (66%) received antibiotic treatment as the postoperative fever was thought to be secondary to infection. The most frequently isolated organisms from all kinds of cultures were as follows: E.coli, Klebsiella spp, Pseudomonas spp and enterococcus spp. According to nosocomial infection surveillance data of Hacettepe University Hospital, resistance rates to fluoroquinolon group of antibiotics for E.coli, Klebsiella spp and Pseudomonas spp vary between 60 and 70% in the urology ward. In addition, this rate ranges between 30% to 60% for aminoglycosides, second and third generation cephalosporins, carbapenem and betalactams-betalactamase inhibitors.
CONCLUSIONS: In this group of patients, antibiotic selection for empiric treatment should be in accordance with the resistance rates. The results of cultures taken preoperatively, and during the febrile period has great importance for decision of required changes during the treatment.

A-83
MINIMAL INVASIVE PCNL IN PATIENTS WITH RENAL PELVIC AND CALYCEAL STONES – EXPERIENCE IN 59 CASES

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AIMS: Stones of the renal pelvis can be treated either by extracorporeal shock wave lithotripsy (SWL) or percutaneous nephrolithotomy (PCNL). As a low-risk procedure with a longer treatment period, SWL often leads to persistent residual stone fragments, whereas conventional PCNL achieves a higher stone-free rate and allows a shorter treatment period albeit with a somewhat higher surgical risk. To reduce the invasiveness of conventional PCNL, the application of a miniaturised instrument for PCNL (MPCNL) was evaluated.
METHODS: For MPCNL a rigid nephroscope with a calibre of 12 F was developed and used in 59 patients. After puncture of the kidney under ultrasound control and single-step dilatation a 15 F Amplatz sheath was placed. Data on the stone size and location, stone-free rate, blood transfusions, operating time and complications were recorded.
RESULTS: In 58 patients, the part of the kidney afflicted by the stone was successfully punctured. On average re-treatment rate was 0.7. The mean stone size was 2.7 cm^2. The average operating time was 90.7 minutes. In every case, the absence of residual stones was confirmed radiologically and nephroscopically. Haemorrhages requiring a blood transfusion did not occur. A febrile pyelonephritis occurred as a postoperative complication in 3 patients (= 5.1%).
CONCLUSIONS: MPCNL represents an alternative to SWL for renal calculi with a size from 1 to 2 cm located in the renal pelvis and calices, especially the lower calix. The advantages are the short treatment time, the high stone-free rate and the accessibility of lower pole stones which are less amenable to SWL. MPCNL is not suitable for large concrements since the limited sheath diameter would increase the operating time. Due to this limitation, MPCNL represents an extension of the indication for conventional PCNL that it can in no way replace.

A-84
THE RENAL BLEEDING AFTER PERCUTANEOUS NEPHROLITHOTOMY

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AIMS: Percutaneous Nephrolithotomy (PCNL) is the treatment of choice for the most renal stones. During and after this procedure always exists a risk of bleeding requiring of blood transfusions, angiography with selective embolization or emergency operation. At present percutanous approach is also limited to complex calculus cases and patients who failed shock wave lithotripsy. We have tried to estimate the superselective embolization in case of bleeding after PCNL.
METHODS: 3 patients (2 men and 1 women, average age 51) with stone disease were treated by one stage PCNL with one access. The lower calix approach was used in all cases and procedures were completed by inserting a nephrostomy. The average stone size was 16 mm (renal pelvis 2, lower calix 1 case). Haemorrhage was observed within two days after surgery and patients needed of blood transfusions. Retroperitoneal hematomas were found in ultrasound examination. The patients were subjected to a superselective renal embolization with injection of collagen fibre stripes and implantation of metal coils.
RESULTS: The embolization caused a complete obstruction of the bleeding vessel and full control of further haemorrhage. Ultrasound examination confirmed stable hematomas and the entire procedure was estimated as successful. Renal angioscintigraphy performed 3 months later showed lack of a presence of radioisotope in minimized renal areas. During follow up was not observed any clinical evidence of infection or abscess formation.
CONCLUSIONS: Superselective embolization of renal vascular lesions is a sufficient and save method of treatment complication after PCNL. It is a satisfactory alternative therapeutic modality to open surgery that is more invasive and often demanding of nephrectomy. Moreover the detection of the bleeding source is rather easy and less a damage of the kidney after the procedure.

A-85
THE DORNIER EMSE 220F-XXP: CLINICAL RESULTS WITH A NEW SHOCK WAVE TECHNOLOGY

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AIMS: The objective of the study is to evaluate the safety and efficacy of the shock wave source EMSE 220F-XXP.
The primary objective of the evaluation is to:

(1) prove fragmentation after ESWL,
(2) evaluate stone evacuation for determining ESWL success rate,
(3) correlate the applied energy dose to success rate (stone discharge), and evaluate the efficacy of the new EMSE XXP.

METHODS: The clinical trial evaluated the treatment of 452 patients between October 2001 and November 2002 with ureteral and kidney stones. The evaluation criteria were as follows:

Table 2 Stone location in the patients treated with Dornier S XXP

Stone location	Number of patients: 452	Average stone size (mm × mm)
Pyelum	101 (22.3%)	15.4 × 10.8
Upper calxy	37 (8.1 %)	9.8 × 6.8
Medial calyx	83 (18.3%)	8.3 × 6.8
Lower calyx	180 (39.8%)	9.9 × 7.3
Ureter	51 (11.2%)	10.8 × 6.8

RESULTS: After first treatment the success rate was 77.2% and after the second treatment 90.3%.A second treatment was necessary in 21.7%.

	Locations retreatment rate (%)	Success after 1st treatment (%)	Success after 2nd treatment (%)
Renal Stones	21.7	77.2	90.3
Pyelum	34.6	65.3	82.6
UC	30.8	66.6	79.4
MC	9.3	90.7	97.6
LC	21.0	76.8	91.9
Ureter	11.8	88.2	96.0

Table 3 Success rates for EMSE 220F-XXP

Locations	No. of shocks (1st treatment)	Average disintegration energy (mJ)/ shot	Total Energy (J) per treatment
Overall	1873	29.8	58.5
Renal Stones	1856	28.9	56.0
Pyelum	2164	33.8	74.5
UC	1941	26.2	51.9
MC	1673	25.7	45.9
LC	1753	28.3	51.6
Ureter	2009	37.5	79.4

Table 4 Shock wave parameter for Dornier EMSE 220F-XXP

	1st treatment	2nd treatment
Patient with pain	36	6
Patient with need medication	28	2

Table 5 Pain during treatment

CONCLUSIONS: The results demonstrate that longer shock wave pulses and larger energy distribution will improve ESWL. The total administered shock wave energy is low avoiding the risk of side effects. The haematoma rate of 0.3% seems to lower than achieved with other shock wave sources. A low PRF seems to be important fact to improve ESWL.

A-86
PRELIMINARY EXPERIENCE WITH THE EMSE 220F-XXP. MOVE OVER? HM3!?

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AIMS: Since January 21, 2002 a new electromagnetic SW-emitter, the EMSE 220F-XXP was installed in our Dornier Lithotripter S. Since then we have been performing clinical evaluation of this new EMSE, which in vitro provides a better desintegration capacity than the HM3.
METHODS: The technical data of the new EMSE 220F-XXP are displayed in comparison to the data of the unmodified Dornier HM3. From January 21, 2002 till February 21, 2002 we have been treating 31 patients with urinary calculi at all levels of the urinary tract with this new EMSE. Average stone size was 69.3 mm^2, mean number of SW 2524 and mean energy level 85%.
RESULTS: Preliminary results for this small group of patients are as follows: retreatment rate 6.5%; auxiliary procedure rate pre-ESWL 3,2 %, post-ESWL 6.5%, total 9.7%; stone free rate at 3 weeks 93.5%; EQA 82.7, EQB 80.5.
CONCLUSIONS: Because of the enlarged discharge capacitor the acoustic output of the EMSE-220F-XXP in an area of 12 mm diameter in the focal plane is improved by 20–25%. In stone models the disintegration capacity is significantly increased and comparable to or even better than the results with the unmodified HM3. Although the very small number of patients would preclude a definite conclusion, the physical properties and the preliminary results of the new EMSE seem to indicate a significantly improved performance that may be comparable or even superior to the HM3. So, move over HM3 (?!).

A-87
INFLUENCE OF SHOCK WAVE ENERGY AND PULSE REPETITION FREQUENCY ON CLINICAL OUTCOMES

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AIMS: The Dornier Lithotripter S is equipped with a new powerful electromagnetic shock wave source, the EMSE220F-XXP. At maximum intensity this lithotripter generates a focal pressure of 90 MPa, with 110 mJ effective energy output in an area of 12 mm diameter in the focal plane per shot. The objective is to evaluate the fragmentation after lithotripsy, discharge of calculi, complications, and side effects using shock wave release frequency between 60 and 80 shocks/min to reduce cavitation related side effects.
METHODS: Until now a total of 113 patients. Average stone was 11.8 mm × 7.2 mm. 93.5% of patients were in a supine position. Location was, in 98% of cases, with X-rays, and in 2% with ultrasound. Average shock wave number was 2654 for renal calculi, and 3475 for ureteral calculi, revealing a shock wave energy dose of 167 J in average, and 269 J respectively. Average shock wave release frequency was only 71 shocks/min. Status of success was followed until 3 month. Prior ESWL auxiliary procedures were performed in 14 cases.
RESULTS: Fragmentation was in 97.3 % after ESWL. Only 3.5 % required 2 sessions. After first ESWL 15% (renal: 1.7%; ureteral: 29.1) of patients experienced complete discharge of fragments, in 68.1% (82.8%; 52.7%) fragments were < 3mm, in 12.4% and in 2.7% fragmentation was incomplete. 92.7% of patients had no complications during treatment. Only 8 patients experienced pain. 2 patients were lost in follow-up, stone free status was achieved in 106 patients. 2 had CIRF resulting in a success rate of 97.3%, and 3 cases stone discharge is expected. Complications were observed in 13 cases, mostly pain and fever. Only 1 auxiliary procedure was necessary. The effectiveness quotient EQB is 83.2.
CONCLUSIONS: The new EMSE supplies sufficient energy to fragment and fully eliminate the majority of calculi in mostly 1 session. The effectiveness quotient is superior than found in the literature. The low shock wave release frequency seems to reduce side effects.

A-88
AMBULATORY EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY (ESWL) TREATMENT OF 3221 CASES WITH URINARY SYSTEM STONES

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AIMS: ESWL is the preferred treatment for the most of the urinary tract stones. We evaluated ESWL results of uriner tract stones
METHODS: Between November 1992 and September 2002, ESWL was applied to 3221 cases .Treatment was postponded for 2 years because of technical defects. Of 3221 cases 1904 (59.20%)was male and 1314 (40.80%)was female .Of 3221 cases 115 were at pediatric age group. Mean age was 44.32 (1.5–92)years .2067 cases had renal stone,1043 had ureteric stone and 111 had bladder stone. 37 cases had solitary kidney ,19 had horseshoe, 12 had malrotated, 18 had pelvic kidneys.Stones size were ; 0–0.5 cm^2 =258, 0.5–1 cm^2 = 983 , 1–2 cm^2 = 1026 , 2–3 cm^2 = 543 and more than 3 cm^2 = 411. In 640 cases DJ stents were

placed prior to ESWL . USG was helped in localization of 2244 stones and X-RAY helped in 977 cases .Dornier MPL 9000 was used .1235 cases underwent single ESWL sessions while remainder had 6106 sessions. Treatment voltages ranged from 14.5 to 20 kV and averaged 18.1. The mean number of shock waves was 3830 (500–16000 shock). Mean follow up period was 47.58 (1–180) days. Our success rates was 92.71% for renal stones,84.37% for ureteric stones and 91.91% for bladder stones.
RESULTS: ESWL is a treatment of choice for urinary tract stones and consider to be effective, safe and noninvasive with high successful rate.

A-89
OUR EXPERIENCE IN THE MANAGEMENT OF URINARY CALCULI USING EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY SPARK GAP SYSTEM (ESWL) IN ADEN, YEMEN

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AIMS: Urinary lithiasis considered one of the most common diseases met with in the urological clinics as well as in the emergency rooms especially in hot climate areas. The development of Extracorporeal Shock Wave Lithotripsy (ESWL) has changed the concepts of urinary stone disease management
METHODS: We have started introducing this tool of treatment in Aden, Yemen since March 2001. In this study running between March 2001 and December 2002, 127 patients with renal and ureteral stones were treated in our clinic using extracorporeal shockwave lithotripsy
RESULTS: In our center, stone disease constitutes 48% patients admitted in the urology section,35% of whom managed successfully using ESWL. The total number of patients was 127; renal stones constitute 102 patients (80.3%),ureteral calculi 25 patients (19.7%). Auxiliary measures as DJ fixation was used in 28% of patients while the remainders without intervention. In 84% of patients one session was enough in fragmenting stones < 1.4 cm in diameter. In the remainder 16% second session was necessary. Results were satisfactory and with least side effects
CONCLUSIONS**:** In spite of short period we found that the patients gradually excepted the extracorporeal shockwave lithotripsy as an alternative method in treating renal and ureteral stones

A-90
THE VALUE OF ULTRASONOGRAPHY AND SPIRAL COMPUTED TOMOGRAPHY IN THE DIAGNOSIS OF STONE-FREE PATIENTS AFTER EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY

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AIMS: To define the importance of different and new radiologic modalities in determining the patients who believed to be stone-free after extracorporeal shock wave lithotripsy (SWL) with plain abdominal X-ray,by evaluating the same patients with ultrasonography (USG) and spiral computed tomography (BT).
METHODS: Between March 2002 and November 2002, 53 patients with the diagnosis of urolithiasis who were treated with SWL and believed to be stone-free, were evaluated with USG and helical BT. The results were compared with the conventional plain abdominal X-ray for the accuracy of the stone-free diagnosis.
RESULTS: We found residual stones in 5 (9.4%) with USG and in 11 (20.7%) with BT of 53 patients which were thought to be stone-free with plain abdominal X-ray alone.
CONCLUSIONS: Although plain abdominal X-ray has been accepted as a first line diagnostic tool in the follow-up after SWL with its cheap and practical use, helical CT was found to be more valuable in diagnosis of residual stone fragments which has not been found in plain abdominal X-ray. Taking these considerations which can change our clinical approach and patient follow-up into account, we believe that the routine use of helical BT can give more accurate information in patient controls after SWL.

A-91
EXPERIENCE OF TRANSCUTANEOUS DISTANCE LITHOTRIPSY OF KIDNEY'S BIG STONES

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AIMS**:** For period of our researches we treated 110 patients with big stones in plates of kidneys. In 87 cases were made lithotripsies by transcutaneous distance method with help of "Multistar Multiline" system (Siemens). All next patients were operated by traditional technique.
METHODS: The transcutaneous distance lithotripsy method was accepted in situation of absence the system for percutaneous lithotripsy. For easiest pass of stones' fragments across prostate we used Cardura 4 mg per day.
RESULTS: In all researched cases in patients were diagnosed big stones in plates of kidneys by X-ray and ultrasound methods. The maximal sizes of the stones were from 2 cm to 5 cm. For 87 patients we made transcutaneous distance lithotripsy. In 79 (90.8%) patients we put stents in ureters. When big fragments of stones went out the stents were aborted.In 79 (90.8%) cases written about method was used one time. In 8 (9.2%) patients we used transcutaneous distance lithotripsy from 2 to 7 times, because stones didn't fragmented after first procedure. In all patients in cases lithotripsy of big stones took place bleeding in urine. The bleedings were stopped in times from one to three days with help of medicines. In 4 (4,6%) cases took places haematomas in under stomach cavity. Three from these patients were treated by conservative methods. One patient was operated for liquidation of haematoma. For one patient were made nephrectomy as result of break up of kidney from lithotripsy.
CONCLUSIONS: In situations when there is not system for percutaneous lithotripsy and in cases when patients categorically don't want operations, the transcutaneous distance lithotropsy method for big stones in kidneys gave us good results. Only in 5 (5.7%) from 87 cases we had failures.

A-92
CALYCEAL STONES : EFFECTIVENESS OF EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY WITH RESPECT TO STONE LOCALIZATION

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AIMS**:** We assess the efficiancy of extracorporeal shock wave lithotripsy monotherapy for isolated lower pole nephrolithiasis and compare it to that for isolated middle and upper caliceal calculi.
METHODS: We treated 284 patients with isolated caliciel stones using a Stonelith V3 lithotripter (PCK, Turkey). The stones were localized in the lower, mid and upper calices in 53.76 and 155 patients respectively. Patients were stratified in to three groups based on stone burden. The energy and shock waves use of anesthesia, number of treatment sessions,auxiliary measures and complications were noted. Results regarding caliceal localization were compared.
RESULTS: There was a significant correlation between stone-free and stone burden. The overall stone free rate (SFR) was 77.35%, 76.3% and 59.35% for lower, middle, and upper caliceal stones. Steinstrasse developed in 20 (7.04%) patients.
CONCLUSIONS: Extracorporeal shock wave lithotripsy appears to be successful for management of isolated caliceal stone disease. ESWL is especially effective in patients with upper and middle caliceal stones compared to lower caliceal stones.

A-93
SUCCESS OF EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY IN PATIENTS WITH LOWER CALICEAL STONE AND FAVOURABLE ANATOMY

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AIMS: To assess the efficacy of ESWL monotherapy for isolated lower pole nephrolithiasis with favourable anatomy and compare it to that for different stone size.
METHODS: From February 1999 to December 2002, adult patients with simple, radio-opaque lower pole kidney stones were treated using a Stonelith V3 lithotripter (PCK, Turkey). Patients were stratified in to four groups based on stone burden. The energy and shock waves use of anesthesia, number of treatment sessions, auxiliary measures and complications were noted. ESWL was considered a failure if residual stone fragments remained after 1 month or if an auxilary procedure on retreatment was required.All of the patients had intravenous pyelograms (IVPs) available for review. İnfundibular length (IL),infundibular width (IW), infundibulopelvic angle (IA) and calyceal – pelvic height (CPH) were measured. The patients who is considered to have a favourable anatomy (IA > = 70 degrees, IL < = 30 mm and IW > 5mm) were included in the study.
RESULTS: The overall stone free rate (SFR) was 84.5 % . The overall stone free rate in stones < 5mm, 6–10 mm, 11–15 mm and 16–20 mm were 90%, 84%, 57%, 50%,respectively. The difference in success between stone groups was statistically significant.
CONCLUSIONS: Extracorporeal shock wave lithotripsy appears to be successful for management of isolated lower caliceal stone disease with favourable anatomy.

A-94
EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY IN THE TREATMENT OF ISOLATED CALICEAL STONES IN CHILDREN

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AIMS: Calyceal stones constitute a challenging problem in children, as in adults. Stone-free rates ranging between 45 to 85% are being reported with extracorporeal shock wave lithotripsy (SWL) in adults and those located in the lower calix are traditionally cleared more poorly. In this study, we retrospectively assessed the efficacy of SWL, for treatment of isolated calyceal stones in children.
METHODS: Between 1995 and 2002, a total of 27 children with isolated calyceal stones were treated with SWL (Siemens Lithostar Plus). Their mean age was 9.0 ± 4.5 years (range: 10 months–14 years). Stones were located in the lower, mid and upper calices in 12,8 and 7 children, respectively. The stone size ranged between 0.5 to 2 cm. Follow up consisted of plain radiographs and/or ultrasound 1 day and 3 to 6 months post SWL. SWL treatment was considered a failure if no fragmentation was noted after 3 sessions. Asymptomatic, non-obstructive and non-infectious stone fragments smaller than 4 mm were considered clinically insignificant residual fragments (CIRF's)
RESULTS: All children were treated as outpatients with intravenous sedation in 7 (25.9%) cases, general anesthesia in 9 (33.3%), and no anesthesia in 11 (40.7%). A maximum of 3500 shocks and 18.1 kV energy per session were given. Overall, a stone-free rate of 85.2% (including clinically insignificant residual fragments (CIRF's) in 22.2% cases) was achieved with a retreatment rate of 59.3%. Stone free rates (including CIRF's in parenthesis) for lower, mid and upper calyceal stones were 75% (25%). 100% (25%), and 85.7 (11.3%), respectively. No significant complication, except renal colic necessitating hospitalization, was observed.
CONCLUSIONS: Our results in a small group indicate that, SWL is efficient and safe in the treatment of isolated calyceal stones in children, although further studies with longer follow up is necessary to assess the fate of CIRF's and potential hazards of SWL on the kidney.

A-95
SUBJECTIVE PAIN SCALE AND NEED FOR ANALGESIA DURING SHOCK WAVE LITHOTRIPSY

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AIMS: Shock wave lithotripsy (SWL) has been routine procedure in the treatment of urinary stone. However, the information on the need for analgesia reported by the patients themselves is scarce. We investigated the patients opinion on the degree of pain during SWL and the need for analgesics in patients with urinary stone.
METHODS: From January to October 2002, prospective questionnaire study assessing the subjective pain during and just after the shock wave lithotripsy (Direx Nova Ultima) was performed in the consecutive patients with uncomplicated renal or ureteral stone. All patients were treated with outpatient basis. None of the patients were premedicated. The patients were given unbiased information on the benefits and potential side effects of the analgesics prior to the procedure. Pain scaling was done using 10-point visual analog scale at 10 minutes after beginning SWL. After the procedure, the patients were asked to complete a 11-item self administered questionnaire. A p value below 0.05 was regarded as significant.
RESULTS: The results from 200 patients (male 123, female 77) with a mean age of 50.3 (±19.9, SD) was analyzed. 126 stones were located in the kidney and 74 in the ureter (upper 45, mid 15, lower 14) with a mean size of 8.2 (±4.0)mm (right 93, left 107). Average subjective pain score was 6.6 (±2.2) during the procedure, however, 158 (79.0%) patients responded that they were tolerable without parenteral or even oral analgesics, respectively. 127 (63.5%) patients do not agree that analgesic use is recommendable to other patients. Pain score was not affected age of patients, laterality, stone size, level of education and socioeconomic status ($p > 0.05$) but was affected by sex and stone location. Pain score was higher in female (7.3 ± 2.2) than male (6.2 ± 2.1) and was higher in renal stones ($p < 0.05$).
CONCLUSIONS: Our result shows that subjective pain severity during SWL is high. However, since the majority of patient fear of the side effects caused by analgesic medication, assurance of the patients and careful monitoring during analgesia is needed in the patients who require SWL treatment for urinary stone diseases.

A-96
THE COMPARISON OF REMIFENTANYL VERSUS PROPOFOL-TRAMADOL COMBINATION VIA PATIENT CONTROLLED SEDATION DURING ESWL

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AIMS: Anaesthesia during extracorporeal shock wave lithothripsy (ESWL) should be both short acting and safe, and also must perform enough analgesia and sedation during the procedure. In this study remifentanyl has been compared with propofol-tramadol combination during ESWL.
METHODS: After hospital ethics committee approval and informed content, 50 patients were randomly assigned to receive either propofol-fentanyl or remifentanyl for ESWL. Tramadol 1 mg/kg was given to propofol-tramadol group (n = 25) intravenously 30 minutes prior to procedure. 1 mg/kg/h hr propofol infusion was given during the procedure. In the remifentanyl group (n = 25), 0.04 μg/kg/min remyfentanyl infusion was given during the procedure. All patients were monitored with SpO_2 , non-invasive blood pressure and ECG. Then 2 L/min O_2 was given via face mask. When they needed additional analgesic the PCA machine was programmed to deliver 5 mg of propofol bolus for propofol-tramadol group and 10 μg remifentanyl bolus for remifentanyl group.

RESULTS: Each groups contained 25 patients. The Visual Analogue Scale (VAS) were lower in the remifentanyl group during and after the procedure ($p < 0.05$). The sedation scores were higher in the propofol group during and after the procedure ($p < 0.01$). The time of discharge from postanaesthesia room was shorter in the remifentanyl group. Side effects as mild nausea, hypotension and bradycardia was seen in the both group and were easily managed.
CONCLUSIONS: ESWL is outpatient procedure. For this reason, the anaesthesia must provide sufficient analgesia and early discharge period and also must have minimal side effects. In the comparison of the two methods used in this study; remifentanyl showed early recovery and a betteranalgesia during the procedure. For this reason, it can be performed during ESWL.

A-97
EFFECT OF INTRAVENOUS KETAMINE AND FENTANYL COMBINED WITH MIDAZOLAM ON ANALGESIA AND SİDE EFFECTS DURING PAEDIATRIC OUTPATİENT LITHOTRIPSY

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AIMS: The advent of ekstracorporeal shock wave lithothripsy (ESWL) is considered a safe and effective treatment for urinary lithiasis in adults. However, the applications of this modality of treatment in children has followed rather slowly. In this study, fentanyl- dormicum has been compared ketamine-dormicum bolus combination for paediatric outpatient lithothripsy.
METHODS: Fourty patients were randomly divided in two groups; group K(n = 20) received 2 mg/kg ketamine i.v 10 min before ESWL and group F (n = 20) recevived 2 µg/kg fentanyl i.v. 3 min before ESWL. All patients received 0.1 mg/kg midazolam i.v. 3 min before ESWL for intraoperative sedations. The pain intensity was evaluated by a numeric rating scale (NRS). A supplemental analgesia with i.v. fentanyl 5 µg was given when inadequate analgesia occurred (NRS > 3). Oxygen supplement though a face mask was given when the SpO_2 fell below 94%. Side effects (nausea, vomiting, dizziness, etc) and the time of discharge from post-anesthesia room (PAR) were recorded. The criterion of discharge from PAR was absence of any discomfort especially when the patient held up-right.
RESULTS: There was no difference between two groups in demographic data, number of shock waves, duration of ESWL procedure, and fentanyl supplement. The incidence of oxygen supplement was lower in ketamine group (1/20) compared with that of fentanyl group (15/20), $p < 0.01$. The frequency of dizziness was lower in ketamine group (1/20) than that in fentanyl group (17/20), $p < 0.01$. The discharge time from PAR was significantly shorter in fentanyl group (20.4 ± 6.2 min) than that in ketamine group (39.5 ± 146 min) , $p < 0.01$.
CONCLUSIONS: Both intravenous ketamine and fentanyl in combination with midazolam could provide good anesthesia for ESWL. However, ketorolac plus midazolam had less side effect. Fentanyl is superior to ketamine as part of a sedative-analgesic technique because of improved recovery profil and calculi fragmentation.

A-98
EXTRACORPOREAL SHOCK-WAVE LITHOTRIPSY(ESWL) IN THE MANAGEMENT OF RENAL COLİC

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AIMS: Renal colic is earliest and the most frequent manifestation of USD (Urinary Stone Disease). The pain appears as a consequence of increase in renal blood flow, high urine flow, increase in intrapelvic pressure and spasm of urinary tract musculature in the area of stone location. Conservative treatment is of a short efficacy and use of surgical methods results in intra- and postoperative complication.
METHODS: Results of follow-up in 77 patients without UTI who were underwent ESWL for an acute upper urinary tract obstruction by a stone were analyzed. Stone size ranged from 4 to 19 (7.2 ± 0.4) mm. Duration of renal colic attack ranged from 3 to 14 hours (mean 3.5 ± 0.2) days. The diagnosis was based on patients complaints medical history, physical examination and US scanning of kidneys and ureters. Besides R-graphy and as indicated, IVU were carried out all patients were treated on the "NOVA" (Direx, Israel) lithotripter at the shock wave strength from 15 to 18.5 (16.3 ± 0.1) kV and number of the shocks was from 200 to 2800 (1000.8 ± 56.7). All patients were followed up dynamically on out-patient basis until they became completely stone-free.
RESULTS: Stone fragment began to pass in 3 hours after lithotripsy; patients became fully stone-free on 15 day. Five patients required the second session on the nearest 5–7 days. Renal attack stopped in 68.3% of patients after ESWL and in remaining after 72 hours. Subsequent pain was not intensive and was due to concrements passage.Patient did not side-effects and there were not complications. Of them 19.5% were completely stone-free in 24 hours; 23.4%,42.8% and 42.8% on 3d 7th and 15th days, respectively.
CONCLUSIONS: ESWL is an effective method of treatment of renal colic attack. Optimal selection of patients and sufficient fragmentation allow to use it widely as a drastic measure of treatment patients with USD manifested by renal colic attack.

A-99
URETEROSCOPIC MANAGEMENT OF URETERAL STONES: AN EXPERIENCE OF 1183 CASES

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AIMS: Ureteroscopy is treatment of choice for ureteral stones in different localization. In this study, we retrospectively evaluated the treatment of ureteric calculi with conventional rigid ureteroscope.
METHODS: A total of 1183 ureteroscopic procedures were done in between May 1992–September 2002. 926 of these patients who underwent ureteroscopic lithotripsy were reviewed retrospectively. Median age was 37.8 years (range between 17–62). At ureteroscopy, the calculi were present in the upper ureter in 9 (0.1%), mid ureter in 42 (5%) and lower ureter in 875 (94.9%) of patients. Stone size was measured radiologically and diamater was < 5 mm in 433 (46.7%) cases, 6–10 mm in 423 (45.6%) and > 10 mm in 70 (7.7%). In the treatment of stones; pneumatic, dye laser, ultrasonic and electrohydraulic lithotripsy or forceps extraction were used as ureteroscopic procedures. Intravenous urography or renal ultrasonography were done after 6 weeks to follow-up.
RESULTS: The overall success rate was 77.8% for all procedures. Pneumatic lithotripsy was determined to be the most effective procedure with a 95.7% success rate. Laser lithotripsy was unsuccessful in 39 of 292 (13.3%) patients, ultrasonic lithotripsy in 58 of 284 (20.4%), electrohydraulic lithotripsy in 7 of 25 (28%) patients. Complications were post-operative fever in 34 (3.6%), urinary tract infection in 22 (2.3%), mucosal lesions (small) in 44 (4.6%), ureteral perforation in 17 (1.8%), stone migration in 51 (5.5%) and ureteral stricture (late complication) in 14 (1.5%). 15 of patients with ureteral perforation went to open surgery and 32 of patients with stone migrations treated with extracorporeal shock-wawe lithotripsy and 19 of them treated again with ureterorenoscopy. Of 14 patients with stricture, ureteral dilatation was enough for 12 and uretero-ureterostomy was done in two patients for distal localized stricture.
CONCLUSIONS: Ureteroscopy has a high success rate with low morbidity and tolerable complications. Among different procedures, pneumatic lithotripsy is most effective method with low failure rates.

A-100
OUR EXPERIENCE OF URETEROSCOPIC TREATMENT İN 315 URETERAL STONE PATİENTS

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AIMS: We rewieved our uretere scopic experiences retrospectively in order to evaluate the success and complication rates of ureteroscopy in distal and middle ureteral stones.
METHODS: 203 male and 112 female patients (a total of 315 patients) with distal and middle ureteral stones were treated by ureteroscopy between March 1993 and November 2002. According to the situation of the cases, only basket extraction, only fragmentation with pneumatic lithotriptor and spontaneous discharge or a combination of these two approaches were applied. 7.5–9.5 F Storz and 8.5–11.5 Wolf semirigid ureteroscopy and a pneumotic lithotriptor(Elmed–Ankara) were used. Size and localization of the stones, operation time, success and complication rates were evaluated.
RESULTS: The avarage time of hospitalization was 3 days (2–8). 275 patients had distal ureteral stones (87%), 32 patients had middle ureteral stones (10%) and 8 patients had bilateral stones. Multiple stones were detected in 35 patients. The avarage stone size was 0.51 cm (min 0.12–max 2.3 cm). 120 patients were stone free by URS and basket extraction, pneumatic lithotripsy and spontaneous discharge were used in 76 patients. 94 patients were stone free by using pneumolithotripsy and basket extraction. Open procedure were performed in 24 patients which had unsuccessfull URS or with complication occurred during the URS or stone removal. 268 patients (85%) were stone free with only one procedure. Two or more procedure were performed in 10 patients because of poor vision during URS with bleeding. Baloon dilatation were used in the management of ureteral stenosis in 11 patients. Complication occurred in a total of 23 patients (7%). In 11 patients, stone was migrated to the pelvis, 9 patients had ureteral false route, 3 had hemorrages.
CONCLUSIONS: URS, being a minimal invasive procedure, has high success and low complication rates in the management of ureteral stones. The increase in the rate of efficacy and decrease in complication rates are time-related.

A-101
THE EFFECT OF URETEROSCOPY IN THE URETERIC STONES

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AIMS: Retrospectively, we evaluate our experience in ureteroscopy with pneumatic lithotripsy used in our clinic betweeen 1999–2000.
METHODS: A total of 102 (82 males, 20 females). In these patients, we used 7.5 F and 10.5 F ureteroscop storz type pneumaclast Tıp-lım type with the using of C-arm scopy, camera and monitor. For stone free purpose in need we either used foreign body forcepts or Dormia basket and in necessary conditions Double-J stent inserted. Fourth day postoperatively stone free patients regarded to be successful. In total of 102 patients with stones, three of them were bilateral, 54 at right ureter and 45 at left. All operation done under general anesthesia. The specifity of these stones are in the below: In distal ureter (patients: 69, stone number: 87, stone size: 60 mm^2, interference number: 83, success rate: 94.3%). In mid ureter (patients: 16, stone number 20, stone size: 40 mm^2 , interference number: 18, success rate: 85%). In proximal ureter (patients: 17, stone number: 19, stone size: 118 mm^2, interference number: 19, success rate: 79%). In total (patients: 102, stone number 126, interference number: 120, success rate: 90%). Our complications were perforation of ureter in two patient. Head of basket breaked out and remain in the ureter, mukozal erosion in one ureter, the migration of four stones into renal pelvis. Complete ureter rupture in one ureter and failure of passing orifice in three and ureter kinks in one patient.
RESULTS: According to literatures the success rate of stone endoscopic interference ranged between 88–100%. In our study the success rate of distal ureteric stones, mid ureteric stones and upper ureteric stones were 94.3%, 85% and 79%, respectively. Total succes rate was 90%. Our results were within these ranges.
CONCLUSIONS: Because of the high success rate and low invasivity of ureteroscopy with pneumatic lithotripys it can be consider as first line of treatment.

A-102
BILATERAL SAME SESSION URETEROSCOPY: A RETROSPECTIVE STUDY OF CASES

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AIMS: The management of ureteric and renal caculi has changed quite dramatically with the use of a fiber-optic ureteroscope to visualise stones. Bilateral same session ureteroscopy (URS) is rarely indicated. The aims of this study is to specify the indications and the avantages of this approch.
METHODS: Between January 1995 and Decmber 2002, 782 URS for stone extraction were performed in our department. 28 patients underwent 28 same session ureteroscopy (3.5%). A 9.5 F and 7.5 F rigid ureteroscope and ballistic lithotriptor were used, with ureteral dilatation in 15 cases. The bilateral URS was indicated essentially in bilateral lower ureteral stones, 5 patients have renal failure and anuria
RESULTS: All stones was located in lower (pelvic and iliac) ureter, the mean operative time was 78 mn (35–120). After one manipulation the stone free was obtained in 21 cases (75%) and 2 manipulations were necessary in 3 cases. Bilateral faillure was noted in one case. In 3 patients URS was successful in one side and ESWL was complementary performed in 2 cases, conversion was necessary in one case. We have a stone free success rate in 85%, Dormia basket wax used in 8 cases to remove stones. Tow perforations (7.1%) was noted treated successfully by double J ureteral stent.
CONCLUSIONS: Bilateral same session ureteroscopy is the best solution for the management of bilateral lower ureteral stone. This study confirm the advantages of this approach for selected patients.

A-103
TREATMENT OF BILATERAL STONES BY SIMULTANEOUS BILATERAL URETEROSCOPY

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AIMS: We retrospectively evaluated the results of bilateral ureteroscopy in one single session for the treatment of bilateral stones.
METHODS: From 1995 to 2002, 271 patients underwent ureteroscopy for stones at our institution. Ten patients underwent a bilateral ureteroscopy for synchronous stones during the same anesthesia. The total number of stones was 33, and the location was lower pole calyx: 9 cases , upper ureter: 12 cases, middle ureter: 5 cases, lower ureter: 7 cases. The median size of stones was 6 mm (2 to 10 mm). A semi-rigid (9.5 Fr) and a flexible ureteroscope (7.5 F) were used for the procedures.
RESULTS: The average duration of procedure was 50 minutes. No pre or postoperative complication was observed. The average length of hospital stay was 3.3 days. The average follow-up was 12 months and all the patients were stone free.
CONCLUSIONS: Despite the size of our series, bilateral simultaneous ureteroscopy appears to be safe and effective for the treatment of synchronous ureteral or kidney stones.

A-104
MANAGEMENT OF DISTAL URETERAL CALCULI WITH URETEROSCOPY AFTER ESWL FAILURE

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AIMS: ESWL and ureteroscopy are currently accepted treatment modalities for distal ureteral calculi. However, the priority and the efficiacy of the methods is controversial. We evaluated the success rate of ureteroscopy in distal ureteral stone patients after ESWL failure.
METHODS: One hundred and thirty five patients underwent semirigid ureteroscopy (7, 5–9, 5 F Storz and 8, 5–11, 5 F Wolf) after ESWL failure at Şişli Etfal Training and Research Hospital between March 1993 and November 2002. The average stone size was 9 mm (min 4 mm – max 23 mm). The average 5 course of ESWL (min 2–max 13) was performed before ureteroscopy. Stone extraction via basket catheter was performed in 54 patients. 72 patients underwent ureteroscopy and pneumatic lithotripsy. Single stone was detected in 103 patients (76%), while 25 patients (19%) have multiple stones. Bilateral stones were detected in 7 patients (5%).
RESULTS: 121 patients were stone–free with single ureteroscopic procedure (90%). Stone extraction was unsuccesful in 14 patients with single ureteroscopy (10%). The management of ureteral stone was successful in 2 patients with hemorrhage and 3 patients with false route who underwent secondary ureteroscopy at another operation day. 9 patients had open procedure in which the stone fragmentation was unsuccessful.
CONCLUSIONS: Although ESWL accepted as a primary treatment option in many center, ureteroscopy is efficient and safe procedure in the treatment of ureteral stone even after ESWL failure with low complication rates.

A-105
THE EFFECT OF POSTOPERATİVE URETERAL STENT USAGE ON POSTOPERATİVE PAİN ; SUCCESS AND COMPLİCATİON RATES IN THE URETEROSCOPIC TREATMENT OF URETERAL CALCULİ: A PROSPECTIVE RANDOMIZED STUDY

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AIMS: We investigated the effect of ureteral stent usage on postoperative pain, success and complication rates in the ureteroscopic treatment of ureter stones.
METHODS: Between February 2000 and October 2002, 143 patients with the diagnosis of distal ureteral calculi were included in the study. Patients were randomized into 2 groups; preoperatively. In the first group of 71 patients, 4F ureteral stent were used and left in place after ureteroscopic procedure while no postoperative stent were left in place in 72 patients of second group. Wolf 9.5 F and Storz 7:5 F semirigid ureteroscopes were used in ureteroscopy and Elmed pneumolithotriptor was used in the lithotripsy. All patients had preoperative and postoperative pain scoring. The ureters were stented between 1–3 days in group 1. We determined stone -free rates with radiological investigation in postoperative 4th week.
RESULTS: One patient was excluded from the study who had open surgical procedure after preoperative ureteral perforation included in ureteral stent group. 70 ureteral stented patients and 72 without stent were included in the study. When compared with ureteral stented group, postoperative pain scoring ($p = 0.005$), urinary symptoms ($p = 0.003$) and total narcotic analgesic usage ($p = 0.002$) were statistically lower in without stent group. There were no statistical difference between two groups when compared according to complication and success rates. ($p > 0.05$) Median stone size was 8.8 mm and stone-free rate was 91.9%. Mean follow-up period was 10.4 + 8.6 months.
CONCLUSIONS: Distal ureteral stones can be cured safely with ureteroscopic procedures with or without ureteral stents. Postoperative pain scoring, urinary symptoms and narcotic analgesic usage was statistically lower in stent-free patients.

A-106
DOES SYSTEMATIC STENTING MONDATORY AFTER RIGID URETEROSCOPY AND ENDOCORPOREAL LITHOTRIPSY. REPORT OF 1450 CONSECUTIVES PATIENTS

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AIMS: To evaluate the necessity of JJ stenting after retrograde ureteroscopy in the treatment of ureteral stones.
METHODS: From December 1992 and June 2002; 1450 consecutive patients (age: 14–86 years) were treated for ureteral stones in different locations (151 lumbar; 265 iliac; 1034 pelvic and 50 bilateral) they were initially managed by thin semi rigid ureteroscopy (8.5 fr) associated to ballistic fragmentation using the. All these procedures were performed by the same surgeon. We had not perform systematic stenting. The necessity of ureteral stenting was discussed case by case and it was decided at the end of the procedure in 286 cases (20%): 90 cases of obstructive oligoanuria, 165 preoperative kidney infection, 13 false passages and 18 pregnant women. In 30 cases; complementary ESWL was performed (after stone flushing) and in 50 cases repeated ureteroscopy was necessary.
RESULTS: 1370 (94.5%) patients were stone free after a single ureteroscopy session. The main complications consisted on 13 cases of false passage managed by JJ stenting in 10 cases and by percutaneous or surgical drainage in 3 cases. No particular complications were noted after long term follow up. The best results were observed with pelvic stones, with no or moderate back pressure and with stone size less than 2 cm. We had noted a simple discomfort or loin pain witch disappeared rapidly after medical treatment in the non drained patients.
CONCLUSIONS: Semi rigid ureteroscopy with ballistic lithotripsy is a reliable technique in treating ureteral stones in any position. Systematic JJ stenting is not mandatory and it have to be discussed case by case. This outpatient procedure is safe, not expensive and it is an effective alternative to treat all ureteral stones.

A-107
URETEROSCOPIC TREATMENT OF LOWER URETERAL CALCULI: A MULTI-ASPECT EVALUATION

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AIMS: Treatment of ureteral stones became more practical and tolerable with the widespread use of endoscopic procedures in skilled hands.Ureteroscopy in combination with auxillary procedures has become the standard procedure in the minimaly invasive treatment of such stones. In this study we aimed to evaluate our results obtained in the ureteroscopic management of ureteral calculi from different aspects
METHODS: A total of 305 patients (187 male, 118 female); with a mean age value of 37.4 years; (ranged from 14–78 years) with 314 renoureteral units (RUUs) were treated by ureteroscopy between 1997–2003. Statistical evaluation of the results was performed with the use of the Pearson correlation test.
RESULTS: Mean stone size was 1.3 cm (ranged from 0,4–2,2 cm) and while 101 stones were removed by ureteroscopy alone (31 %), additional procedures including electrohydraulic lithotripsy (EHL), basket application, pneumatic or ultrasonic lithotripsy were applied in 204 (69%) stones.The mean operation time was 35 minutes (ranged from 20 to 54 minutes.) The procedures were

completely succesfull in 204 RUUs (95%), with 266 RUUs (83%) following the first attempt, 21 RUUs (5%) following the second attempt, and 23 RUUs (7%) following the first ureteroscopy and ureteral dilatation. The results were unsuccessful in 7 RUUs (2%) in which ureterolithotomy was performed. The mean hospitalization period was 36 hours. No significant correlation was found between the stone size and the type of endoscopic intervention ($r = 16$, $p > 0.05$), whereas the stone site and the adhesion of the stone to the ureteral epithelium were correlated both with the operation time and the amount of irrigation fluid used ($r = 39$, $p < 0.05$ and $r = 76$, $p > 0.05$ respectively).
CONCLUSION: Our results demonstrated the successful and practical use of ureteroscopy in the management of ureteral stones with satisfactory safety. We believe that: in skilled hands this procedure should be the treatment of choice in the management of the stones located especially in the lower part of the ureter when compared with SWL.

A-108
STENTING POST URETEROSCOPY (URS): THE IMPACT OF STENT MATERIAL ONPERIOPERATIVE MORBIDITY

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AIMS: The routine placement of a stent post URS, is a highly debatable issue today, but there still are cases in which the procedure is warranted.We analyzer experience using various types of stent material.
METHODS: The study included data from 58 URS procedures, performed between 1/1/2002-31/12/2002 for diagnostic (non stone) purposes (9 cases),or ureteral stone (upper, mid, lower) disease (49 cases). There were 58 patients mean age 53,75 years (21–80),33 males and 25 females. Stents have been placed in 47 patients, after ureteral baloon dilation (14), for severe stone impaction (9), minormucosal injuries (8), colic after nonstented URS (2), synchronous nephrolithiasis (5), ong steinstrasse (2), URS for impacted stent (1) and residual stone debris (6). URS was performed using 8 Fr.semirigid and 7,5 Fr.flexible ureteronephroscopes, pneumatic lithotripter and fluoroscopy. Adequate stent length was chosen in relation with patient height. A form with intra and postoperative parameters was completed.
RESULTS: A number of 15 regular polyurethane,24 hydrogel coated (PercuflexPlus), 6 silicone and 2 Superglide pigtails have been placed (all of 6 Fr.). URS was successful in 87.7% of stone and 77.7%of non stone procedures. The Percuflex stents have presented the best performance,with the greatest easiness of bypassing tortuosities in 95.8% (23/24), lack of complications and better patient tolerance in 83.3% (20/24) of patients.Respectively the polyurethane stents had lower bypassing ability (66.6%), high complication rate (migration,pyelonephritis) in 20% and the lowest tolerance (20%) while the silicone and superglide stents had an intermediary performance but no complications.The mean in dwelling time was 15 weeks. In our video we present characteristic cases of ureteral surgery and stenting. –
CONCLUSIONS: When stenting is necessary,the best choice is the use of hydrogel coated stents, as they present the best procedural performance and the highest level of tolerance by the part of the patients.

A-109
IS URETERAL STENTING NECESSARY AFTER TRANS URETERAL LITHOTRIPSY?

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AIM: A prospective randomized controlled trial was performed to determine whether stents may be eliminated after uncomplicated ureteroscopic lithotripsy.
METHODS: Between October 2000 and March 2001 100 patients underwent transureteral lithotripsy at Shohada medical center.A 40 patients undergone TUL without stenting (Group 1) and compared to a control group of 40 patients with ureteral stenting after TUL (Group2). All intervention was performed under spinal anasthesia with 8F semi-rigid ureteroscope (a swiss lithoclast). Stone were located in the lower ; middle and upper third of ureter ; 20{50%}18{45%}2{5%} in group 1 and 20(50%),17(42/5%), 3(7/5%) in group 2 respectively.
RESULTS: Stone free rate was achieved in 95%in both groups. Failed to access for stone was 2{5%}in both groups.2 patiens{5%}in group 1 and 3 patients {7/5%}in group 2 stone strasse were seen and managed with RETUL.
CONCLUSIONS: In our experience in uncomplicated TUL and complete fragmentation of stone ureteral stenting is not necessary and significantly reduce irritative and painful symptoms.

A-110
FACTORS AFFECTING THE LEARNING CURVE IN URETEROSCOPIC TREATMENT OF URETERAL STONES: ANALYSIS AND COMPARISON OF THE SUCCESS AND COMPLICATION RATES OF FOUR UROLOGISTS

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AIMS: To compare the results ureteroscopic stone treatment in the hands of four urologists in order to evaluate the factors that affect the learning curve.
METHODS: The medical records files of all patients who underwent ureteroscopic treatment for ureteral stones by a team of 4 urologists were retrospectively reviewed. All of the indications for ureteroscopic treatment were given by consensus. The intensity of ureteroscopic training each surgeon had during residency was evaluated by the number of cases performed during training, availability of video ureteroscopy, and the presence of an ESWL unit at the training facility. The time spent since the completion of residency was also noted. The results of the first 30 consecutive procedures performed by each urologist in our institution were analyzed for this study. Thus, a total of 120 procedures were evaluated. The success and complication rates of each urologist was calculated and compared with each other. Also, each urologist's results for the initial 15 and the latter 15 procedures were compared to each other and to the corresponding groups of other 3 urologists. Kruskal-Wallis test and One-way ANOVA was used for the comparison of data with SPSS 9.05 for Windows software.
RESULTS: There was no statistically significant difference for the operation times and size of the stones that were treated by each surgeon. There was no significant difference for success and complication rates between the 4 surgeons and between the rates for the initial and latter 15 cases of each surgeon.
CONCLUSIONS: The differences in the intensity of endourological training during residency did not seem to have any effect on the success and complication rates for ureteroscopy between the surgeons. There were also no differences for these parameters for the initial and latter 15 cases of each surgeon. Treatment decision based on consensus seems to diminish any differences that could result from different training backgrounds.

A-111
EPIDEMIOLOGY OF UROLITHIASIS IN THE ARAL SEA–ECOLOGIC DISASTER ZONE IN UZBEKISTAN

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AIMS: Aral sea area,Khorazm Region in particular,is considered to be a zone of ecologic disaster with typical natural and climatic conditions which are, in particular, risk factors for urolithiasis development and contributing to its prevalence.
METHODS:This problem has been investigated by the epidemiologic study carried out in 2000–2002 among rural population.

The volume of general totality was 17/279 and volume of the random sample–2330 at age from 1 to 94 [males – 1617 (69,4%),females – 713 (30,6%)].Prevalence of urolithiasis was evaluated by the presence of crystalluria, calculi, their spontaneous passage or removal.
RESULTS: Signs of urolithiasis were revealed on the whole in 115 (4.9%) inhabitants; crystalluria in 101 (4.3%): 67 (4.1%) in males and 34 (4.8%) in females; in the remained 14 (0.6%) there was found calcuria.According to their mineral composition crystalls consisted predominantly of triplephosphate – 37 (36.6%), ammonium urate – 25 (24,7%) and uric acid – 23 (22.8%). CaOx, cystine and calcium phosphate crystals were revealed in 9 (8.9%), 4 (4.0%) and 3 (3.0%) patients,respectively.
At the same time signs of urinary tract infection were revealed in 56 (48.7%) subjects with crystalluria and calcuria (bacteriuria revealed by the counting in the camera, from 103 to 105 CFU per ml) that can mainly explain such a great specific weight of crystals which are formed in the infected urine , as a rule. On the whole, bacteriuria has been found in 33.6% of inhabitants studied that witnesses, in particular, of the negative contribution of ecological disaster factors to immunity status of inhabitants.
CONCLUSIONS: The results obtained allow to develop optimal measures of preventive therapy and prophylactics of urolithiasis in the area of ecology disaster regions of Uzbekistan.

A-112
EPIDEMIOLOGY OF UROLITHIASIS IN KASHAN

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AIMS: To estimate epidemiology of urolithiasis in Kashan, urinary stones received by clinical laboratories from March 1997 to March 2001 were studied.
METHODS: A descriptive study by existing data sampling was designed. Patients\'data include age, sex, date referring and kind of stones were recorded and analyzed.
RESULTS: Of 534 patients 376 cases (70.41%) were males and 158 cases (29.59%) were females. The most patients were in age-group 31–40. The most common age-group in females 20-30 and males was 31–40. The overall ratio of male to female was 2.4 :1. Of 534 cases, calcium stones (oxalate, phosphate & combination of both) have most frequency (80.13%). Other stones in order to frequency were included uric acid (18.9%), strovite (1.87%), and cystiene stones (.18%). The most common of referring were september and august
CONCLUSIONS: In base of our findings, urolithiasis is more common in males than females (2.4 : 1) and in 4th decade of life. Prevalence of urolithiasis is increased in hot months of summer.

A-113
THE SURVEY OF URİNARY LİTHİASİS IN GUİLAN (NORTHERN IRAN)

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AIMS: lithiasis is a major problem in community health because of its 15–20 percent long life involvement risk. Environmental influencing factors vary for urinary lithiasis formation and for their different types. In this investigation we conduct a comprehensive study on urinary lithiasis in Guilan, a template province in north Iran.
METHODS: In seven years period (between, 1994 and 2001), we examined 2933 urinary lithiasis analysis operated in our department. All information about calculus type, patient's age and sex, and date of patients operation; seasonal referrals were recorded.
RESULTS: The most common lithiasis were combined triple-phosphate and calcium oxalate calculi, and the rare lithiasis were combined triple phosphate and urate calculi. In men, common urinary lithiasis were calcium oxalate calculuses (23.36%), and in women common urinary lithiasis were combined triple-phosphate and calcium oxalate (30.3%). Most urinary lithiasis was operated in summer (29.5%) in August and September. The male to female ratio of urolithiasis was 1.93 /1.
CONCLUSIONS: In our study combined of triple-phosphate and calcium oxalate were most common urinary lithiasis followed by pure calcium oxalate lithiasis, and surprisingly, there was more urinary lithiasis in men in comparision with women, than was expected.

A-114
PREVALENCE AND INCIDENCE OF UROLITHIASIS IN GERMANY – AN EPIDEMIOLOGIC UPDATE

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AIMS: Two epidemiologic studies in 1979 and 1984 showed prevalence for stone disease in Western Germany of about 4%. The corresponding incidence in these studies reached 0.4%.For the first time after reunification of Germany we repeated this epidemiologic investigation, representative for the overall German population, by using the same research institute (INFAS - Bad Godesberg).
METHODS: In 2001 three cohorts of 2500 persons each(total 7503 persons),representative for the whole german population and its social structure were interviewed. We asked for urinary stone disease in general (prevalence), for new urinary calculies in 2000 (incidence), for the recurrence rate as well as for treatment and/or metaphylaxis to prevent stone recurrence.
RESULTS: Prevalence of urolithiasis in Germany rose from 4.0% (1984) to 4.7%(2001). Current prevalence in males was 5.5%,in females 4%. In the group of males between 50 – 64 years of age prevalence increased up to 9.7%. But also incidence of urinary stones increased from 0.4% (1984) to 1.47% (2000). Onset of disease occurred most frequently in the group of 25 – 50 years aged persons. In 55% the stones were removed actively by different treatment modalities. To prevent stone recurrence 89% augmented their diuresis, only 9% received pharmacological treatment.
CONCLUSIONS: Both prevalence and incidence of urinary stones in Germany increased dramatically in the last decade. Reasons – as our study indicates – are a high recurrence rate and a poor acceptance of the metaphylaxis, especially pharmacological long-term treatment.

A-115
THE EFFECT OF CLIMATE VARIATIONS ON URINARY SYSTEM STONE FORMATION AT ZONGULDAK AREA

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AIMS: The relation between climate and stone formation has not been clearly understood. It has been suggested that some factors such as heat and humidity have affects on urine acidification and crysta lization. Clear rain, heat and humidity differences was determined last three years at Zonguldak area. We investigated possible affects of these differences on stone formation.
METHODS: Urinary system disease statistics (1997–1999) which were obtained from Ministry of Health and Directorate of City Health, and average humidity, heat and rain reports (1997–1999) which were obtained Directorate of City Meteorology were compared average seasonal recordings by using graphics.
RESULTS: The average seasonal recordings (between 1931–1999 years)at zonguldak area was;Heat; 13.4 C,Humidity; %68,Rain; 12356 kg/m^2.

At year 1997;Heat; 12.8 C,Humidity; %73.8,Rain; 16661 kg/m^2.
At year 1998;Heat; 14.1 C,Humidity; %77.9,Rain; 14277 kg/m^2.
At year 1999;Heat; 14.5 C,Humidity; %77.3,Rain; 11306 kg/m^2
The number of stone patients increased between years of 1997 and 1999,n = 230;n = 467;n = 596, respectively.
CONCLUSIONS: The heat and humidity increased, and rain decreased between years of 1997 and 1999. There were differences according to seasonal normal. The migration was determined during this period according to Directorate of City Population recordings. However, it is possible to suggest that climate variations may result in stone formation. The data which were reached from this study has to be confirmed with other studies that would be done at same climate variations observed areas to define stone percentage rates of population.

A-116
WEATHER VARIABLES LIKE TEMPERATURE AND HUMIDITY ARE FACTORS THAT CONTRIBUTE IN TRIGGERING RENAL COLIC OFF

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AIMS: Renal colic is one of the most common symptoms that lead patients at the emergency department. It is estimated that about 10–12% of the general population will suffer at least one episode of similar pain during their lifetime. Our aim was the investigation of the effect of weather variables, such as temperature and humidity, in the incidence of renal colic during the year.
METHODS: Data from patients examined at the emergency department of the Urology Clinic of Athens General Hospital "G.Gennimatas" from September,1,2001 to August,31,2002 with symptoms of renal colic was reviewed. The monthly incidence of renal colic was related to the variables of temperature and humidity at the time of the medical examination, using data from the National Technical University of Athens – www.meteo.ntua.gr.
RESULTS: A total of 1141 patients were included in the study, with a predominance of men (61% of cases). The majority of cases was observed in summer (28.4%) and autumn (28.3%). positive correlation between the monthly incidence and the mean temperature of the previous month was found.The humidity factor correlated inversely with the number of cases per season , but not with the mean humidity of the same or the previous month. By setting patients in groups with respect of the mean humidity, regardless of season, 25.8% of cases presented in a mean humidity between 50.01–60.00%.
CONCLUSIONS: Our data suggest: a) a positive correlation between the monthly incidence of renal colic and the mean value of temperature of the previous month, b)an inverse correlation between the mean value of humidity each season– but not each month– and the incidence of renal colic. These facts are in coherrence with our hypothesis that dehydration due to the increase in temperature and decrease in humidity contribute to more episodes of renal colic .

A-117
ASSESSMENT OF THE RELATIONSHIP OF NEPHROLITHIASIS AND WATER HARDNESS IN HUNGARY BY USING GIS

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AIMS: The authors studied the spatial, gender and age differences of morbidity of nephrolithiasis based on hospital in-patient care events and they assessed the relationship of spatial accumulation of the morbidity of nephrolithiasis and water hardness
METHODS: This is a descriptive epidemiological study, in which authors applied ageographic information system analytical method. The standardized morbidity ratio (SMR) of nephrolithiasis was computed on settlement level merged to settlement-sizes of 2000 inhabitants. The SMR, indicating the difference of morbidity of the settlement compared to the national average was computed by indirect standardization method. The significance of the difference of mortality from the national average was tested by c2 test.The correlation of spatial accumulation of morbidity and accumulation of water hardness was examined by correlation, and the association of high morbidity and regional accumulations of areas with high water hardness was checked with c2 test.
RESULTS: The results show significantly higher morbidity in Zala, Vas, Nógrád, Bács-Kiskun counties. The ratio of men and women is 1/0,98. The most significant morbidity is demonstrated for the age group of 35–64, but it is still high in the age group of women older than 65 years. Nephrolithiasis and water hardness show significant correlation in some regions of Hungary. It is desirable to carry out further examinations to clarify the association of drinking water quality and the development of renal stone types in analytical epidemiological studies in the areas with high correlation. Based on the in-patient morbidity data of GYÓGYINFOK a reliable picture is seen about the prevalence of nephrolithiasis.
CONCLUSIONS: The causes of the revealed regional, gender and age differences and the role of the risk factors need further studies.

A-118
DEMOGRAPHIC FACTORS IN THE DIETARY INTAKE AMONG URINARY STONE PATIENTS

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AIMS: The aim of the present study was to find out the influence of demographic factors, like religion, place of residence, age and sex of the patients on the dietary intake pattern among urinary stone patients.
METHODS: The data for the study were collected from among 200 patients with stone disease. Twenty four-hour urine samples were collected for estimation of calcium, oxalate, uric acid, magnesium and citrate. The corresponding nutrient intake of the same during the day of collection was estimated by entering the detailed daily dietetic intake history of each patient into a computer programme called DIET designed for the purpose. The mean intake of nutrients namely, calcium, oxalate, uric acid and citrate was correlated with age, sex, religion and place of residence during the last five years. The correlation between nutrient intake and output was calculated.
RESULTS: It was seen that males had higher intake of nutrients considered as promoters for stone disease namely, calcium, oxalate and uric acid. This group was the most vulnerable group prone to stone formation. Gulf migrants also had higher oxalate intake compared to the native group. The nutrient risks were higher in the high-risk stone patients in the 30–50 years age group. The study indicates that urinary stone disease mostly affects the working class population particularly males.
CONCLUSIONS: The dietary intake among urinary stone patients varies between communities and individuals and also by their age and sex.

A-119
THE INVESTIGATION OF PREVALENCE OF RENAL STONE DURING THE LIFE TIME IN THE KAHRAMANMARAŞ CITY

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AIMS: We aimed to determine the prevalence of urinary tract stone disease in Kahramanmaraş area and whether or not it is stones zone.
METHODS: It was establish target population in Kahramanmaraş city. 2321 adult (age >20 years) occupants were included into the study(1161 female, 1160 male). Questionnaires were administered door-to-door by the educational nurses.
RESULTS: The overall prevalence of stone among males was 9.5% , among females was 11.8%. In both of sex overall prevalence of stone were 10.9%. In all age classes, the prevalence of renal stones was significantly higher between 40–60years.
CONCLUSIONS: Prevalence rates obtained from this study showed that Kahramanmaraş area is a renal stone zone. We think that, having a sedantary life and feeding by more animal proteins have an important role on these rates.

A-120
CHEMICAL COMPOSITION OF URINARY CALCULI IN MAROCCAN ADULTS

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AIMS: The aim of this study is to describe the chemical composition of urinary calculi in Moroccan adults.
METHODS: From November 1999 to July 2002, 733 urinary calculi from Moroccan adults aged more than 20 years (507 males and 226 females, sex ratio M/F = 2.24)were referred to our laboratory. Calculi were collected after extracorporeal shockwave lithotripsy (61.6%), spontaneous passage (19.7%) or surgical removal (6.5%). Stones were analyzed by two physical methods: first, optical examination to determine morphological characteristics and search for the nucleus; second, identification and quantification of crystalline composition by infrared spectroscopy. The results were expressed as main component and compared to stone composition observed in France and Tunisia.
RESULTS: Most calculi came from the upper urinary tract and were more frequent in the age range 40–49 years in both sexes. In male patients, stone composition was as follows: whewellite (Wh): 59.3%; weddellite (Wd): 19.7%; uric acid (UA): 10.3%; carbapatite (CA): 4.6%; struvite (Str): 1.9%; ammonium urate (AmUr): 1.2%, and cystine (Cys): 0.2%.In female patients, stone composition was Wh: 61.3%; UA: 12.3%; CA: 10.5%; Wd: 10.1%; AmUr: 3.2%; Str: 1.9%, and Cys: 0%.The study of nucleus in order to precise the cause of the stone revealed the following results.
In males, Wh: 55.6%; CA: 22.7%, UA: 7.2%; Wd: 5.9%; Str: 1.7%; AmUr: 0.3%, and Cys: 0.2%. In female patients, Wh: 37.8%; CA: 18.5%, UA: 17.1%; AmUr: 5.1%; Str: 2.3%; Wd: 2.3%, and Cys: 0%.Wd was more frequent in young patients and, conversely, UA in oldest subjects. In Morocco,like in Tunisia (12.8% in females, 5.1% in males), but not in France (10.6% in males, 7.1% in females), UA was more frequent in female patients.AmUr was more frequent in both sexes in Moroccan patients than in the two other series (0.4 ± 0.2%).Str was less frequent in Moroccan than French (3.7%) or Tunisian (6.4%) female patients.
CONCLUSIONS: Stone composition in Moroccan adult patients is characterized by a predominance of calcium oxalate monohydrate in both sexes and a higher uric acid stone frequency in female than male patients.

A-121
DOES THE TYPE OF ANATOMIC ABNORMALITIES INFLUENCE THE STONE COMPOSITION IN UROLITHIASIS PATIENTS?

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AIMS: The aim of present study was to assess the composition of calculi according to the type of anatomic abnormalities (AA).
METHODS: Among 16,656 stones referred to our laboratory, 2714 were associated with some type of AA, a crude prevalence of 16.3%. Among the latter, full information as to the type of AA was provided for 1863 patients (1360 males, 503 females), who constituted the study material. Calculi were analysed by infrared spectroscopy. Stone composition in 13942 stone formers (SF) (9517 males, 4425 females) devoid of any AA served as a reference group (RG).
RESULTS: Main components of stones in RG were as follows: whewellite (Ww), 49%; weddellite (Wd), 24%; carbapatite (CA), 12.5%; brushite (Br), 1.3%; struvite (Str), 1.4%; uric acid (UA) 8% and other 3.8%. AA of the upper urinary tract were present in 732 cases (39.3%). In horseshoe kidney (n = 65), the proportion of Wd (29%) and CA (20%) was higher than in RG. In MSK (n = 474), CA (24%) was more frequent whereas Str was very infrequent. In cystic kidney diseases (CKD, n = 103), UA was more prevalent (41%) and Wd was less frequent (10%).
In caliceal abnormalities (n = 90), Ww (56%) and CA (30%) were the most prevalent. Ureteric AA were found in 561 cases (30.1%). In megaureter (n = 63) and vesicoureteric reflux (n = 45), CA (44%) and Str (8%)were much more prevalent than in RG.In ureteropelvic junction obstruction (n = 286), ureteroceles, and other malformations (n = 167), stone composition was similar to that observed in RG. Lower urinary tract AA were found in 570 cases (30.6%). In benign prostatic hypertrophy (BPH, n = 402), UA (40%) was more prevalent than in a subset of 921 male SF without AA (24%) of similar age (about 71 years). In other bladder AA (neurogenic bladder, exstrophy and other, n = 168), all forms of phosphate represented 92% of stones.
CONCLUSIONS: Our data provide evidence that the crystalline composition of stones differs in the various types of AA, which suggests particular relationships between metabolic disorders and AA. Analysis of stone composition may thus provide useful information as to the pathogenic mechanism(s) involved in stone formation in individual patients.

A-122
COMPOSITION OF RENAL AND BLADDER CALCULI IN PEDIATRIC STONE FORMERS

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AIMS: To analyse the composition of renal and bladder calculi in Pediatric stone formers and its role in etiological assessment.
METHODS: One thirty four renal and 38 bladder calculi were analysed by InfraRed Spectroscopy. Separate analysis was done for core and surface in all stones where possible. Mixed stones and stones containing urates were also analyzed by chemical methods.
RESULTS: *Renal Stones* Of the 134 renal stones 66 (49%) were pure and 51% were mixture.Of the pure stones 49% were Ammonium Acid Urate (AHU), 36% Calcium Oxalate (CaOx), 1% Uric Acid (UA), 6% Struvite (ST) and 3% Calcium Phosphate (CaP), 2 of Cystine, 3 of Xanthine and 1 of 2,8 diHydroAdenine. Analysis of composition of pure stones in age group A <= 5 years, group B 6–10 years and group C >10 years showed that in A 88% were AHU, in B 26% were AHU and 52% CaOx while in C 80% were CaOx and 7% were AHU. Core and surface analysis showed AHU in 49% in core and 35% CaOx, while in surface 50% CaOx and 32% AHU. Struvite was 8% and 11% in core and surface respectively. Overall frequency of compounds was 57% of AHU , 70% CaOx, 14% CaP, 10% Struvite and 1% was UA.
Bladder Stones Of the bladder calculi 36% were pure and 64% mixed calculi. In the core 39% had AHU and 39% CaOx, 11% UA and 8% Struvite. Overall frequency of compounds was AHU 45%, CaOx 73%, CaP 12%, Struvite 21% and UA 16%.

CONCLUSIONS: Stone analysis is important in determining the etiology of stone disease. The presence of AHU in kidney and bladder calculi suggests a common cause in our population i.e. endemic calculi due to poor nutrition, diarrhea and dehydration. Increasing age gives pattern similar to developed world i.e. CaOx stones.

A-123
INSIGHTS INTO ETIOLOGY OF PAEDIATRIC UROLITHIASIS

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AIMS: To determine the demographic patterns, etiology and risk factors in paediatric urolithiasis.
METHODS: An interventional study was conducted in 168 children with stones with normal renal functions and no urinary tract anomaly and 76 siblings. History, physical examinations and dietary assessment was done. Lab investigation included CBC, serum urea, creatinine, electrolytes, Calcium, Phosphate, uric acid, protein, Magnesium, urine analysis and culture. Twenty four hours urine for metabolic analysis included calcium, oxalate, phosphate, magnesium, citrate, uric acid, cystine, sodium and potassium. Radiological investigations included ultrasound, x-ray KUB and x-ray IVU in all patients. Surgical management included ESWL, PCNL and open surgery. Stone analysis was done by IR spectrophotometry.
RESULTS: Majority of the children were male (Ratio M: F = 2.3: 1), age range 3 months to 15 years, 64% were from urban and 36% from peri urban and rural areas. 25% patients had an immediate family history of stone disease and 40% in extended family history. Prominently vague abdominal pain in children $<=$ 5 yrs and flank pain was predominant symptoms in $>$ 6 yrs. 104 (62%) patients had renal stones (Bilateral renal 42, 25%). Ureteric stone was seen in 6 (3%) Bladder stone was seen in 30 (18%), while multiple sites of stones was seen in 28 (17%). Urinary risk factors showed hyperuricosuria ($p = 0.04$) in patients vs. controls. Stone composition in renal and bladder stone analysis showed predominance of ammonium acid urate (AAU) in age group $<=$ 5 yrs and calcium oxalate (CaOx) in older age group.
CONCLUSIONS: Children of less than 5 years of age predominantly have AHU stones in the kidney, while children more than 5 years have predominance of CaOx stones. Where as bladder stones continue to have AHU and CaOx in equal proportions. The presence of AAU in the core of kidney and bladder stones in children points to a probable common etiology i.e.malnutrition, diarrhea and wheat germ diet.

A-124
METABOLIC EVALUATION IN PEDIATRIC STONE DISEASE

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AIMS: As the recurrence of stone disease is common it is wise to study factors playing role in the etiology. In this study the database of pediatric stone disease in Hacettepe University Department of Urology has been re-evaluated. This is the largest pediatric stone disease metabolic evaluation data in the literature.
METHODS: The metabolic evaluations of 205 pediatric stone cases that had been treated from 1996 to 2002, had been analyzed multiparametrically.
RESULTS: The spot and 24 hours collected urine samples of patients have been metabolically analyzed prior to surgery or ESWL. Also after the procedure was applied the extracted stones had been analyzed in the MTA Institute. We could complete the metabolic evaluations of 165 patients (81%). In 46 (22.3%) of the patients, there were no metabolic abnormalities. There were hypocitraturia in 28.8%, hyperoxaluria in 24.4%, cystinuria in 7.3%, hypercalciuria in 6.3%,hyperuricosuria in 4.4% and two or more metabolic abnormalities in 15.1%. In cystograms of 43 of the patients we observed 6 vesicoureteral refluxes. The metabolic data of the refluxing cases were not different from the non-refluxing ones. After the operations we could obtain 133 (64.9%)patients' stone analysis results. The calcium-oxalat stone was the most common (66.9%), and whewellite subtype of this stone was obviously outstanding (38/89). Also relatively frequent stones were as follows: cystine stones (12%), uric acid stones (13.5%), struvite stones (8.2%), and mixed types (12.8%). Moreover for calcium stones hyperoxaluria (40%), hypocitraturia (36%), and hypercalciuria (10%) were the most common metabolic abnormalities.
CONCLUSIONS: Hypocitraturia is the most common metabolic abnormality in pediatric stone disease. Hypocitraturia and hyperoxaluria are the major metabolic factors playing role in the etiology of calcium stones. Hypercalciuria is detected less than expected. In the pediatric stone disease vesicoureteral reflux is more frequent than the normal population, but there was no difference between the refluxing and nonrefluxing groups when metabolic abnormalities were concerned.

A-125
HACETTEPE EXPERIENCE IN PEDIATRIC STONE DISEASE

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AIMS: In this study pediatric stone disease database in Hacettepe University has been evaluated retrospectively for demographic, clinical data, and treatment modalities.
METHODS: The demographic data of 259 children, who had been treated for urinary stone disease, is given.
RESULTS: 259 children between 3 months and 16 years (mean 80 months) had been followed up for 3–72 months (mean: 15.6 months). The complaints at first visit were pain (52.4%), urinary tract infection (16.5%) and hematuria (14.6%). 15% of the patients had family history of urinary stone disease. The stones localized in the kidney (52.3%), renal pelvis (19.5%), upper ureter (9.4%),lower ureter (14.1%), and in bladder (3.4%). The average stone mass was $10 +- 2.3$ (4–13). We have applied extracorporeal shock wave lithothiripsy in 40.1% (one or multiple sessions), percutaneous nephrolithotomy in 19.3%,ureterorenoscopy in 8.1%, pyelolithotomy in 6.9%, ureterolithotomy in 6.2%, nephrolithotomy in 2.3%, nephrectomy in 1.5%, cystolithotomy in 1.5%, cystolithotripsy in 0.8%; and 9.7% of them were followed conservatively. There were accompanying abnormalities in 35 patients (15%), and 67.8% of these were urinary tract associated. In cystograms of 37 patients 6 had also vesicoureteral reflux. After management 76.4% of patients was stone free, 14.5% had 2 mm or smaller residual stones, and in 4.2% stone mass decreased. In 20% second session, in 2.4% third session and in 1.9% fourth session of treatment applied. Multi-session treatments were usually needed in cystine stones. Of the 205 patients in 65% stone analysis, and in 80% metabolic evaluation had been conducted. Dietary advice (10%), scholl solution (24.4%), urocit-k (13.2%), alpha-mercaptopropionyl glycine (7.5%), thiazid diuretics (3.9%), or ammoniumchlorur (1.5%) treatments were ordered for metabolic improvement.
CONCLUSIONS: The treatment modalities for stone disease applied in adults can also be applied in children. Incidences of congenital anomalies and vesicoureteral reflux are higher in urinary stone forming children than in normal population. Cystine stones have the highest recurrence rate. Medical treatment has an important role in prevention of recurrence.

A-126
COMPARISON OF METABOLIC PROFILES BETWEEN ADULTS AND CHILDREN WITH PRIMARY UROLITHIASIS: SOME CLUES FOR PEDIATRIC STONES AT AN ENDEMIC AREA

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AIMS: To compare the metabolic profiles of adults and children with urinary stone, and to obtain some clues about etiology of pediatric urolithiasis in the endemic area of Southeast Turkey.
METHODS: Consecutive 15 adults and 23 children diagnosed as urinary stone disease for the first time. The age, gender, body surface area (BSA, Haycock formula) and daily fluid intake of the subjects were recorded. In 24 hours urine samples of all patients, total volume, protein, creatinine, sodium, calcium, phosphate and magnesium levels; in serum samples, creatinine, sodium, calcium, phosphate, magnesium and uric acid levels were studied. For convenient comparative analyses, urine values of both groups were equalized with BSA correction.In statistical analyses, Mann-Whitney U and chi-square tests were used.
RESULTS: Mean ages were 33(20–65)in the adults,and 5 (0.3–17) in the children with urolithiasis ($p < 0.05$). The male to female ratio was 10/5 in the adults, and boy to girl ratio was 11/12 in the children ($p > 0.05$). Statistically significant differences in daily fluid intake, urine volume, urine creatinine and calcium levels disappeared after BSA correction. Among the corrected 24 hours urine parameters, only protein level was statistically different between both groups (higher in the children) after equalization. In addition, serum creatinine level was statistically lower, and serum phosphate level higher in the children.
CONCLUSIONS: In the study, most evident differences have not been found between adulthood and childhood urolithiasis diagnosed at our region in terms of metabolic profile herein. However it may be emphasized the probable relationship between renal loss of protein and urolithiasis in children, though larger series with more comprehensive analyses are needed for further outcomes.

A-127
CALCIUM OXALATE UROLITHIASIS IN CHILDREN

AIMS: To determine and study various salts in 24-h urine by renal calculi analysis in small groups of children with urolithiasis.
METHODS: In three groups of children the 24-h urine samples were examined for pH, calcium (Ca), oxalate (Ox), phosphate (P), uric acid (UA), magnesium (Mg), potassium (K), sodium (Na) and citrate (Cit). Merckognost was used for urinary calculi analysis.
RESULTS: *Case 1* is a 8 y. boy with 3.6mm stone in left renal pelvis and 2.6 mm ureteral stone. His grandmother and aunt had urinary stones. His urinescreen results: Ca – 2.5 mmol/d, Ox – 420 μmol/d, P– 24 mmol/d, UA – 3.14 mmol/d, Mg – 1.2 mmol/d, Cit – 0.8 mmol/d, pH – 6.0. His aunt's /35 y./ urinescreen results: Ca – 5.0 mmol/d, Ox – 1140 μmol/d, P –155 mmol/d, UA – 7.55 mmol/d, Mg – 1.3 mmol/d, Cit – 0.98 mmol/d, pH – 6.0. Boy's stones contained Ox 40%, Ca 50%, P 4%, Mg 1%, UA 0%, cystine (Cys) 0%, ammonium (Ammon) 0%. *Case 2* – a 15 y. girl. Renal ultrasound investigation revealed left and right pelvic stones, 6 mm and 4.5 mm respectively, and some rigid micro inclusions. Her grandfather and aunts had urinary calculous stones. The girl's urinescreen results: Ca–5.5 mmol/d /norm 5.0/, Ox – 937 μmol/d, P – 97 mmol/d, UA - 8.3 mmol/d, Mg – 1.8 mmol/d, K – 25 mmol/d, Na – 166 mmol/d, Cit – 1.4 mmol/d, pH – 5.0. Stones contained Ca 50%, Ox 50%, P 2%, Mg 0.5%, UA 0%, Cys 0%, Ammon 7%. *Case 3* – a 13 y. boy. Renal ultrasonography revealed 16.7 mm left pelvic stone with hydronephrosis. His grandfather had biliary tract stones and father – urinary stones. His urinescreen results: Ca – 2.6 mmol/d, Ox – 351μmol/d, UA – 4.97 mmol/d, P – 45 mmol/d, Mg – 2.0 mmol/d, K – 17.6 mmol/d, Na – 141 mmol/d, Cit – 0.5 mmol/d, pH – 5.0. Stones contained Ca 20%, Ox 50%, P 3%, Mg 1%, Ammon 0.5%, UA 0%, Cys 0% .
CONCLUSIONS. Results show the importance of evaluating genetic and multivariate risk factors in the pathogenesis of calcium oxalate urolithiasis. It could be presumed, that uric acid makes favorable medium for CaOx stone formation.

A-128
UROLITHIASIS AS A COMPLICATION OF PYELONEPHRITIS IN 8-TH MONTH OLD BOY

A. Goszczyk, V. Bochniewska, A. Jung, J. Rutka

AIMS: The authors present a case of urolithiasis in 8-th month old boy as a complication of pyelonephritis.
METHODS: This boy was hospitalised in 8-th month of his life because of pyelonephritis /etiology Proteus mirabilis/. In ultrasonography examination (US) pyelocalcycectosis dextra was observed /pelvis of the kidney 18 x 10mm, calyxes 8 mm/. Urography and cystography without pathology.
RESULTS: Two months later /in 11-th month of his life/ urine analysis shows: pH-8, ammonium phosphate, leucocyturia / pyuria/. Proteus mirabilis in urine culture was growed. In US a stone /13 mm/ in urinary bladder was found. During surgical intervention the stone was removed. The biochemical analysis of the stone: 62% Magnesium- amonium phosphate, 37% calcium oxalate /35% calcium oxalate monohydrate, 65% calcium oxalate dihydrate/
CONCLUSIONS:

1. Urinary tract infections with ureaso / + / pathogens /Proteus, Klebsiella, Pseudomonas/ are often the reason of urolithiasis.
2. Urolithiasis can also be recognised in such young age.

A-129
PEDIATRIC UROLITHIASIS AND URINARY TRACT INFECTION

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AIM: In most series, about 70% of pediatric nephrolithiasis are diagnosed during work up of UTI . In this study ,we evaluated the frequency of stones associated with UTI especially on the location of stones.
METHOD: This study was performed retrospectively on 48 cases of pediatric nephrolithiasis (age < 15 y), which were admitted during the last 7 years.
RESULTS: Recording of all 48 patients were reviewed, including 30 (62%) males and 18 (38%) females with a mean age of 7.8 years (range 1-15). Among these patients 23 (47%) had stone in kidney and in 12 (25%), 8 (16%) and 5 (10%) had stone in ureter, bladder, and urethra respectively. Established UTI was detected in 9 (18.75%) that included 6 with kidney stone and 2 with stone in urethra.
CONCLUSIONS: It appears that associated of UTI with urinary stones is not very common and if any,mostly UTI is associated with upper urinary stones.

A-130
CYSTINE CALCULI IN CHILDREN: THE RESULTS OF A METABOLIC EVALUATION AND RESPONSE TO MEDICAL THERAPY

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AIMS: To describe baseline metabolic abnormalities and evaluate mercaptopropionylglycine (MPG) plus potassium citrate (PC) treatment in restoring metabolic abnormalities and in preventing new stone formation in children with cystine stones (CCS).
METHODS: Daily urinary excretions of cystine, calcium, oxalate, citrate, magnesium, urate and phosphorus were determined in 18 CCS and 24 healthy children. The CCS were treated

with MPG at 10–15 mg/kg and PC at an initial 1 mEq/kg daily dose for a median 15 months. PC dose was adjusted to render urinary pH 6.5-7.5.
RESULTS: There was no significant difference in baseline metabolic profile between the CCS and the control group except for citrate. The CCS excreted less citrate than the control group ($p = 0.044$). After the treatment median SD urinary cystine (mmole/mole creatinine) decreased from 245 233 to 140 106 ($p = 0.015$). Urinary citrate increased from 255 219 mg/1,73 m^2 ($p = 0.003$). No serious adverse reaction was noted. Of the 15 patients with follow-up data, five (33%) developed eight recurrent calculi (recurrence rate 0.64 per patient year).
CONCLUSIONS: Our results suggest further investigation on low citrate excretion in cystinuric children. PC therapy was effective in raising both urinary pH and urinary citrate. However, high recurrence rate and persistent cystinuria in our patients emphasize the inadequacy of our treatment schedule in prevention of recurrent cystine calculi.

A-131
ULTRASONOGRAPHY IN MONITORING CONSEQUENSE OF LITHOTRIPSY TREATMENT IN CHILDREN WITH UROLITHIASIS

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AIMS: The aim of the study was to establish the usefulness of ultrasonography (US) in monitoring consequenc of lithotripsy treatment in urinary tract.
METHODS: The study included 276 patients (149 girls and 127 boys) aged 2–18 years with urolithiasis, treated in our Department since 1991 until 2002. In 276 children were performed 577 lithotripsy procedures (498 kidney and 79 ureter units). We analyzed US pictures after lithotripsy treatment. US examinations were performed using 5 MHz probe.
RESULTS: In 235/577 (40.7%) cases changes in urinary tract were found. We observed: in 138/498 (27.7%) cases changes in kidney parenchyma, in 76/498 (15.2%) cases- urinary retention in pyelocalyceal system, in 9/498 (1.8%) cases- stone in upper part of ureter, in 7/577 (1.2%) cases stone- in lower part of ureter, in 5/577 (0.8%) ''steinstrasse''. In 342/577 (59.3%) cases changes in urinary tract in ultrasonography examination were not observed.
CONCLUSIONS: 1/ US examination is effective method in monitoring consequence of lithotripsy treatment in urinary tract. 2/ US examination as noninvasive and safe method enables frequent monitoring urinary tract after lithotripsy treatment.

A-132
PEDIATRIC PERURETHRAL ELECTROHYDRAULIC LITHOTRIPSY. AN EXPERIENCE IN 85 CASES

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AIMS: Every attempt is made to render the patient stone free under one anesthetic with the least morbidity, cost and risk possible. Advent of small caliber panendoscopes and different types of intracorporeal lithotripsy machines makes it possible to deal with both urethral and vesical stones in kids through the urethra.
METHODS: Eighty-five kids were presented to our department between 1995–2002 with either vesical or urethral stones in 52 and 33 cases respectively. Age range was 1.5–12 years. Previous bladder surgery was reported in 28/85 (32.9%) cases.Stone burden ranged from 4–18 mm. Stones were radiolucent in 12(2.4) cases. Multiple bladder and combined urethral and bladder stones were recorded in 10 (11.8%). Electrohydraulic cystolithotripsy (EHCL) for all stones were done in bladder including urethral stones after its pushing back using irrigant wash. Disintegration was performed using either cystoscope (7.5F) or short ureteroscope(7 F) and electrohydraulic lithotripsy probes. Follow up range was 1–5 years.
RESULTS: Disintegration was successful in 83/85(97.6%).Mean operative time was 17 minutes. Urethral catheter was maintained for 23–72 hours. We resorted to open surgery in 2 cases of bladder perforations. No reported other operative and postoperative complications.
CONCLUSIONS: EHCL in children is a safe, simple and quick modality of intracorporeal lithotripsy. Its comparison with other modalities in terms of small flexible

A-133
PEDIATRIC UROLITHIASIS WITH RENAL FAILURE: RECENT ADVANCES IN THE MANAGEMENT AT A TERTIARY CARE CENTRE IN PAKISTAN

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AIMS: To evaluate the prevalence and advances in the management and its influence on the outcome of pediatric urolithiasis with renal failure.
METHODS: Between 2001 and 2002, 628 patients were admitted with stone disease. Initial history, physical examination, blood biochemistry, ultrasound kidneys and x-ray KUB was done in every case. Ninety-four children with renal stones had associated renal failure with blood urea ranging from 40 mg to 484 mg/100ml and S. creatinine ranging from 1.5 mg to 13.0 mg/100ml. The management in these 94 cases included initial resuscitation in the form of PCN, JJ stenting ± dialysis. After improvement of renal functions definitive management was done in the form of PCNL, URS and open surgery to make these children stone free.
RESULTS: At 3 months follow-up after treatment 18 children with calculus anuria had full recovery of renal functions (S. creatinine < 1 mg), while in 76 children, 36 (47.5%) had complete recovery, 16 (21%) had partial recovery while 18 (23%) had no recovery of renal functions. Results of PCNL, ESWL and URS shows slightly lower clearance rate in children with compromised function as compared to children with normal renal function.
CONCLUSIONS: Urolithiasis is endemic in children in Pakistan, 15% of all urolithiasis cases presented in renal failure. With application of modern endourological procedures many of the children can be saved from ESRD and open surgery.

A-134
ACUTE RENAL FAILURE DUE TO HYPOXANTHINE STONES IN A 3-YEAR-OLD GIRL

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AIMS: Urinary tract calculi composed primarily of xanthine and hypoxanthine are rare both in adults and children. We describe the clinical presentation and management of a 3-year-old girl who presented in acute renal failure with hereditary xanthinuria and bilateral urolithiasis formed from hypoxanthine. Classical xanthinuria is a rare autosomal recessive disorder of purine metabolism characterized by excessive excretion of xanthine in urine. Hereditary xanthinuria is classified into three categories. Classical xanthinuria type I lacks only xanthine dehydrogenase (XDH) activity, while type II and molybdenum cofactor deficiency also lack XDH and aldehyde oxidase enzyme activities.
METHODS: A 3-year-old girl was diagnosed as presented acute renal failure (creatinine clearence 39.5 ml/dk), hypouricemia (0.6 mg/dl) and bilateral urolithiasis. Urine excretion of uric acid was decreased (0.4 mg/dl). Because of obstructive uropathy due to ESWL resistant multiple and large stones, open lithotomy operation was performed.
RESULTS: After the litotomi operation, renal functions was return to normal. Stones was analyzed with X-ray diffraction-6000 machine to used Cu-X-ray tube and was determined hypoxhantine (C5 H4 N4 O) stones.
CONCLUSIONS: Hypoxanthine and xanthine stones due to hereditary xanthinuria are rare in the child and adult. Rutin analysis of plasma and urine uric acid levels are important to diagnose.

A-135
PAEDIATRIC UROLITHIASIS: EVALUATION OF RISK FACTORS IN 138 CHILDREN

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AIMS: Pediatric urolithiasis is a rarely encountered pathology except from endemic areas like our country. As a recurrent pathology which could reveal functional as well and morphologic changes in the urinary tract, apart from urogenital abnormalities, metabolic and environmental factors should be evaluated thoroughly in each patient. In this present prospective study, 138 children with stone disease are being evaluated regarding the patients' and family history together with serum and urine risk factors.
METHODS: Between 1996–2003, 138 children (56 female, 82 male) referring to our Department with complaints due to urolithiasis, with an age range of 0.6–16 years (mean 7.5) have been evaluated. All patients were examined with respect to stone localization, associated abnormalities, urinary tract infection, positive family history and that of serum, urine risk factors. In addition to standard risk factors (hypocitraturia, hypercalciuria, hyperoxaluria, hyperuricosuria, hypomagnesuria), dietary composition and 24 hours urine volume were also assessed in all children. Cystinuria has been looked for in all children and children with this specific pathology have been excluded from the study program. The results of surgical, endoscopic and medical treatment are being discussed.
RESULTS: Stone size ranged from 0.3 to 3.4 cm. with an average value of 2.2 cm. Localization of the stones were classified as unilateral single stone in 72 patients, multiple unilateral stones in 31 patients and bilateral multiple stones in 16 children. Our results demonstrated that hypocitraturia was the most common risk factor detected in our group. A positive family history was present in 74 cases (54%). In addition; urinary tract infection (UTI) was present in 85 cases (62%) and 67 cases gave an anamnesis of recurrent UTI in the past. Associated urogenital abnormality has been detected in 13 cases (9.4%). There was a significant correlation between stone size and urinary citrate excretion together with the presence of UTI and urinary phosphate excretion ($p < 0.05$ ve r:0.59, p:0.047). Treatments were open surgery in 23 (16%)cases, ESWL in 53 (38%) cases and Endoscopic surgery in 31 (22%)cases. Following these procedures while 77 (55%) patients were completely stone free, 40 (28%) patients had residual stones (< 5mm) and 12 (16%)patients passed the stone(s) spontaneously. During follow-up, regrowth were seen in 6 (4.3%) patients and again stone recurrence was noted in 6 (4.3%) cases.
CONCLUSIONS: Apart from stone removal procedures; treatment of pediatric urolithiasis requires a thorough metabolic and environmental evaluation of all patients in an individual basis. Obstructive pathologies have to be immediately corrected and apparent metabolic abnormalities should also be treated. Children with positive family history will be followed carefully with respect to stone recurrence. Urine volume increase in accordance to body mass index and medical therapeutic agents which in turn rise urine citrate levels should be encouraged.

A-136
COMPARISON OF URETEROSCOPIC TREATMENT OF STONES IN DISTAL, MIDDLE, AND PROXIMAL URETER AND RESULTS OF LONG TERM FOLLOW-UP

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AIMS: To evaluate the outcome of patients treated with ureteroscopy for stones in distal, middle, and proximal ureter and the long term complication rates, retrospectively.
METHODS: Medical records of all patients treated with ureteroscopy for ureteral stones between July 2000 and December 2002 were retrospectively reviewed. Patient characteristics, surgical parameters, and complications were compared for stones in distal, middle and proximal ureter. Radiological evaluations were performed in the first day, and third and twelfth postoperative months.
RESULTS: A total of 140 procedures were performed on 127 patients. There were 87 males and 40 females between the ages of 13 and 84 years. Ninety-four stones were localized in the distal, 22 in the middle and 24 in the proximal ureter.
Dilation proximal to the stone was present in 107 urinary tracts (76%). The mean stone size was 9.8 +− 4.7 mm. The operation time ranged between 15 and 300 minutes. In 80 procedures stones were fragmented with intracorporeal lithotripsy and in 116 procedures stones were retrieved via basket catheters with or without fragmentation. In 107 procedures (76.4%) stone clearance was achieved without any further treatment. In 13 procedures (9.3%) residual fragments remained that necessitated further treatment with ESWL or repeat ureteroscopy. In 20 procedures (14.3%) ureteroscopy failed. The success, residual fragment and failure rates were 87.2%, 9.6%, and 3.2% for distal, 77.3%, 4.5%, and 18.2% for middle and 33.3%, 12.5%, and 54.2% for proximal stones. Immediate or early complications were encountered in 18 procedures (12.9%). The complication rates were 9.6%, 18.2%, and 20.8% for distal, middle and proximal stones, respectively. The mean follow-up time was 12 months. In the long term follow-up 2 patients had ureteral stricture and both were managed successfully by balloon dilation. One of these patients had a proximal and the other middle ureteral stone.
CONCLUSIONS: Ureteroscopic treatment of ureteral stone disease is highly successful in appropriately selected cases. Stones located in middle and proximal ureters result in lower success and higher early and late complication rates.

A-137
ROUTINE URETERAL DILATATION DOES NOT NECESSARY FOR URETEROSCOPIC LITHOTRIPSY

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AIMS: Our aim was to report our experience on using of ureteroscopy without ureteral dilatation for the treatment of ureteral stones.
METHODS: Ureteroscopic stone removal with a pneumatic lithotripsy was performed in 134 patients (80 male, 54 female) with a mean age of 36.4 (18–65) years. The stones were located in lower, middle, and upper ureters in 92, 18 and 24 patients and the mean stone diameters were 9.2 (6–15) mm, 10.5 (8–15) mm and 8.8 (8-10) mm, respectively. The patients with upper ureteral stone had previously been treated with ESWL but fragmentation could not be achieved. All patients with middle ureteral stone and 64 patients with lower ureteral stone did not received any treatments. A 0.032 inch guide wire was placed in every patients before the procedure and 8 F ureteroscope was introduced into the ureter without any ureteral dilatation. The stones were fragmented by pneumatic lithotripter (VibrolitTM, Elmed, Turkey) in the ureter. The fragments were removed from ureter by basket catheter or stone forceps. A double J stent
RESULTS: The mean operation time was 44 (20–120) minutes. After the operation the stone-free rate was 89/92 (97%) for lower, 15/18 (83%) for middle and 18/24 (75%) for upper ureteral stones, respectively. The failure rate and migration of stone fragments were increased when stone is in the the proximal part of upper ureter. The fragments were migrated to the kidney in 5 out of 6 patients. In one patient, we could not reach the stone and an open ureterolithotomy was done. The main reason for failed lower and middle ureteral stone was blurred vision due to bleeding. Ureteral perforation did not occur in any patient. Patients were discharched from hospital within 6 to 24 hours.

CONCLUSIONS: In conclusion, our experience suggest that ureteroscopy with a pneumatic lithotripsy have a high success and low complication rate for the treatment of lower, middle and upper ureteral stones that cannot be treated with ESWL, and can be done without ureteral dilatation.

A-138
OPTIMAL TREATMENT IN LITHOTRIPSY WITH MINIURETEROSCOPE

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AIMS: To compare the methods of ''break and leave'' and ''break and clean'' in ureteroscopic lithotripsy.
METHODS: The last 100 patients with urolithiasis were randomly treated with miniureteroscope using the method of ''break and leave'' or ''break and clean''. A pneumotic lithotrite was used as the power source. URS procedure was done by 6,9 Fr ureteroscope and 3 Fr basket catheter or 3 Fr grasping forceps was used for cleaning procedure. KUB and USG were performed for the patients at fifteenth day of spontaneous passage following the lithotripsy.
RESULTS: This procedure was achived in 44 of 50 patients who underwent to lithotripsy and spontaneous passage. In 3 cases secondary ureteroscopic intervention was performed successfully following the primary procedure.The remaining 3 cases were subjected to an open ureterolithotomy due to the hard, multiple and/or big stones. Therefore, the success rate of intervention was 94%, whereas the complication rate was 0%. During the ureteroscopy, an open surgery was performed for one patient who was subjected to accessorial interventions in addition to the primary lithotripsy because the basket catheter was broke in two within ureter. In one patient, a severe narrowness of ureteral meatus was detected during the postoperative checks, and transurethral meatotomy was performed. In one patient, a detachment in the form of mucosal flap occurred during the extraction of stone, and was treated with peroperative cold section. In three patients, the basket catheter was affixed during the extraction. In two out of these patients, the basket catheter was removed together with the stone without traction during the 24–48 hours spontaneous passage period, while in one patient the basket catheter was removed together with the stone using the method of peroperative unroofing. Our interventional success rate was 98%, and the complication rate was 12%.
CONCLUSIONS: Although using the ''break and leave'' method combined with an accessorial tool for cleaning the pieces of stone operation seems to reach a similar success rate, both the high possibility of complications and additional cost of 150

A-139
A NEW URETERORENOSCOPE WITH SEMIFLEXIBLE SHAFT AND 270° DEFLECTION: COMPARISON WITH CONVENTIONAL SCOPES

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AIMS: Flexible ureterorenoscopy is widely used for minimal-invasive stone treatment and allows, in conjuction with specific tools and probes, extraction of lower pole stones. However, the maximal scope deflection is impaired after introduction of these extraction instruments and retrograde access to the lower pole might become difficult. We developed in cooperation with other groups a new flexible ureterorenoscope with 7.5 F diameter and a relatively rigid shaft, that allows very high deflections. Aim of the study was comparison of the new scope with available flexible ureterorenoscopes after insertion of lithotripsy tools and probes.
METHODS: We measured active/passive deflection and maximal irrigation flow of several flexible ureterorenoscopes (9.0 F Wolf, 7.5 F Olympus, 7.5 F Storz and the new 7.5 F Storz) and inserted 9 different instruments. Additionally, the maximal deflection that allows easy passage of the tools through the working channels was determined.
RESULTS: The new semiflexible ureterorenoscope reached significantly higher maximal deflections than the other scopes. With an empty working channel, maximal active deflection of 270° could be reached. Thin instruments as 200 μm laser probes or 2.4 F zero-tip baskets did not influence the deflection in contrast to the other scopes. Also with larger tools as the 3 F triceps grasper deflections up to 180° were possible. The irrigation flows of the new scope were comparable with the 7.5 F Storz and Olympus, which have the same working channel diameter. The bigger 9 F Wolf scopes reached highest irrigation flow.
CONCLUSIONS: The knowledge of the influence of probes on scope mobility is important for planing and performing successful flexible ureterorenoscopies as the tested flexible ureterorenoscopes differed significantly with respect to passive and active deflection. The newly developed semiflexible scope has advantages compared to conventional instruments and may allow retrograde stone extraction also under difficult anatomic situations

A-140
RIGID AND FLEXIBLE URETERORENOSCOPY: IMPACT OF SIMULATOR TRAINING ON CLINICAL SKILLS

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AIMS: The recently developed UroMentor provides highly realistic simulation of rigid and flexible ureterorenoscopy (URS). In order to become standard training equipment, the impact on personal clinical improvement and skills must be justified. We therefore evaluated the outcome of training in urological novices and experts.
METHODS: Group 1: 20 experienced urologists (total number of flexible URS 21–153) were monitored during flexible URS for treatment of a lower calyx stone and the outcome was correlated to individual experience. A score was compiled based on recorded parameters, e.g. total operation time, stone contact time, complications such as bleeding or perforation, and treatment success. Group 2:5 urological residents without endourological experience were trained in rigid URS for ureteral stone treatment on the UroMentor. Clinical skills were subsequently compared to those of untrained persons.
RESULTS: Group 1: All urologists achieved stone disintegration and removal on the simulator. The reached score was equivalent to their personal experience. Group 2: Simulator training resulted in an inclined learning curve for the residents. Comparison with untrained residents in clinical cases showed distinct advantages in favour of the trainees and confirmed our hypothesis that simulator training is a safe and effective method of URS training.
CONCLUSIONS: Our data strongly supports the impact of URS simulator training on clinical cases. A high level of personal experience with ureterorenoscopy clearly correlated with skills shown on the simulator. It was further demonstrated that simulator training distinctly improves clinical skills.

A-141
URETEROSCOPY AND ENDOCORPOREAL LITHOTRIPSY IN UROLOGICAL URGE SITUATIONS. REFLECTIONS ABOUT 418 CASES

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AIMS: To prove the feasibility of ureteroscopy in urological urge situations and to identify risks factors that predict post operative events.
METHODS: The data of 418 patients who underwent ureteroscopy with stone fragmentation in particular situations from December 1992 to June 2002 were analyzed.All of the patients

were managed by semi rigid ureteroscopy associated to ballistic lithotripsy . 145 acute renal colic; 90 acute renal failure; 165 obstructive pyelonephritis and 18 pregnant women were involved in this data. In 2 patients, haemodialysis was necessary before URS because of severe renal impairment. JJ stenting was performed in all cases except the patients treated for renal colic (92 of 275 patients:33.5%).We evaluate the effectiveness of this procedure in treating the stone and to relief pain; to control infection and to improve the renal function.
RESULTS: Access to the ureter was successful in all cases with establishment of ureteral permeability after a single session. In 10 cases (2.5%) complementary ESWL was necessary to treat flushed stones. We noted 2 ureteral perforations (0.5%) managed successfully in 97% of cases (10 flushed stones; 3 partial fragmentation). Pain relief was obtained within 24 hours after the procedure. Infection control was obtained after URS and ureteral stenting associated to wide spectrum antibiotherapy except 2 cases of severe septicaemia (1.2%) . In case of obstructive anuria we noted improvement in renal function within 6 to 12 hours following URS and stone fragmentation. In these cases (90cases), ureteral stenting was performed also systematically.For the 18 pregnant women, this procedure treated the stone in 14 cases (77.8%) successfully. We had not noted premature delivery.Except the 4 cases of severe infection and ureteral perforation, no particular complications were noted.
CONCLUSIONS: Urgent management of complicated ureteral stones is possible using semi rigid ureteroscopy and ballistic lithotripsy with low morbidity rate. A good selection of patients associated to mandatory technical precautions and well trained urologist are the main factors that predict the success rate of this procedure and the post operative events.

A-142
ELECTROCONDUCTIVE LITHOTRIPSY FOR RADIOLUCENT RENAL STONES USING THESONOLITH 4000 LITHOTRIPTER

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AIMS: Radiolucent renal stones (mainly uric acid stones),are sometimes too large and resistant to oral chemolysis.We describe here our experience,treating them with the electroconductive lithotripter Sonolith 4000,which has a dual type localization system.
METHODS: Data analysis from 570 consecutive patients with renal stones ,treated between 1/1/2001–1/9/2002, revealed 22 patients (3.85%) having radiolucent stones. All patients had been previously treated orally for at least 30 days,with no success (20 of them with Allopurinol + bicarbonates, having ahyperuricemic status). There were 9 men and 13 women, mean age 62 years, presentinga mean stone size of 10.8 mm, (5–25 mm) (max.diameter). They had 25 stones (10 in pelvis, 5 in middle calyx and 10 in the lower calyx). Five patients had a pig tail stent placed before treatment. The Sonolith 4000 lithotripter (EDAP-Technomed) delivers shock-wave energy on a very precise pathand has an additional ultrasound localization arm with a 3.5 MHztransducer, giving online data on a touch screen monitor.
RESULTS: Seventeen patients (77.27%) became stone free after one session at month control. Another four (18.18%) needed more than one session and adjuvant oral chemolysis ,being larger or and inside a lower calyx. Totally 21 were free at 3 months (95%). Among stone free patients, 2 relapsed (9%) during the next 6 months and treated successfully with lithotripsy. Only six patients needed minor analgetics (diclofenac IM) during sessions, but no other medication. The ultrasound localization system permitted precise focusing, even in the presence of multiplestones or pigtails. The mean shock wave number was 2157.6 (800–3000) and the mean energy (Bars) was 487.7 (99–747). There were no serious intra or post treatment complications.
CONCLUSIONS: Electroconductive lithotripsy is a safe and useful tool for the treatment of radiolucent renal calculosis. The easiness of localization, the precise delivery of energy and the relatively painless procedure helps for an efficient and patient friendly treatment.

A-143
INFLUENCE OF DIFFERENT STONE EXTRACTION TOOLS AND LITHOTRIPSY PROBES ON SCOPE DEFLECTION AND IRRIGATION FLOW OF SIX DIFFERENT FLEXIBLE URETERORENOSCOPES

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AIMS: Lower pole renal ureteroscopic access is frequently limited by alterations of deflection and irrigation flow when an instrument is passed through the working channel. Actually, a new active primary and secondary deflecting ureterorenoscope (URS) is available to reliably reach the entire renal anatomy, including the lower pole calyces. The aim of this study was to determine the influence of different tools and probes on the active deflection and flow irrigation of 6 different URS including the new DUR 8 Elite.
METHODS: Alterations in the active deflection and irrigation flow (60 and 100 cm H_2O) of 6 flexible URS (ACMI DUR 8 & DUR 8 Elite, Wolf 7.5F & 9F, Storz 7.5F,Olympus 6.9F) were evaluated in vitro using 13 stone extraction tools (Ncircle COOK®, Zerotip-Graspit-Triceps Microvasive®, Sur-Catch ACMI®, Dimension Bard®),1.9F non-nitinol basket and 2.4F graspers Bard®) and 6 lithotripsy probes (Holmium YAG laser Versapulse® (200–365µ) and ACMI (200µ), Nd:YAG Freddy Laser® (200µ), Electro-hydraulic (EH) ACMI® 1.9F, flexible Swiss Lithoclast Master®).
RESULTS: The flexible Swiss Lithoclast® probe, the 365µ Holmium:YAG laser and the non-nitinol-tools significantly inhibited the deflection of all URS. 200µ laser fibers (Holmium YAG, Freddy®) and 1.9F EH probe had minimal influence on the deflection (2 to 50°). The greatest deflection with inserted stone extraction tools was possible with all nitinol baskets and Microvasive Triceps®.For all URS, the irrigation flow with an empty working channel was 42–56 ml/minute (at 60 and 100 cm H_2O). All stone extraction tools significantly reduced the irrigation flow (0 to 9 ml/minute). In contrast 200µ laser fibers and EH probe had minimally influence on the flow irrigation (14 to 36 ml/minute).Greatest deflections with inserted tools/probes were obtained with the DUR 8 Elite due to its active secondary deflection.
CONCLUSIONS: The alteration of the deflection of the URS by tools/probes must be respected in order to perform a successful flexible ureterorenoscopy to treat stones in the lower pole. Actually, greatest deflection are obtained by the combination of nitinol tools, 200µ laser fibers or 1.9F EH probe with the new DUR 8 Elite URS.

A-144
EXPERIENCE OF INTRACORPOREAL LITHOTIPSY IN THE MANAGEMENT OF LOWER URETERAL CALCULI USING LITHOCLAST

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AIMS: Aim: The management of stone lower end ureter, especially in recurrent cases and with large stone mass, considered a challenge for the urologist. The introduction of endourological instrumentation and the technology of urinary tract imaging and intracorporeal lithotripsy have solved many conditions to retrieve such cases by ureteroscpic maneuvers.
METHODS: We are the only clinic in Aden governorate treating urinary tract stones by extracorporeal and intracorporeal lithotripsies. In this study running since January 2001 till December 2002, 98 patients with stones lower end ureter were treated with ureteroscopy and ureterolithotripsy using swiss lithoclast. The stone main diameter was 6.5mm (between 4 to 14 mm).

RESULTS: In 89 patients (90.8%) were stones removed successfully. They were extracted by dormia basket in 21 cases (23.6), in 17 cases (19%), and in 51 patients (57.3%) we used lithoclast to fragment the stones. Ureteral stent was inserted in 38 cases (38.8%). The average operative time was 35 minutes and the average hospital stay was one day. The outcome of this procedure was favorable with least complications and cost-effective.
CONCLUSIONS: Our experience shows that ureteroscopic lithotripsy provide a safe and effective means of performing intracorporeal lithotripsy for lower ureteral stones. Thus, ureteroscopic pneumatic lithotripsy can treat effectively lower ureteral calculi. J Endourol 2001 Sep;15(7):697–9

A-145
OUR EXPERIENCE ON ENDOSCOPIC SURGERY FOR URETERAL CALCULI IN PEDIATRIC POPULATION

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AIMS: By the development of smaller size instruments, choice of treatment for ureteral calculi in pediatric population has become endoscopic more than open surgery. This study aims to present our experience on endoscopic surgery for ureteral calculi in pediatric population.
METHODS: We included 21 children who were treated with ureterorenoscopy (URS) for ureteral calculi between November 1997 and February 2002.
RESULTS: The mean age of the children was 6,5 (1–14) years. The mean follow-up duration was 8 (3–18) months. Ten patients were male and 11 were female. The stone was in the upper ureter in nineteen cases and in the lower ureter in 2 cases. 7,5 F ureteroscope was used for access into the ureter. For lower ureteral stones Holmium YAG laser was used in 18 cases and forceps extractor for 1 case. Both of two stones in the upper ureter were pushed back. The mean stone size was 7.7 mm (4–15 mm). The mean duration of anesthesia was 47 min (15–90 min). In all cases fragmentation was achieved during the operation.
Except the push-back cases, stone free rate after single-stage procedure was 79%(15/19). With the repeating procedures in the remaining 4 cases, success rate became 95% (18/19). In push-back cases, the stone free state was proved after ESWL. Ureteral perforation occurred in two cases. The stone migrated out of ureter in one case while this case was managed conservatively and in the other one first an ureter catheter was placed than URS was performed and the stone was fragmented with laser.Double J stent was placed after the procedure in 19 cases. Ureteral catheter in 2 cases and glide-wire in 1 case were placed after unsuccesful DJS placement attempt. In the case which glide-wire was left DJS was placed 5 days later.
CONCLUSIONS: In the pediatric age group as in adults, URS and laser lithotripsy is effective particularly in the lower ureteral stones.

A-146
INTRACOPOREAL LITHOTRIPSY FOR URETERAL CALCULI – EXPERIENCE IN 1474 PATIENTS

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AIMS: Purpose: we evaluate the effectiveness & safety of different modalities of intracorporeal ureteroscopic lithotripsy for management of ureteral calculi in 1474 patients.
METHODS: Intracorporeal ureteroscopic lithotripsy by ultrasonic,electrohydrolic, pulsed-dye laser and holmium-YAG laser lithotripters was performed in 1474 patient between 1988 and 2002. Urteral calculi were located in distal ureter in 50.2%, mid ureter in 17% & proximal ureter in 32.8%.Various rigid, semirigid & flexible endoscopes were used. Patients were assessed post operatively by KUB & U/S to assess the stone free state after the procedure.
RESULTS: The overall success rate was 95.7%. As stratified by the modality of disintegration, the success rate of ultrasonic lithotripter was 93.3%, electrohydrolic lithotripsy was 93.8%, pulsed dye laser was 96.4% while holmium- YAG was 97.4%. Fragmentation was incomplete in 1.8% of cases which requires second look ureteroscopy to reach the stone free state. The complications of intra-corporeal lithotripsy was highest with electro-hydrolic lithotripsy (9%), while with holmium-YAG laser it was the lowest (0.8%).
CONCLUSIONS: As regard the different moderlalitites of intracorperal ureteroscopic lithotripsy, holmium-YAG laser was the most effective & safe lithotripter in the management of ureteral calculi. The effectiveness & safety of holmium-YAG laser lithotripsy combined with the small caliber ureteroscopes make it the best modality for ureterosocpic lithotripsy.

A-147
BOTTLED MINERAL WATERS IN TURKEY AND THEIR PREVENTIVE ROLE IN RENAL STONES

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AIMS: There have been some controlled trials in humans on the beneficial effects of drinking mineral waters (especially hydrogencarbonated or calcium and magnesium rich ones) on risk factors for urolitiasis. We aimed to determine the chemical compositions of natural mineral waters bottled in Turkey and evaluate their possible beneficial effects in reducing renal calculi formation.
METHODS: Bottles of twenty-four of the 25 commercially bottled natural mineral water brands in Turkey were collected from the market. Each sample was analysed for Total Dissolved Solids (TDS), hardness and for $Na+$, $K+$, $Ca++$, $Mg++$, $Cl-$, $F-$, $HCO3-$, $SO4-$, and CO2 levels.
RESULTS: 19 water samples were classified as ''mineral water'',since their total mineral concentrations were above 1000mg/L. The calcium contents of 5 water samples were found above the level of 300 mg/L $Ca++$ that makes them rich in calcium. Similarly, magnesium contents of 6 bottled waters were above the desirable concentration of 100 mg/L $Mg++$ for natural waters rich in magnesium.12 bottled mineral waters had high bicarbonate contents over 1300mg/L HCO3—that gives them the characteristics of hydrogencarbonated water.
CONCLUSIONS: Bottled mineral waters in Turkey, with their suitable chemical ingredients may have potential beneficial effects on risk factors for renal stones. It might be expected that risk of stone formation (especially calcium oxalate stones) can be reduced by consumption of hydrogencarbonated mineral waters bottled in Turkey, which are rich in Calcium and Magnesium as well.

A-148
ATOMIC ABSORPTION SPECTROSCOPIC STUDY OF DIFFERENT WATER SAMPLES CONSUMED BY PATIENTS HAVING UROLITHIASIS AND SCANNING ELECTRON MICROSCOPIC STUDY OF *INVITRO* CRYSTALS

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AIMS: The study was conducted to find out the effects of quality of drinking water on the crystallization process of urine.
METHODS: Sixty five water samples consumed by proved urinary stone patients were analyzed using atomic absorption spectroscopy for qualitative analysis and the same water samples were

added to in vitro crystal growth medium to study the difference in crystal growth.
RESULTS: The atomic absorption spectroscopic study of water samples showed that there is appreciable difference between the calcium and sodium values of tap and well water. It was found that as the hardness, total dissolved solids and calcium content of the drinking water increases there is corresponding increase in the crystal growth. The in vitro crystal aggregation was significantly more in the setup adding well water compared to the set up adding tap water.
CONCLUSION: The quality of drinking water, along with other promoters of stone formation might be an added risk factor in the much complex process of urolithiasis.

A-149
DOES CONSUMPTION OF DRINKING WATER INFLUENCE STONE FORMATION

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AIMS: In this paper, the role of drinking water in the genesis and prevention of stone formation was studied.
METHODS: 100 samples of water consumed by various colic, crystalluric and stone patients during the time of 24 hour urine collection were analyzed using atomic absorption spectroscopy. Interrelationship between the elements in drinking water and urine biochemistry was assessed. 23 factors were studied viz. pH, electrical conductivity, total dissolved solids, turbidity, total hardness, calcium, magnesium, sodium, potassium, total alkalinity, carbonate, bicarbonate, sulphate, chloride, fluoride, iron, nitrate, silica, phosphate, lead, cadmium, zinc and total coliforms
RESULTS: The mean values of 8 factors directly related to the process of stone formation were calculated for a 24 hour daily intake. The observation showed the following mean values; total hardness-30, calcium – 1852, magnesium – 253, sodium – 2115, total alkalinity – 18.18 bicarbonate – 1628 fluoride – 824 and silica – 1497. These mean values were correlated with the corresponding 24-hour urine out put values,
CONCLUSIONS: The content of elements in drinking water formed a significant amount of intake in certain situations, thus increasing the total dietary intake of the particular nutrient. It is observed that the quality of drinking water influence calculogenesis in the stone patients. This aspect needs to be incorporated in the dietetic advice given to the stone patient. Analysis of individual water samples thus gains clinical significance.

A-150
EFFECT OF ACUTE LOAD OF SIX SOFT DRINKS ON URINARY STONE RISK FACTORS

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AIMS: Stone patients are generally advised to take plenty of fluid and they frequently ask which is the best form to take this. Many add cranberry juice to their diet because of its perceived benefits for the urinary tract. However, little is known about the effect of cranberry juice on urinary stone risk.
METHODS: Six volunteers participated in this study of six drinks, a still mineral water (volvic), a carbonated mineral water (Perrier), cranberry juice,orange juice,grapefruit juice and Coca-cola. A control urine sample was collected 2 hours after consuming 500 ml of a standard mineral water. This was followed by a test drink (1000 ml, taken over 1 hour) and all urine in the following six hours was collected and pooled. Urines were analysed for pH, calcium, oxalate, citrate, sodium, potassium, magnesium, phosphate and creatinine. Results were analysed in relation to creatinine as the difference between control urine and test urine (paired t-tests).
RESULTS: Orange juice, grapefruit juice and Perrier water caused a significant increase in pH ($p < 0.05$) and both calcium and citrate were significantly increased by grapefruit juice ($p < 0.05$). There were no notable differences observed which might be expected to influence stone disease.
CONCLUSIONS: In this study of a large acute load of various soft drinks, none were found to be particularly beneficial or detrimental in terms of excretion of stone risk factors. In particular, the popular use of cranberry juice appears to be neutral in any lithogenic properties and can be a useful means to increased urine output.

A-151
THE EFFECT OF ALCOHOL CONSUMPTION ON THE EXCRETION OF LITHOGENOUS SUBSTANCES

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AIMS: The consumption of alcohol has risen continuously since World War II in Japan. It is correlates with the growing incidence and prevalence of urinary stone disease as well as the instance the consumption of animal protein. A high intake of alcohol results in a rising lactatemia which causes a decrease of the renal elimination of uric acid and hyperuricemia. However, there has been no detailed examination to determine whether the effect on urinary substances by the alcohol consumption. We conducted the comprehensive metabolic evaluation
METHODS: Male Wister rats were fed nutritionally adequate liquid diet for 4 or 8 weeks in which ethanol provided 5% of liquid. Pair-fed littermates consumed the same diet that an isocaloric amount of carbohydrate was substituted for ethanol. 24-hour urine collection was performed before feeding ethanol, and after 4 or 8 weeks. The analysis of each 24-hour urine specimen include urine volume, osmolarity, and excretion of the following ionic components: calcium, phosphate, uric acid, urea nitrogen, sodium, potassium, magnesium, citrate, oxalate, and creatinine. The statistical analysis of data was performed by Mann-Whitney U test.
RESULTS: Urine volume was low and osomlarity was high in rats, which fed ethanol. Urinary citrate was significantly lower in rats with ethanol than control rats (14.6Å} 21.6 versus 3.8 Å} 0.6 É g/day at 4weeks, 93.1 Å} 36.2 versus 38.21 Å} 15.9 É g/day at 8 weeks) There were no statistical differences in other metabolic substances between rats with ethanol and control rats
CONCLUSIONS: The risk of stone formation increase with the consumption of alcohol, which conducts low urinary volume, high urinary osmolarity, and hypocitraturia.

A-152
THE IMPACT OF DIET IN IDIOPATHIC CALCIUM OXALATE STONE DISEASE

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AIMS: Malnutrition is suggested to be the major environmental risk factor in idiopathic calcium oxalate stone disease. The aim of the present study was to evaluate the effect of diet modifications on urine composition and the risk of calcium oxalate crystallization in calcium oxalate stone formers.
METHODS: One hundred and seven consecutive calcium oxalate stone patients, 76 men (mean age: 47.4 +/–14.0 years) and 31 women (mean age: 43.9 +/–12.1 years) were enrolled in the study. None of the patients had apparent predisposing conditions, such as primary hyperparathyroidism, Crohn's disease,intestinal resection or other specific disorders. Each subject collected 24-h urine on a habitual, self-selected diet and after 7 days on a standardized diet according to the dietary recommendations for calcium oxalate stone formers.

RESULTS: On the usual diet, low urine volume (< 2 l/24h) was present in 57.9% of patients, hypercalciuria (> = 8 mmol/24 h) in 25.2%, hypomagnesuria (< 3.0 mmol/24h) in 18.7%, hyperoxaluria (> = 0.5 mmol/24 h) in 14.0%, hyperuricosuria (> = 4.0 mmol/24 h) in 41.3%, and hypocitraturia (< 2.5 mmol/ 24 h) in 57.0% of the patients. On the ingestion of the balanced mixed standardized diet,the relative supersaturation with calcium oxalate decreased significantly from 7.28 on the usual diet to 4.20 ($p < 0.001$), mainly due to the significant rise in urinary volume, pH value, magnesium and citrate excretion and the significant decrease in urinary calcium and uric acid excretion. Urinary oxalate excretion averaged 0.389 mmol/d on the usual diet and remained unchanged on the standardized diet (0.372 mmol/d).
CONCLUSIONS: The evaluation of urinary risk profile of the calcium oxalate stone patients on their usual dietary habits indicate a high risk for calcium oxalate stone formation. A low urine volume, hypocitraturia and hyperuricosuria were identified as the most frequent urinary metabolic abnormalities. The shift to a balanced mixed diet according to the recommendations for calcium oxalate stone formers significantly reduces the stone-forming potential.

A-153
THERAPEUTIC ROLE OF DIETARY CALCIUM/OXALATE RATIO INURINARY STONE DISEASE

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AIMS: The study was conducted to find out the therapeutic role of calcium /oxalate ratio in urolithiasis patients.
METHODS: A dietetic survey was conducted among 350 proved urinary stone patients simultaneously with the 24 hour urine collection, with detailed record of the meal items consumed by each of them. The daily intake of nutrients was estimated using a computer program designed for the purpose. The 24 hour urine was analyzed for each of the nutrients.
RESULTS: It was found that when calcium intake increased upto 2000mg from the normal range of 400–500 mg per day, there was no considerable rise in oxalate excretion. But this was not seen to be the case once the intake was more than 2000 mg per day. Hence it is highly possible that a calcium intake in the range of 2000–10000 mg per day will essentially lead to hyperoxaluria. The highest increase in the number of hyperoxalurics occurred when the intake rose from the range of 200–400 mg per day to 400–600 mg per day. So a daily intake of above 400 mg per day leads to an extremely high risk for hyperoxaluria. In an attempt to study the dietary relations in depth, we considered the oxaluric group separately. A significantly high %age of hyperoxalurics had a daily calcium intake within the range of 500–200 mg per day. Thus the maximum allowance for the daily intake of calcium is 200 mg per day, but value above 100 mg may put the patient at increased risk.
CONCLUSIONS: The study revealed the optimum dietary intake of calcium and oxalate for urinary stone patients.

A-154
THE EFFECT OF DIFFERENT DIETARY SUPPLEMENTS ON THE URINE CHEMISTRY OF BLACK AND WHITE SOUTH AFRICAN SUBJECTS

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AIM: Since urolithiasis is uncommon in South Africa's black population, the present study was undertaken to investigate the effect of different dietary supplements on the urine biochemistry of this race group as well as that of whites.
METHODS: Five different dietary protocols (calcium-rich diet, calcium supplement, vitamin B6 supplement, L-cysteine supplement and L-glutamine supplement) were administered and urinary excretion was examined in 10 white and 10 black stone-free South African subjects. 24h urine samples were collected from each subject at baseline and after 4 days on the prescribed protocol. The urine was analyzed using modern laboratory techniques.
RESULTS: None of the protocols altered the urine biochemistry in black subjects. In whites, the Ca-rich diet significantly increased urinary potassium (47.15 to 104.35 mmol/24hr [$p = 0.0001$]); the calcium supplement significantly decreased the Tiselius risk index(315 to 170 [$p = 0.014$]); the vitamin B6 supplement significantly decreased urinary calcium (3.89 to 2.50 mmol/24hr [$p = 0.016$]) and urinary phosphate (28.89 to 21.62 mmol/24hr [$p = 0.027$]); L-glutamine supplement significantly decreased relative supersaturation (2.63 to 1.41 [$p = 0.01$]); L-cysteine supplement significantly decreased urinary calcium (3.89 to 2.64 mmol/24hr [$p = 0.031$]) and the Tiselius Risk Index (315.37 to 168.18 [$p = 0.013$]).
CONCLUSIONS: In the present study all 5 dietary interventions had no effect on blacks. Since less than 1% of the South African Black population form kidney stones it seems that in blacks a homeostatic adjustment takes place keeping urinary concentration of substances in balance. All dietary protocols had favourable effects on whites.

A-155
DECREASING CALCIUM OXALATE CRYSTALLIZATION RISK DUE TO CONTROLLED CHANGES IN NUTRITIONAL BEHAVIOUR

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AIMS: Without any doubt, nutrition is one of the major factors influencing urinary composition. Dietary restrictions advised to stone formers in most cases led to a remarkable decrease in the long-term stone recurrence rate; supplementary medicine additionally enhances the treatment\'s success.
In this study, we tested the influence of a balanced diet given over seven days to recurrent calcium oxalate patients during hospitalization.
METHODS: From 30 calcium oxalate (CaOx) stone formers, inpatients in our hospital for evaluation of their metabolic status, the urinary CaOx crystallization risk according to the BONN-Risk-Index (BRI) was determined on the 1st and 7th day of their stay. The urine was collected in a day and a night fraction (8 am – 8 pm, 8 pm – 8 am). The patients were advised to eat all of the meals and beverages supplied, which were composed according to the recommendations of the German Society of Nutrition.
RESULTS: After one week of hospital stay, the mean BRI of the day urine fractions decreased by 30.6% (from initially 2.78/l to 1.93/l). A similar decrease was also observed in the night fractions: here, the mean BRI decreased by 32.0% (3.81/l to 2.59/l). Both decreases are statistically significant.
CONCLUSIONS: The obtained results reflect a considerable and relevant (general) change in the crystallization risk. Thus, this study clearly points out the importance of nutritional behaviour in, at least, CaOx stone formation. Although the patients have suffered from urolithiasis for many years, they did not change their general diet to their advantage. This may be due to both, a lack of sufficient enlightment, and low patients\' compliances. It is obvious that the success of dietary treatment, can be further increased by an individually composed diet – preferably under the guidance of a nutritionist taking into account the patient\'s particular metabolic disorder(s).

A-156
PROBIOTIC BACTERIA: A ROLE IN STONE DISEASE?

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AIMS: To investigate the ability of bacteria found in probiotic toghurts (Lactobacillus acidophilus and Bifidobacterium animalis) to metabolise oxalate.
METHODS: Freeze dried bacteria, used for yoghurt production were grown as starter cultures.These cultures were incubated for 3 days in microaerophillic conditions at 30 degrees celcius. 10 microlitres of each culture was innoculated onto de Man, Rogosa, Sharpe (MRS) broth under similar conditions. The final bacteria concentration produced was 3.6 x 10^4 organisms / ml, to which 5 mmol of Ammonium Oxalate was added. Oxalate concentration was measured after 24 hours incubation. A medium blank of broth and oxalate was prepared and used as a control for the oxalate analysis.
RESULTS: L. acidophilus demonstrated a significantly greater ability to degrade oxalate compared to B. animalis. Both bacteria were able to grow in an oxalate rich environment.The oxalate degrading properties are shown in Table 1.

Table 1 Oxalate degrading properties

Mean final oxalate concentration mmol/l		Mean % change in oxalate concentration
L. acidophilus	4.3	14.0*
B. animalis	4.6	8.0
Control	4.7	6.4

*p = 0.009 (t test)

CONCLUSIONS: L. acidophilus is able to grow in an oxalate rich environment and to degrade oxalate. L. acidophilus may have a role in the management of hyperoxaluric stone disease.

A-157
DIETARY ASSESSMENT OF PAEDIATRIC STONE FORMERS AND THEIR HEALTHY SIBLINGS

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AIMS: To compare the dietary patterns in paediatric stone formers and their healthy siblings, and to evaluate the effect of diet on stone formation
METHODS: One hundred and forty four patients and 60 controls were recruited from the paediatric stone clinic at SIUT during the same period. Demographic, anthropometric, biochemical, clinical and detailed dietary data was collected and analysed using chi square and T-test.
RESULTS: In the overall population, anthropometric data revealed that controls have better heights and weights than patients ($p = 0.03$, $p = 0.02$). When stratified for age, only weight was found to be significant in the 6–10 years age group ($p = 0.01$). Malnutrition based on Z Score related to age, height and weight revealed growth deficit in the patient population ($p = 0.02$). Food frequency questionnaire revealed patients to be consuming less protein, fiber and more oxalate in their diets ($p = 0.003$, $p = 0.004$ and $p = 0.009$ respectively). Seven day dietary intake showed paediatric stone formers to have a higher intake of oxalate and sodium ($p = 0.002$, $p = 0.02$) and a lower intake of protein ($p = 0.004$) than their siblings.
CONCLUSIONS: This study indicates poor nutrition and individual dietary risk factors influence stone formation.
(A-158 missing)

A-159
CALCIUM STONE DISEASE IN YOUNG FEMALE PATIENTS

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AIMS: It has been described that, within the past 25 years, there has been a progressive fall in the age of renal stone onset in the population and an increase in the number of young female patients. The aim of this study was to investigate the urine biochemistry and the dietary pattern of female calcium renal stone formers in the age group less than 30.
METHODS: From January 1996 to December 2002 a total of 1198 patients (814 M, 384 F) with upper tract renal stones were referred to our clinic for SWL treatment. We observed 47 female patients with age < 30 years (12%). Out of this group, in 13 patients we were able to obtain a full investigation comprising 24-hour analysis and dietary recall.
RESULTS: Mean urinary volume was 1761 +/–896 ml/day, fasting urinary pH 5.88 +/–0.54, urinary calcium 159 +/–65 mg/day, urinary citrate 423 +/–167 mg/day and urinary oxalate 24 +/–11 mg/day. Hypercalciuria was observed in 1 patient, severe hypocitraturia associated with MSK in 1 case and mild idiopathic hypocitraturia in 2 cases. Daily energy intake was 1761 +/–896 kcal. Intakes of proteins, carbohydrates and fat respectively 68 +/–17, 240 +/–96 and 61 +/–28 g/day. Calcium intake was 476 +/–299 mg/day. No history of urinary tract infection was present in any case.
CONCLUSIONS: No distinctive biochemical pattern for young female renal calcium stone formers was observed; in the majority of the patients stone disease was idiopathic. The dietary pattern was characterized by a reduced intake of calcium.

A-160
THE TIMING OF TAKING CALCIUM SUPPLEMENT AND THE RISK OF NEPHROLITHIASIS

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AIMS: Variation in the timing of calcium supplement may affect gastrointestinal absorption of both calcium and oxalate differently and may associate with variable risk of calcium oxalate (CaOx) nephrolithiasis. Limited human studies, under the usual diet and recommended calcium intake, on the appropriate timing for taking calcium supplement are available. The objective of this study was to compare calcium bioavailability and the risk of calcium oxalate stone formation during taking calcium supplement with meal vs. at bedtime.
METHODS: Healthy male navy officers,n = 32, age (mean +/– SD) 22.7 +/–1.9 years,weight 61.2 +/–7.4 kg who had normal renal function and no history of renal stone. The subjects were randomly allocated into Group A, taking 1 g of calcium carbonate with meal, 3 times/day; and Group B, taking 3 g/day of calcium carbonate at bedtime.After taking the regimens for 1 week, followed by 1 month of wash-out period, crossover for the regimens between both groups were done. The diet was controlled throughout the study. 24-hour urine collections for the determination of urinary constituents were obtained. Activity product of CaOx was applied to assess the risk of CaOx stone formation.
RESULTS: There was no difference in the urinary calcium excretions between those obtained during taking calcium supplement with meal (206.5 +/–104.4 mg/day) and those obtained during taking at bedtime (203.2 +/–93.7 mg/day). The urinary oxalate was significantly decreased when taking calcium supplement with meal (11.6 +/–4.5 vs. 15.0 +/–6.1 mg/day, $p = 0.01$) whereas there was no alteration when taking at bedtime (13.5 +/–4.3 vs. 13.3 +/–5.4 mg/day, $p = 0.9$), compared to the corresponding baseline values. There was no significant alteration in the activity product of CaOx when taking calcium with meal(0.57 +/–0.2 vs. 0.54 +/–0.3, $p = 0.54$), but significant increase when taking at bedtime (0.72 +/–0.3 vs. 0.47 +/–0.2, $p < 0.01$), compared to corresponding baseline values.
CONCLUSIONS: Calcium supplement should be taken with meal in order to avoid increasing the risk of calcium oxalate nephrolithiasis.

A-161
IS OXALATE MAINLY ABSORBED FROM THE STOMACH IN RATS?

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AIMS: To identify the main oxalate absorption site in the upper G-I tract, we measured oxalate excretion after acute administration of oxalate from either the stomach or the intestine.
METHODS: Male Wistar rats weighing approximately 180 g were divided into 6 groups of 5 rats each. After the animals were anesthetized with intraperitoneal urethan (0.6 mg), they were administered oxalic acid (10 mg, 110 mol) alone or oxalaic acid + calcium (4.4 mg, 110 mol), via a gastrostomy (control group), via gastrostomy with pyloric ligation (stomach group), or via the duodenum (intestine group), respectively. Urine specimens were collected hourly by bladder puncture before and at hourly intervals up to 5 h after administration, and immediately stored at –80 until assay. Urinary oxalate and citrate were measured by capillary electrophoresis (Hewlett-Packard 3DCE). Urinary calcium, magnesium and phosphorus were measured by ICP spectrophotometry (ICPS-7000,Simazu).
RESULTS: Both in the control group and intestine group, urinary oxalate excretion significantly increased at 1 or 2 h after administration. In the stomach group, urinary oxalate excretion did\'t increase at all. The administration of equimolar oxalate and calcium(110 mol) slightly increased urinary oxalate excretion in the control group. Each dose did\'t change urinary excretion of citrate, magnesium, and phosphorus,except calcium.
CONCLUSIONS: Free oxalate seems to be absorbed more readily than calcium oxalate from the G-I tract, and oxalate seems to be absorbed from the stomach. Therefore, in rats dietary oxalate is mostly absorbed from the intestine and is not likely absorbed from the stomach.

A-162
PNEUMATIC LITHOTRIPSY IN THE MANAGEMENT OF IMPACTED DISTAL URETERAL STONES

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AIMS: The treatment of impacted ureteral calculi by ESWL normally yields poor results. Intracorporeal lithotripsy can be a good alternative in these cases. We evaluated, retrospectively, the outcome of patients with impacted distal ureteral stones treated with uretroscopic pneumatic lithotripsy. We investigated the usefullness of pneumatic lithotriptor in impacted ureteral stones in the era of laser lithotriptors.
METHODS: From January 1999 to october 2002 fourty impacted distal ureteral stone cases were treated using retrograde ureteroscopic pneumatic lithotripsy. Stones were classified as impacted if a stent or wire could not be passed during procedure. Of forty stones eight (25%) were treated by ureteroscopic pneumatic lithotripsy as initial treatment and thirty-two (75%) with ureteroscopic pneumatic lithotripsy as auxiliary treatment after failed ESWL. The procedure was performed, with a semi rigid 9.5 Fr ureteroscope, after dilation of ureteral orifice. Stones were disintegrated into fragments 3 mm or smaller and they left for spontaneous pass. Total stone extraction was not performed. At the end of the procedure routine ureteral stenting was not performed. All patients were evaluated by intravenous urography at four weeks.
RESULTS: Thirty-seven stones (92.5%) were effectively fragmented by ureteroscopic pneumatic lithotripsy and eliminated within one month after treatment. One stone which was prevezikal could not be reached because of orificial edema, in one other stone ureteral perforation occurred during procedure, these stones were treated by open surgery. One other stone migrated in to the kidney,was treated successfully with ESWL after stenting.
CONCLUSIONS: As a conclusion impacted distal ureteral stones can be treated safe and effectively with ureteroscopic pneumatic lithotripsy and it has low cost than the other intracorporeal lithotriptors.

A-163
URETEROSCOPY AND PNEUMATIC LITHOTRIPSY IN THE TREATMENT OF URETERAL CALCULI AT DIFFERENT LOCATIONS

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AIMS: To present our clinic experience with ureteroscopy (URS) and pneumatic lithotripter in the endoscopic management of ureteral calculi at different locations.
METHODS: Between March 2000 and December 2002, 124 patients underwent URS and endoscopic lithotripsy for ureteral stones at different locations with a pneumatic lithotripter (PCK, Ankara, Turkey). Of patients, 72 (58%) were male 52 (42%) were female. The stone sizes ranged from 4 to 17 mm with 83 (67%) located in distal, 34 (27%) in mid ureter and 7 (6%) in proximal ureter.
RESULTS: The average age of patients was 36 years (range: 20–73 years). A complete stone elimination was achieved with URS and pneumatic lithotripsy within 1 month after treatment in 103 (83%) patients. The success rate was highest for stones located in distal ureter (92.3%), whereas it was 74% for mid ureter and 57.2% for proximal ureter. The operative time ranged from 10 to 45 min, with an average time of 27. In 16 patients stones were partially fragmented, remained in situ or were pushed back to kidney. They were subsequently treated by SWL or open ureterolithotomy. In 3 cases, ureteral perforations was observed during the procedure and of these 2 were successfully treated by JJ stent and 1 needed open surgery. Complications such as perforation, hematuria and urinary tract infections were encountered in 8 patients. Patients were discharged from the hospital after 1–4 days (average (1.7).
CONCLUSIONS: Our data revealed that URS with pneumatic lithotripsy is a safe, effective and rapid treatment modality for ureteral calculi

A-164
CLINICAL EFFICACY OF A COMBINATION PNEUMATIC AND ULTRASONIC LITHOTRITE: THE LITHOCLAST ULTRA.

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AIMS: A new combination intracorporeal lithotriptor (Lithoclast Ultra, EMS, Nyon, Switzerland) has been developed for percutaneous applications. It combines the stone clearing efficiency of an ultrasonic device with the fragmentation strength of a pneumatic probe into one single handpiece. Herein we present our initial clinical experience with this device in a prospective comparison between the combination lithotrite and standard ultrasonic lithotripsy.
METHODS: Twenty consecutive patients undergoing percutaneous nephrolithotomy (PNL) for stone extraction were enrolled in the study. PNL was performed using a standard ultrasonic device (Olympus, Melville, NY) in ten patients and the combination lithotrite was utilized in ten individuals. Stone location and burden were assessed prior to the operative procedure. Stone clearance rates (measured in mm^2/min) were calculated for the two devices. Complications and stone-free rates were compared between the two groups.
RESULTS: Stone location and composition were similar in the two groups of patients. Average time required for complete stone

disintegration/extraction was considerably higher in the ultrasonic patients (43.7 min versus 21.1 min for those treated with the combination device, $p = 0.036$). The opposite was true for the average rates of stone clearance (expressed in mm^2/min), where the standard ultrasonic device could clear 16.8 mm^2/min versus 39.5 mm^2/min for the combination lithotrite ($p = 0.028$). Complications between the two groups were comparable.
CONCLUSIONS: Combination ultrasonic/pneumatic lithotripsy is capable of disintegrating and extracting stone material at a more rapid rate than standard ultrasonic devices. Complication rates were comparable between the two devices. Stone-free rates are slightly superior with the combination lithotrite. This new device is efficacious and safe during the removal of large renal calculi.

A-165
URETEROSCOPIC PNEUMATIC LITHOTRIPSY RESULTS IN MIDDLE AND LOWER URETERAL STONES: ONE YEAR EXPERIENCE

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AIMS: We evaluated the effectiviness of ureteroscopic pneumatic lithotripsy in middle and lower ureteral stones.
METHODS: In one year period 30 patients (21 male, 9 female) who had middle and lower ureteral stones underwent ureteroscopic pneumatic lithotripsy procedure in our clinic. Ages were between 22–65 (average 41.3). Totally 37 ureter stones extracted. In 15 patients the stones were in the right ureter, in 12 of them they were in the left ureter and in 3 patients there were stones in both ureters. Of the ureteric stones, 30 were located at the distal end, and 7 in the mid-ureter. The diamaters of the stones on direct graphies were in average 9.2 mm (4–14). All procedure was performed by using 9.5 F Storz rigid ureteroscope. The stones were fragmented to approximately 3 mm. size. The fragmentation and clearance of all targeted calculi were accomplished.
RESULTS: 27 of 30 patients have become stone-free (90%). In 5 patients, dormia basket catheter were used for extraction of fragmented stones. Subsequent ESWL was used for three patients that ureteroscopic pneumatic lithotripsy failed and all become stone-free. The average operation time and postoperative hospitalization time were 24.5 minutes and 2.2 days respectively. In 5 patients we observed serious mucosal attachment to the stones. As complication, we observed submucosal false road in 1 patient, and hematuria lasting for three days in 1 patient.
CONCLUSIONS: Ureteroscopic pneumatic lithotripsy is an efficient treatment modality with a low propertion of complication in middle and lower ureteral stones. It has lower cost-effectiveness ratio in comparison to other alternative methods.

A-166
COMPARISION OF LASER LITHOTRIPSY WITH PNEUMATIC LITHOTRIPSY IN THE TREATMENT OF URETERAL STONES

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AIMS: In this study, we compared the success and failure of ureteroscopic treatment of ureteral stones with laser lithotripsy and pneumatic lithotripsy.
METHODS: A total of 458 patients who underwent ureteroscopy for ureteral stones with dye-laser lithotripsy in 292 and pneumatic lithotripsy in 166 were retrospectively evaluated in between May 1992–September 2002. Mean age value was 37.6 (range between 17–62). Of the patients, 194 were female (42.3%) and 264 were male (57.7%). Stones were localized in proximal ureter in 6 patients (1.3%), in mid ureter in 26 (5.6%) and in distal ureter in 426 (93.1%). A 10 F rigid ureteroscope was used for procedures. The patients were followed-up with intravenous urography or renal ultrasonography at 6 weeks after the operation.
RESULTS: While pneumatic lithotripsy was successful in 159 (95.7%), laser lithotripsy was successful in 253 (86.7%) of the patients. Failure rate was 7 (4.3%) for pneumatic lithotripsy and 39 (13.3%) for laser lithotripsy respectively. Overall failure rate was 46 for two procedures. Complications were significantly different for each group. 15 patients (9%) in pneumatic group and 55 patients (18.8%) in laser group had early and late complications. Pneumatic lithotripsy was more effective in every localization of ureteric calculi.
CONCLUSIONS: Pneumatic lithotripsy had a higher success and lower failure rate than laser lithotripsy in the treatment of ureteral stones with ureteroscopy.

A-167
SAFETY AND EFFICACY OF HOLMIUM:YAG LASER LITHOTRIPSY IN PATIENTS WITH BLEEDING DIATHESES

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AIMS: To assess the safety and efficacy of ureteroscopy and holmium:YAG (yttrium-aluminum-garnet) laser lithotripsy in the treatment of upper urinary tract calculi in patients with known and uncorrected bleeding diatheses.
METHODS: A retrospective chart review from 2 tertiary stone centers was performed to identify patients with known bleeding diatheses who were treated with holmium:YAG laser lithotripsy for upper urinary tract calculi. Twenty-five patients with 29 upper urinary tract calculi were treated with ureteroscopic holmium laser lithotripsy. Bleeding diatheses identified were coumadin administration for various conditions (17), liver dysfunction (3), thrombocytopenia (4), and von Willebrand's disease (1). Mean international normalized ratio (INR), platelet count and bleeding time were 2.3, 50×109/L, and > 16 minutes, for patients receiving coumadin or with liver dysfunction, thrombocytopenia, or von Willebrand's disease, respectively.
RESULTS: Overall, the stone-free rate was 96% (27/28) and 29 of 30 procedures were completed successfully without significant complication. One patient who was treated concomitantly with electrohydraulic lithotripsy (EHL) had a significant retroperitoneal hemorrhage that required blood transfusion.
CONCLUSIONS: Treatment of upper tract urinary calculi in patients with uncorrected bleeding diatheses can be safely performed using contemporary small caliber ureteroscopes and holmium laser as the sole modality of lithotripsy. Ureteroscopic holmium laser lithotripsy without preoperative correction of hemostatic parameters limits the risk of thromboembolic complications and costs associated with an extended hospital stay. Avoidance of the use of EHL is crucial in reducing bleeding complications in this cohort of patients.

A-168
URETEROSCOPY AND HOLMIUM:YAG LASER LITHOTRIPSY: AN EMERGING DEFINITIVE MANAGEMENT STRATEGY FOR SYMPTOMATIC URETERAL CALCULI IN PREGNANCY

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AIMS: Symptomatic urolithiasis in pregnancy that does not respond to conservative measures has traditionally been managed with ureteral stent insertion or percutaneous nephrostomy (PCN). Holmium:yttrium-aluminum-garnet (YAG) laser lithotripsy using state-of-the-art ureteroscopes represents an emerging strategy for definitive stone management in pregnancy. The purpose of this study was to review the results of holmium laser lithotripsy in a cohort of patients who presented with symptomatic urolithiasis in pregnancy.

METHODS: A retrospective analysis was conducted at 2 tertiary stone centers from January 1996 to August 2001 to identify pregnant patients who were treated with ureteroscopic holmium laser lithotripsy for symptomatic urolithiasis or encrusted stents. Eight patients with a total of 10 symptomatic ureteral calculi and 2 encrusted ureteral stents were treated. Mean gestational age at presentation was 22 weeks. Mean stone size was 8.1 mm. Stones were located in the proximal ureter/ureteropelvic junction (UPJ) (3), mid ureter (1), and distal ureter (6).
RESULTS: Complete stone fragmentation and/or removal of encrusted ureteral stents were achieved in all patients using the holmium:YAG laser. The overall procedural success rate was 91%. The overall stone-free rate was 89%. No obstetrical or urological complications were encountered.
CONCLUSIONS: Ureteroscopy and holmium laser lithotripsy can be performed safely in all stages of pregnancy providing definitive management of symptomatic ureteral calculi. The procedure can be done with minimal or no fluoroscopy and avoids the undesirable features of stents or nephrostomy tubes.

A-169
IS THE HOLMIUM YAG LASER THE IDEAL INTRACORPOREAL LITHOTRIPTER? AN EVALUATION AFTER 597 URETEROLITHOTRIPSIES

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AIMS: A variety of intracorporeal lithotripters are currently available. There are different sources of energy to obtain the stone fragmentation, with different mechanisms of action, different characteristics of the probes to transmit the energy, different effectiveness on chemical composition of the stones, different capability to potentially damage the urinary tract and to lead to complication and then different handling for the urologist. As a source of energy to fragment the stones we evauated the effectiveness and safety of the the holmium yag laser dornier medilas, flexible probes, size 200–600 micron. We evaluated the complications due to the use of the Holmium Yag Laser as intracorporeal lithotripters and not due to the ureterorenoscopes employed.

METHODS: 597 Patients between November 2000 and January 2003

Stone location	Number of patients	Stones size
Upper ureter	231 (38.6%)	8–20 mm
Middle ureter	89 (14.9%)	8–15 mm
Lower ureter	202 (33.8%)	8–20 mm
Steinstrasse	75 (12.9%)	25–70 mm

All chemical compositions of stones were present in our series, including cystine and calcium oxalate monohydrate stones. The DORNIER MEDI-LAS Holmium YAG laser was employed in our Stone Center.

RESULTS:

Stone location	Number of patients	Stones size
Upper ureter	231 (38.6%)	8–20 mm
Middle ureter	89 (14.9%)	8–15 mm
Lower ureter	202 (33.8%)	8–20 mm
Steinstrasse	75 (12.9%)	25–70 mm

In our series, 575 patients out of 597 (96.3%) were stone-free after one Holmium YAG laser procedure. 13 patients with upper ureter stones had an unintentional push up of the stone, and 4 had fragments in the kidney and underwent ESWL to complete the treatment. In the same way, 5 out of 89 patients with middle ureter stones needed a subsequent ESWL to remove some fragments from the kidney.
CONCLUSIONS: In our stones center, we usually recommend eswl, as first choice, for the treatment of stones in the proximal ureter only in the absence of ureterohydronephrosys, while we usually use an endoscopic approach, as first step, in the middle and distal ureteral stones.
The endoscopic approach is mandatory in patients with steinstrasse after eswl.

A-170
EFFECT OF LASER LITHOTRIPSY BY MEANS OF FREQUENCY-DOUBLED DUAL-PULSE ND: YAG LASER (FREDDY) – AN IN VITRO STUDY WITH NATURAL URINARY CALCULI

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AIMS: Laser lithotripsy is indicated in case of flexible ureterorenoscopy concrements and as a therapeutic alternative for ballistic and ultrasound lithotripsy with rigid endoscopy. Lasers of various wavelengths are available for lithotripsy. Besides alexandrite and holmium lasers, most recently also Frequency-Doubled Dual-pulse ND: YAG Laser (Freddy) has become available.
METHODS: An in vitro experiment was performed on 288 natural urinary calculi in order to evaluate the disintegration performance of Freddy. The laser lithotripsy was carried out in a water bath. The mean shock wave frequency was 4.5 Hz, mean number of shock waves was 116, energy impulse was 120 mJ. The disintegration performance was evaluated and classified by using various pore-size sieves and weighing the filtrate in groups A: <0.2 mm; B: 0.2–0.8 mm; C: 0.8–1.4 mm; D: >1.4 mm. The results were obtained in relation to the composition and original size of the urinary calculi.
RESULTS: The urinary calculi were composed of $n=56$ uric acid (UA), $n=40$ calcium oxalate monohydrate (COM), $n=43$ calcium oxalate monohydrate and dihydrate (COX), $n=26$ calcium phosphate (CP), $n=13$ cystine (C), $n=15$ struvite (S) and $n=95$ mixed stones (M). The mean original size of the urinary calculi was $31mm^2$. The proportion of disintegrates in group D was 90.5% (C), 76.1% (UA), 81.9% (COM), 53.4% (COX), 58.5% (CP), 68.1% (S). The mean number of impulses was: 501 (C), 169 (UA), 123 (COM), 35 (COX), 107 (CP), 28 (S) and 105 (M).
CONCLUSIONS: The results confirm the good disintegration performance of Freddy for the eradication of stones containing calcium oxalate dihydrate. The disintegration performance is lower for COM, CP and S. UA can be disintegrated even less. C exhibits practically no disintegration. Mixed stone types disintegrate more easily than stones composed of only one type of mineral. Moreover, the in vitro experiments provide evidence that the angle of administration is significant for the disintegration performance. Further experimental studies are needed to clarify the extent to which the tangential application of the laser probe can improve the disintegration performance.

A-171
RETROGARDE URETEROPYELOSCOPIC HOLMIUM LASER LITHOTRIPSY FOR LARGE RENAL CALCULI

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AIMS: To assess the efficacy and safety of the retrograde uretropyeloscopic holmium laser for treating renal stoens that are too large to treat with extracoproreal shock wave lithotripsy (ESWL)
METHODS: A total of 30 patients with renal stone burden greater than 2 cm were selected for this technique. Twenty two

patients were males and 8 patients were females.The mean age was 43 years (range from 18–62 years).The stones were located in the renal pelvis in 16 patients, lower calyceal in 5, middle calyceal in 2, upper calyceal in 1 and multiple pelvic and calyceal in 6 patients. Lithotripsy was done by Holmium laser using the 550 m and 200 m. Laser fiber passed through the semirigid fiberoptic long ureteroscope or the actively deflectable flexible ureteropyeloscope respectively. Success was defined as total fragmentation of the stone to fine dust less than 2 mm in diameter and/or clear imaging on renal ultrasonography and plain U.T. with the 3 months follow-up. Failed cases received either alternative or complementary ESWL therapy.
RESULTS: Endoscopic access with complete stone fragmentation was achieved in 23 patients out of 30 (76.6%). Failure met with in 7 patients resulted from poor visualisation, the initial presence of stones in or migration of their large fragments into inaccessible calyx. There were no major intraoperative complications. Postoperative complications included haematuria that persisted for 2 days in one patient and high grade fever in 2 patients. All were treated conservatively.
CONCLUSIONS: Large renal calculi that are not amenable to ESWL monotherapy can be safely and effectively treated with retrograde endoscopic technique that seems to compete well with the more invasive percutaneous or open surgical maneuvers.

A-172
NON-STENTED HOLMIUM: YAG URETROSCOPIC MANAGEMENT OF LOWER URETRAL CALCULI

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AIMS: We evaluate the clinical outcome of non-stented ureteroscopic laser lithotripsy of lower ureteral calculi with respect to efficacy, safety, postoperative pain and hospital stay.
METHODS: A total of 35 patients undergoing ureteroscopy without prior ureteral dilatation followed by holmium: YAG laser lithotripsy and the procedure were ended without stents. This randomized prospective study was compared to a control group of 35 age, sex and procedure matched patients who had undergone the same procedure with routine placement of stents in the same period of the study. Patients were contacted 24, 48 hours, 1 and 4 weeks postoperatively to determine postoperative pain and analgesic requirements. Radiological follow-up consisted of renal ultrasound and plain KUB film, while excretory urography was done at 3 months.
RESULTS: Five patients (14.2%) of the study group demonstrated dilatation of pelvicalyceal system and upper ureter, which improved completely at the seventh postoperative day. Patients with stents had statistically significantly more postoperative overall pain ($p < 0.001$) and total analgesic use ($p < 0.001$) compared to the non-nted study group. Hospitalization was 1.8 (+ 1.6) and 5.7 (+ 1.7) days respectively ($p < 0.001$), and the time to return to normal activities was 7.3 (+ 1.2) and 9.7 (+ 1.3) days, ($p < 0.001$) in both the non-stented and the stented group respectively. None of 27 (77.1%) patients of the non-stented group who had follow up excretory urography at 3 months had a newly identified ureteral stricture.
CONCLUSIONS: Non-stented uncomplicated ureteroscopic Holmium-YAG laser lithotripsy without ureteral dilatation is safe and offers numerous advantages over routine stent placement.

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TEN YEARS EXPERIENCE ON MANAGEMENT OF URETERAL STONES

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AIMS: Retrospective study of results and complications of ureteroscopy with lasertripsy.
METHODS: We treated 1427 ureteral stones with lasertripsy (pulsed dye laser) with uretroscopy. We use a rigid uretroscopy 11.5 Ch (n = 379) and semi-rigid of 7.2 Ch (n = 1048). Both with laser fiber of 200 micras (n = 262) or 320 (n = 1165). Stone were in the upper in 125 cases, in the middle in 319 and 983 were in the lower ureter. Average patient aged was 40.8 (range 2–91), and there were 884 men and 543 women. Average stone number per patient was 1.06. In 1075 cases with left ureteral catheter during 24 hours or less in 1049 cases. Average maximum stone diameter was 9.06 mm (range 3–38 mm) and minor diameter 5.6 (2–24 mm).
RESULTS: In 1324 patients (92.78%) the ureteral stones were fragmented completely by a single endoscopic procedure. In 103 cases lithotripsy no were effective. Of them in 31 cases no attack were possible; in 56 stone ascended to kidney and thus ESWL were done; in 16 cases no fragmentation were possible. In 16 stones no fragmented we applied ultrasound (9 cases), forceps extraction (5) and spontaneously discharged in two patients. Of 31 cases with attack no were possible: open surgery (5 cases), second uretroscopy in 26 (16 stones fragmented completely in second look, 3 stones ascended to kidney, 4 forceps extraction and 3 no access). According stone situation, 17.6% of upper stone dont were fragmented, no access were possible or stone ascended to kidney. In middle ureter were 12.5% and the lower stone no resolved in 4.1%. There were urinary tract injuries in 24 patients all resolved with pigtail (2/125 upper, 12/319 middle, 10/983 lower). In 19 cases there were pyelonephritis without obstruction resolved with antibiotic therapy (4/125 upper, 6/319 middle, 9/983 lower).
CONCLUSIONS: Ureteroscopy with lasertripsy is an excellent and safe method, preferably in lower ureteral stones.

A-174
DURABILITY OF THE MEDICAL MANAGEMENT OF CYSTINURIA.

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AIMS: The medical management of cystinuria has incorporated increased urine volumes, alkalinization, and the use of thiol medications. We have noticed difficulties with patients complying with medical management recommendations. We therefore sought to evaluate the durability of treatment success in our patients with cystinuria.
METHODS: A retrospective chart review was performed for all patients with cystinuria identified over an eight-year period. Medical therapy utilized, stone recurrence rates, compliance with medications and follow-up, and results of metabolic evaluations were reviewed. The average concentrations of urinary cystine for initial and follow-up 24-hour samples were compared between those compliant with medical management and those unable to follow recommendations. Each patient was mailed a questionnaire to assess self-perception of medical compliance.
RESULTS: We identified 26 cystinuric patients followed for an average of 38.2 months (range 6–83). Females represented 58%. Overall, compliance was poor with a short duration of success. Of the 26 patients, only 4 (15%) have been able to achieve and maintain therapeutic success as defined by urine cystine levels less than 300 mg/L. 11 patients (42%) were able to achieve success but subsequently failed at an average of 16 months (range 6–27). Of these, 7 (64%) were able to regain therapeutic success. Five patients (19%) were never able to achieve success while 6 (23%) failed to keep follow-up appointments or supply subsequent 24-hour urine studies. Self-assessment of compliance was high, regardless of physician perceptions or treatment results.
CONCLUSIONS: The durability of medically treating cystinuric patients is limited, with only a small percentage of these patients able to achieve and maintain the goal of reducing cystine below

the saturation concentration. Greater physician vigilance with cystine stone formers is required to achieve successful prophylactic management. Furthermore, these patients will require better insight into their own disease in order to improve compliance.

A-175
EFFICACY OF A SELECTIVE TREATMENT AND RISK FACTORS FOR RECURRENCE IN RECURRENT CALCIUM OXALATE STONE FORMERS

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AIMS: The present study was performed to examine the efficacy of a selective treatment according to the guidelines for the prevention of recurrence in calcium oxalate stone patients and to assess risk factors for stone recurrence.
METHODS: To investigate the effect of specific diagnostic and therapeutic measures, 134 recurrent calcium oxalate stone formers participated in a prospective study for two years with regular follow-ups of at least every six months. Depending on the results of analysis of 24-hour urine, nutrition record and metabolic situation, selective recommendations were given concerning diet and medication.
RESULTS: Throughout the follow-up period, 57 (43%) of the patients experienced relapses. In recurrence-free patients, the significant increase in urinary volume, as well as urinary pH, potassium and citrate excretion, three indexes of compliance with alkalization, resulted in a significant decrease in the calculated risk of calcium oxalate stone formation. In patients with recurrences during follow-up, the relative supersaturation with calcium oxalate increased significantly, mainly due to the significant rise in urinary oxalate excretion exceeding the significant increases in urinary volume, pH, potassium and citrate excretion. Multiple logistic regression analysis revealed previous ESWL treatment and a history of multiple stones as independent predictors of the risk for recurrence.
CONCLUSIONS: The results indicate that compliance with drinking advice and alkalization therapy was highest among both, patients with and without recurrences, compared with all other therapeutic measures. The increase in oxalate excretion is identified as the major urinary risk factor for relapse during follow-up in recurrent calcium oxalate stone disease.

A-176
EFFICIENCY OF LONG TERM POTASSIUM CITRATE TREATMENT IN PATIENTS WITH IDIOPATHIC CALCIUM OXALATE STONE DISEASE

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AIMS: To determine the long term efficacy of potassium citrate based medical treatment in Ca-oxalate bearing patients.
METHODS: 94 patients with idiopathic calcium oxalate stone disease were evaluated. All the patients underwent a complete metabolic evaluation for urolithiasis. Patients were randomised to two groups and 53 patients were administered oral potassium citrate (Urocit-K®) 60 mEq/day as treatment group and 41 patients received no medical treatment as control group.
RESULTS: Mean follow up was 26.4±4.2 months for treatment group and 21.4±3.6 months for control group. Hypocitraturia (72%), hypercalciuria (23%), hyperoxaluria (9%), hyperuricosuria (6%) were risk factors for stone formation. Urinary pH and citrate were found significantly higher in the treatment group than control patients ($p < 0.05$). On the other hand, urinary uric acid and calcium were lower in the treatment group than control group ($p < 0.05$). The stone recurrence rates were 13.2% and 53.6% in treatment and control patients group respectively ($p < 0.001$). In the treatment group, patients who still had residual fragments < 5 mm after initial treatment has significantly lower residues at the follow-up than control patients who had residual fragments ($p < 0.05$). Stone free period in the treatment group was 5.135 times higher than control group ($p < 0.05$).
CONCLUSIONS: Potassium citrate treatment is effective both in prophylaxis and treatment of Ca-oxalate stone disease so we believe that routine usage of citrate treatment in patients who has idiopathic Ca-oxalate stones may result better control of disease at long term follow-up.

A-177
ORAL POTASSIUM CITRATE REPLACEMENT THERAPY FOR THE PREVENTION OF RECCURENCE OF CALCIUM UROLITIASIS IN CHILDREN WITH HIPOCYTRATURIA

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AIMS: Although idiopathic hypocitraturia is associated frequently with childhood calcium urolithiasis, controversy on its clinical significance persists. This study is carried out to define the role of oral potassium citrate replacement therapy for the prevention of urinary stone disease.
METHODS: Potassium citrate at 1 mg/kg/day dose were administered in 64 idiopathic hypocitraturic children {median age:7.2 (1–14); male/female: 40/24} with calcium urolithiasis, throughout a median follow-up of 21.9 months (6–67 months). Of the 64 patients 44 were primarily diagnosed and the other 20 had had recurrences in the pre-treatment period.
RESULTS: The urinary pH and citrate excretion increased as the level of urinary calcium excretion, decreased significantly following the treatment. The oxalate levels showed no significant change. In the recurrent patient group, while the new stone formation rate was 0.32/year (total 89 years of follow-up) before the treatment, this rate decreased to 0.17/year (total 31 years of follow-up) after the treatment. In the primarily diagnosed group, no recurrences occurred after treatment. No adverse reaction was recorded due to drug administration.
CONCLUSIONS: Idiopathic hypocitraturia can be corrected actively by oral potassium citrate replacement therapy. The treatment of hypocitraturia seems to decrease stone recurrence rate especially in patients who had recurrent stone formation before treatment.

A-178
THE EFFECT OF ALENDRONATE TREATMENT ON URINARY CALCIUM AND CITRATE LEVELS IN POSTMENOPAUSAL WOMEN

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AIMS: We investigated the effect of alendronate on serum and urine chemistry profiles in postmenopausal women under calcium treatment for osteoporosis.
METHODS: After having a 1 week calcium treatment, 66 patients were divided into two groups and 42 patients in group 1 received 10 mg alendronate and 24 patients in group 2 received placebo daily for 4 weeks. For each group serum chemistry profiles for calcium, phosphorus, ALP, BUN, uric acid, creatinine and 24-hour urine chemistry for calcium, phosphorus, magnesium, citrate, oxalate, uric acid were obtained at base line, after 1 week calcium treatment and lastly at the end of the alendronate or placebo treatment for 4 weeks.
RESULTS: Serum ALP and 24-hour urine calcium were significantly decreased in the alendronate group than in placebo group. Also 24-hour citrate was significantly increased in the alendronate group than in the placebo group ($p < 0.05$). There was no significant difference between two groups for other parameters ($p > 0.05$).
CONCLUSIONS: According to these findings alendronate can be used both for prophylaxis in recurrent calcium stone formers and

for inhibiting urinary calculi growth. Also it can be safely used in hypercalciuria with osteoporosis and osteopenia.

A-179
EFFECT OF SODIUM CITRATE ON CALCIUM OXALATE UROLITHIASIS RISK FACTORS

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AIM: To investigate the potential prophylactic and therapeutic effects of a widely used urinary alkalanising agent in South Africa, CitroSoda, on calcium oxalate kidney stone disease.
METHODS: Twenty healthy male subjects and 20 calcium oxalate male stone formers participated in the study. Each subject took 4600 mg/day citrate (CitroSoda, Abbott Laboratories, South Africa). Supplementation lasted for 7 days. 24-hour urines were collected under normal dietary conditions at baseline and during the final day of supplementation. Urines were analyzed using standard laboratory techniques and data were statistically analyzed using analysis of variance.
RESULTS: *Controls*: Statistically significant favourable changes were observed in 5 key risk factors after 7 days of CitroSoda ingestion: pH increased by 14.8% ($p < 0.0001$); citrate excretion increased by 24.8% ($p = 0.0363$); calcium excretion decreased by 27.9% ($p = 0.0166$); the relative supersaturation (RS) of uric acid decreased by 81.4% ($p = 0.0058$) and the RS of calcium oxalate decreased by 34.3% ($p = 0.0286$). No unfavourable changes were observed.

Stone Formers: Statistically significant favourable changes were observed in 6 key risk factors after 7 days of CitroSoda ingestion: pH increased by 16.0% ($p < 0.0001$); citrate excretion increased by 29.2% ($p = 0.0453$); calcium excretion decreased by 33.7% ($p = 0.0046$); oxalate excretion decreased by 33.3% ($p < 0.0001$) the RS of uric acid decreased by 83.3% ($p < 0.0001$) and the RS of calcium oxalate decreased by 63.6% ($p < 0.0001$).
CONCLUSIONS: These results present very convincing evidence demonstrating the efficacy of CitroSoda as a potential prophylactic and therapeutic agent for the conservative treatment of calcium oxalate urolithiasis in males.

A-180
STONE RECURRENCE RATE AND METAPHYLAXIS IN PATIENTS UNDERWENT EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY

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AIMS: To analyze the stone recurrence rate in patients underwent extracorporeal shock wave lithotripsy (ESWL) and the effects of metaphylaxis in the follow-up of this patients.
METHODS: This study has been designed as a prospective randomized trial. Patients underwent ESWL (machine Lithostar – plus -Siemens) were studied in a period 03/90–03/92 and follow – up for at least 10 years (03/02). The group I underwent metaphylaxis. After the metabolic diagnosis all the patients were specifically treated for each one of them and nutritional orientation was performed by a dietitian. Patients were followed for at least 10 years with regular evaluations every 4 months in the first year and then every 1 year. The group II were not underwent metaphylaxis and the patients were followed with regular evaluations every 1 year. It was used the Kruskal-Wallis test for the analysis of frequency of stones and the variance test for all the other parameters.
RESULTS: In group I there were 400 patients, 199 (49.7%) males, 355 (88.7%) white people and 13 (3.2%) blacks. The mean age of these patients was 41.7 + 13.8 years (ranging from 10 to 83). In group II there were 450 patients,230 (51.1%) males, 369 (82%) white people and 18 (4%) blacks. The mean age was 43.4 + 11.7 years (ranging from 15 to 81). Stone location, burden, multiplicity, stone free, residual fragments and mean treatment rate were similar in both groups. The average shock wave number and intensity, were 4000 (range 2600–6000) and 18 KV (range 16-19) in both groups. In group I the recurrence rate at the end of 10 years was 14.5%, In group II the recurrence rate at the end of 10 years was 85.0% ($p < 0.001$). The mean number of stones/year /patient decrease from 1.8 before ESWL to 0.8, after ESWL, in group I at the end of study, and increase from 1.6 before ESWL to 2.8, after ESWL in group II at the end of study ($p < 0.001$), in group II.
CONCLUSIONS: The recurrence rate is higher in patients underwent ESWL. Metaphylaxis can decrease this high recurrence rate after ESWL. For clinical and economics reasons, all patients underwent ESWL, need undergo metaphylaxis.

A-181
BACTERIAL CULTURE OF INNER AND OUTER SURFACES OF STONES IN URINARY TRACT AND DETERMINATION OF ITS RELATION TO URINARY TRACT INFECTION AND STONE BIOCHEMISTRY

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AIMS: In the present study, bacterial characteristics of inner and outer surfaces of stones that were extracted from urinary system were evaluated. Cultured microorganisms, preoperative and postoperative urinary tract infections and stone biochemistry were investigated in respect to bacterial growth at inner and outer surfaces of the stones.
METHODS: Between January 1997 and October 2000, a total of 80 patients with urinary tract stone disease were evaluated. All patients underwent open surgical intervention and stones extracted from urinary system were analyzed biochemically and bacterial cultures were obtained both from inner and outer surfaces of each stone.
RESULTS: Of the patients, 61 had negative urine cultures. The most commonly isolated microorganism in the preoperative period was E. Coli. Patients were treated with appropriate antibiotics before any surgical intervention. During the operation bacterial culture was obtained from both inner and outer surfaces of stones. Sixteen(20%) patients revealed positive culture results from outer surface of stones and 10 (12.5%) patients had bacterial overgrowth in the inner site of their stones. The most commonly detected stone was calcium-oxalate monohydrate (whewellite) and 38 (43.5%) patients had this type of stone. Whewellite stones had S. aureus, S. albus and E. Coli whereas, whewellite + wedellite stones contained S.aureus. Calcium phosphate and struvite stones predominantly harboured Proteus microorganisms and whewellite + calcium stones had S. albus, enterobacter and E. Coli. Of the 16 patients with positive cultures at outer surface, seven (43%) had different microorganisms than the inner side of the stone.
CONCLUSIONS: Depending on the antimicrobial regimen used for prophylaxis and treatment, a prophylactic strategy added minimally to the overall treatment cost of SWL, and proved cost beneficial when taking into consideration serious UTIs requiring inpatient treatment. Thus, our results may support the idea of the use of prophylactic antibiotics in patients that underwent SWL for urinary tract stone disease.

A-182
COMPARATIVE STUDY OF RECTAL DICLOFENAC-NA AND PETHIDINE INJECTION IN TREATMENT OF RENAL COLIC

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AIMS: In this study, therapeutic effect of rectal diclofenac-sodium is compared with pethidine injection in renal colic.
METHODS: 256 patients were assigned to one of two treatment groups randonmely.first group (122 pts.) received diclofenac supp. 100 mg. and second group (134 pts.) received pethidine 50

mg. I.M. injection, and response to medication recorded at 10, 20 and 30 minutes
RESULTS: The efficacy of rectal diclofenac was 88.5%. And of pethidine injection 92.6% (pain relief were significant in both groups)
CONCLUSIONS: Rectal diclofenac is as effective as pethidine injection in emergency renal colic. Furthermore, it is available, cheap, low side effect and ease for self-administration, which increases patient compliance. So, it is a good alternative for narcotics in treatment of renal colic.

A-183
MEDICAL TREATMENT OF RENAL COLIC AND THE USE OF COX-2 INHIBITORS

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AIMS: The wide use of NSAIDS in the treatment of renal colic has greatly improved the quality of life of these patients. Still,questions remain unanswered, concerning the effectiveness of different medications, the side-effects of each one, the optimal duration of treatment etc. The aim of our study was to investigate whether the use of a new category of NSAIDS, namely selective COX-2 inhibitors, aids in the symptomatic relief, and evaluate their effect in patients with renal colic.
METHODS: Patients examined at the emergency department of our hospital, suffering from renal colic,were included in the study. The diagnosis of renal colic was based on the results from the physical examination, the imaging studies (KUB, U/S, IVU) and the presence of hematuria in a urine sample. These patients were treated with NSAIDS intramuscularly, and when the pain resolved, oral medication was administered for the next days with a selective COX-2 inhibitor, such as meloxicam. The intensity of pain before and after the administration of drugs was measured with the use of VAS (visual analogue scale). Opiate analgesics were used at the emergency department in cases where the pain did not resolve with the standard therapy of NSAIDS.
RESULTS: 187 patients fulfilled the entry criteria with a mean age of 45.6 years. As far as renal colic pain is concerned, before the use of medication, the mean intensity of pain was 7.38 (VAS), which dropped to 2.63 (in the scale from 1–10) after the use of NSAIDS. The maximum duration of treatment was 1 month, but most patients received medication for 15–20 days. Side-effects from the use of COX-2 inhibitors were: gastrointestinal-13.9%, skin-2.14%, metabolic-0.16%. 9 patients changed medication or stopped. Opiate analgesics were used in 2.89% of patients.
CONCLUSIONS: Our results suggest that the use of selective COX-2 inhibitors, was well tolerated by patients, and led to a significant decrease of the pain, until a definite solution was provided, either by spontaneous passage of the stone, or by more aggressive treatment, where it was needed.

A-184
UROLITHIASIS IN ALBANIA – A STUDY OF 35 YEARS RESEARCH

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BACKGROUND: Urolithiasis is an important cause of mobility in adult and children in Albania. We assesed prospectively all patient aged from one day old (just borned) up to 35 years old with urolithiasis admitted between 1971 up to 2001 in urological clinic in Tirana, Albania.
METHODS: In all cases about 12792 patients were evaluated 69.2% sex male and 30.8% female the stones were obtained by surgery 70%, ESWL 24% and 2% belongs to cystoscopic extraction, and 4% treatment with mineral water (Mineral water called Glina which is very famous one and spread wide used in Albania) and calculi passed spontaneously (per vias naturalis).
We have examined 2.786 calculi case by infrared spectroscopy and urine sample were analysed for calcium oxalate, carbonate and ect.
RESULTS: Calcium oxalate (CaOx) and phosphate was predominant constituent of the kidney stones in 40%. Pure calcium oxalac 33%. Carbonate calcium 17%, Cystine 1.70% and Uric acid 8.30%.
Metabolic and infections were found in 31% and 21% respectively, 8% had stones caused by a Urinary tract anomaly with stasis and 30% of stones were endemic (from south of Albania). In the 10% the cause of the urolithiasis remained unknown.
CONCLUSION: Our opinion is that the Urolithiasis is a disease spread through Balanic Peninsula. In Albania Urolothiasis cases most frequently in children of age from 2–10 years old, and in adults from age 25–45 years old. Albania is historically and endemic areas Urolithiasis country in Balkan.
For this classic methods in treatment of Urolithiasis country in Balkan. For this classic methods in treatment of Urolithiasis (open surgery) is very good and appreciated. The second the mineral water GLINA which was above metioned is a bacteriologically clean water that helps for eliminated small calculus measure from 2–6mm long.

A-185
CORRELATION OF CT VERSUS PLAIN RADIOGRAPHY FOR MEASURING URINARY STONES

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AIMS: Expectant vs interventional management of ureteral calculi is primarily based on size criteria. Existing data on measurement of stones has been by plain radiography for radiopaque calculi. Variability of reported measurements between different imaging modalities may have significant consequences. We correlated the measurements of urinary stone size from spiral non-contrast computerized tomography (CT) with that of plain radiography.
METHODS: We retrospectively measured reteral calculi on CT and plain radiography (KUB). A total of 21 patients with urolithiasis underwent both imaging studies from January 2002 to October 2002, with a total of 32 calculi analyzed. Size on both the plain radiography and non-contrast CT was determined in the transverse and craniocaudal dimensions.The craniocaudal dimension on CT was determined by measuring the stone on reconstructed coronal CT images. The stones were also categorized according to transverse size, with ranges of 1.0 to 5.0 mm, >5.0 mm to 10.0 mm, and >10.0 mm. Measurements between imaging modalities were blinded and performed consecutively by a dedicated investigator.
RESULTS: In all, 32 calculi were evaluated. Their transverse sizes ranged from 2.0 to 10.0 mm, while their craniocaudal sizes ranged from 2.0 to 11.0 mm on plain radiography. Mean transverse dimension of the stones plus or minus standard deviation on CT was 4.4 +/–2.0 mm versus 4.6 +/–2.1 mm on plain radiography (paired t-test, $p<0.16$). Mean craniocaudal dimension of the stones on CT was 7.3 +/–3.1 mm versus 5.8 +/–2.8 mm on plain radiography (paired t-test, $p<0.0001$). For 31/32 stones, CT and plain radiography transverse measurements agreed when categorized according to clinically relevant stone size ranges.
CONCLUSIONS: With fastidious measurement of stone dimensions on both CT and plain radiography, we found that the transverse dimension of stones measured by the two modalities were concordant. The craniocaudal measurements of the stones were found to be statistically significantly different on CT versus plain radiography, with CT measurement being 1.5 mm larger on average.

A-186
THE ROLE OF SPIRAL COMPUTERIZED TOMOGRAPHY IN THE DETERMINATION OF THE CHEMICAL COMPOSITIONS OF PURE AND MIXED URINARY STONES

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AIMS: Computed tomography (CT) is becoming the preferred radiographic examination in diagnosis and management of calculus disease. Management of calculus disease can be facilitated by ascertaining the composition of the stones. Unneccessary shock-wave treatment could be avoided should the fragility of stones is predicted at the time of diagnosis. The purpose of this study was to determine the chemical composition of pure and mixed urinary calculi by multislice helical CT.
METHODS: A total of 107 stones (86 pure and 21 mixed) were measured in multislice helical scanner with phantoms containing air. Scans were performed at two energy levels of 80 kV and 120 kV with 1 mm thickness. Chemical compositions of urinary stones were assessed on the basis of differences between the densities measured in Hounsfield Units (HU). With respect to density measurements in HU stones were assigned into 6 different groups as uric acid, struvite, cystine, calcium phosphate, calcium oxalate monohydrate and calcium oxalate dihydrate.
RESULTS: Densities measured by multislice helical CT at 120 kV were significantly different from each other for the 6 groups of pure stones. Densities of different regions of mixed stones were also statistically different than each other. It was remarkable that the densities of different regions measured in mixed stones were not different than the corresponding densities of pure stones. This finding supports the idea that different chemical compositions within a stone can be identified by their densities measured by multiclice helical CT. The density ranges defining the pure stone compositions were noted as, uric acid: 112–436; struvite: 510–681; cystine: 994–1240; calcium phosphate: 1452–1640; calcium oxalate dihydrate: 1813; calcium oxalate monohydrate: 1743–2857.
CONCLUSIONS: The chemical compositions of both pure and mixed stones can be determined by multislice helical CT in an in vitro setting. The feasibility of in vivo determinations remains yet to be clarified.

A-187
POTENTIAL IN VIVO DETERMINATION OF STONE COMPOSITION USING LOW ANGLE X-RAY SCATTERING AND MULTIVARIATE REGRESSION ANALYSIS

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AIMS: Low angle X-ray scattering (LAXS) can be used to characterise urinary stones, based on their unique diffraction patterns. The aim was to explore the use of LAXS at diagnostic x-ray energies in conjunction with multivariate regression analysis to determine stone composition in situ to improve patient selection for extracorporeal shock wave lithotripsy treatment.
METHODS: LAXS measurements were made using a 70 kVp X-ray spectrum and a high purity germanium detector fixed at an angle of 5° to the primary beam. A LAXS study was carried out on 31 calibration samples and 51 unknown urinary stones. Multivariate calibration models were built for predicting composition in vitro and in vivo by simulation. Predicted stone composition was compared with results from qualitative infrared analysis.
RESULTS: LAXS signatures of common stone types were found to be distinct, even when attenuated by human tissues, as found in the simulation procedure. Simulation studies on test samples showed that quantitative prediction in vivo could give an accuracy of 66% and an uncertainty of 7% but would require 600 seconds of X-ray exposure. Associated skin dose was estimated to be 5.4 Gy, sufficient to induce temporary erythema. However, qualitative prediction in vivo of the major stone components could be achieved using an exposure time of 30 seconds, giving a prediction accuracy of 73% when compared against qualitative infrared spectroscopy results, and an uncertainty of 34%. The area of skin exposed to X-rays was estimated to be 0.16 cm^2. Skin dose was estimated to be 0.27 Gy, well below any threshold dose for deterministic effects.
CONCLUSIONS: The technique has been shown to be able to predict stone composition in situ and before treatment begins, making it a potentially useful diagnostic tool in the surgical management of urolithiasis.

A-188
3D RECONSTRUCTION AND INSTANT VOLUME MEASUREMENT SOFTWARE: APPLICATION TO RENAL STONES: EXPERIMENTAL AND FIRST CLINICAL STUDIES

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AIMS: We evaluated a PC based software program that allows 3D reconstruction and instant volume measurement on DICOM CT images of renal stones. We report our experience with this software using intact human stones as well as our first clinical application.
METHODS: Our software is based on an active contour method, implemented in C/C++ language that runs in real time on a commercially available PC and can be used with any kind of CT images in DICOM format.
EXPERIMENTAL STUDY: 10 intact human kidney stones including complex and staghorn calculi were scanned using a usual clinical protocol for renal stones on various CT scanners. We performed 3D reconstruction of each stone and measured the instant volume using our software program. The calculated volume was compared to real volume measured by an immersion method.
CLINICAL STUDY: 12 patients with complex or staghorn calculi underwent CT imaging before percutaneous nephrostolithotomy (PCNL), and 3D reconstruction and instant volume measurement of the stones was performed. After PCNL, the true volume of each stone was measured by immersion of corresponding fragments and compared to the CT-calculated volume.
RESULTS: In both the experimental and clinical studies all stones were easily reconstructed. In the experimental study, volume measurements matched real volumes of the stones with less than 2% error. In the clinical study the calculated stone volume varied from 1 cm^3 to 18.5 cm^3 and matched the true stone volume within 1.5%.
CONCLUSIONS: Our stone volume-calculating software is easy to use on a low cost commercially available PC with any kind of CT DICOM images, and is reliable for 3D reconstruction and volume measurements of renal stones.

A-189
COMPARISON OF ABDOMINOPELVIC UNHENHANCED SPIRAL CT AND PLAIN ABDOMINAL X-RAY +ULTRASOUND IN THE DIAGNOSIS OF URINARY SYSTEM

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AIMS: Urinary system stone disease is the third most common disorder affecting urinary system following urinary infections and prostate disease. We planned the study in order to compare the diagnostic value of non-contrast abdominopelvic spiral CT and Plain Abdominal X-Ray + Ultrasound (USG) in the evaluation of urinary system stones.
METHODS: We included a total of 49 patients in the study with the evidence of urinary system stone disease in the physical examination and urine analysis who admitted to our polyclinics between February 2002 and November 2002. There were 33 male and 16 female patients with the mean age of 39.6 years (12–71 years). All the patients were evaluated by Plain Abdominal X-

Ray, USG and Spiral CT (5 mm thick sections, a pitch of 1.5, a reconstruction interscan spacing at 3 mm, an examination area extending from the kidneys to the base of the bladder) .
" In the evaluation of 49 patients by non-contrast spiral CT, 11 kidney stones, 19 ureteral stones, 8 kidney and ureteral stones and 6 other urinary system disorders (nephrocalcinosis, UPJ stenosis, ureteral stenosis, pyelonephritis, 2 ureteral tumors) were detected. 5 cases were normal. 2 stones were in proximal ureter (7%), 2 stones in mid-ureter (7%) and 23 stones were in distal ureter (86%). In the 27 cases (55.1%) with the diagnosis of ureteral stone by spiral CT, stone was detected in 7 cases (25.9%) by Plain Abdominal X-Ray, Grade 1–2 pelvic dilatation in 12 patients (44%) and stone in 5 patients (18%) were found by USG. 19 kidney stones were detected by spiral CT while 4 kidney stones (21%) by Plain Abdominal X-Ray and 10 (52%) by USG were detected.
CONCLUSIONS: High specifity and sensitivity rates compared to USG and Plain Abdominal X-Ray (95% and 100%)(83.3% and 62.9%) respectively, no allergic side effects, rapid diagnosing capability and most important; detecting other pathologies with similar symptoms are the advantages of CT. But high cost, need experience in skills and high radiation dose limit it's use.
Because of these limitations Unenhanced Spiral CT should be reserved for cases where USG + Plain Abdominal X-Ray do not show.

A-190
THE VALUE OF STONE DENSITY OF URINARY TRACT MEASURED BY NON-CONTRAST SPIRAL COMPUTERIZED TOMOGRAPHY IN THE PREDICTION OF FRAGMENTATION BY EXTRACORPOREAL SHCOCK WAVE LITHOTRIPSY

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AIMS: The aim of this prospective analysis is to evaluate the attenuation value of urinary tract calculi on unenhanced spiral computerized tomography (CT) images as a predictive factor in fragmentation of calculous with extracorporeal shock wave lithotripsy (ESWL).
METHODS: A total of 51 consecutive patients with urinary tract calculi (30 renal and 21 ureteral calculi) were prospectively analyzed in this study. Calculous attenuation value was measured in Hounsfield units on non-contrast spiral CT sections through the calculi on 5 to 10 points. Patients were subsequently underwent ESWL treatment. Body mass indices, required mean shock wave number with its energy and session number, lowest, highest and mean Hounsfield units of calculi were determined in achieved and unsuccessful stone fragmentation groups.
RESULTS: With ESWL treatment, we achieved complete stone fragmentation in 40 patients (17 ureteral, 23 renal calculi), whereas there was no fragmentation in the remaining 11 (3 ureteral, 8 renal calculi). Mean age (year), body mass index (kg/m^2), stone volume (cm^2), total number of shock wave for clearance, Hounsfield units, power (kV) were 46 ± 9, 26.0 ± 3.6, 0.8 ± 0.7, 2878 ± 2549, 1315 ± 277 and 15.5 ± 2.3, respectively in patients with totally achieved fragmentation on calculi. Those parameters were $49 \pm 12.27.8 \pm 3.2$, 1.0 ± 0.4, 3700 ± 1892, 1443 ± 285 and 16.1 ± 0.6, respectively in patients without stone fragmentation. All parameters were statistically insignificant between both groups. The mean required number of shock wave for fragmentation was 1728 ± 1220 in the former group.
CONCLUSIONS: The CT attenuation value on differentiate urinary tract calculi that are likely to fragment easily on ESWL from those that would require a greater number of shock waves for fragmentation or may fail to fragment on ESWL required further prospective analysis for each part of urinary tract. However, in this preliminary analysis, we can not conclude the predictive role of stone density using unenhanced CT on stone fragibility due to lack of number of patients for each side of urinary tract as lower pole, out of lower pole kidney stones, upper and lower parts of ureteral stones.

A-191
FOURIER TRANSMISSION INFRA RED ANALYSIS FOR URINARY STONE ANALYSIS

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AIMS: This study was done to find the efficacy of Fourier Transmission Infra Red (FTIR) analysis of different fragments of urinary stone over the conventional Infra Red (IR) analysis.
METHODS: 100 stone samples were analysed using both IR and FTIR. The delineation of components of stone in either method was compared.
RESULTS: In IR analysis, overlapping of wavelengths was observed between Calcium oxalate dihydrate (COD) and Calcium Oxalate Monohydrate (COM) – by the wave patterns in the spectral regions of 520 & 521, 604 & 604, 780 & 778 etc., COM and Uric Acid (UA) – 660 & 657, COM and apatite (604 & 600), COM & ammonium urate (604 & 601), COM and struvite (1461 & 1465, 1618 & 1616), COD and apatite (604 & 600), struvite and apatite (574 & 571), apatite and newberyite (1061 & 1058, 1647 & 1648), brushite and uric acid (658 & 657, 791 & 787), brushite and ammonium urate (530 & 531, 791 & 793, 1136 & 1138) and UA & ammonium urate (1124 & 1120). By performing FTIR analysis, the differentiation between the different phosphates became easier and the overlapping of wavelengths between COD and COM, COM and UA, COM and apatite, COM and amm. Urate, COM and struvite, COD and apatite, struvite and apatite, apatite and newberyite brushite and uric acid, brushite and ammonium urate and UA & ammonium urate could be avoided.
CONCLUSIONS: FTIR analysis is superior to IR analysis. This is because the instrument has very high wavelength resolution. The FTIR spectra are fast. It takes about one second to collect and scan, which contain intensity information for all.

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APPROACHES TO URINARY STONE ANALYSIS METHODS

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AIMS: In this study main goal is to determine the specivities and sensitivities of the most common stone analysis methods X-ray diffractometry (XRD) and wet chemical methods by comparing the results of both with the integrative approach results.
METHODS: The 107 stone obtained by surgical intervations were analysed in Louis C. Herring Co. stone research laboratory (Florida, USA)using the integrative analysis approach which is composed of partial or all of XRD, infrared Spectrophotometry, chromatography, fluorescence, polarization optical crystallography, chemical microscopy, ultraviolet visible spectroscopy, and photomicroscopy methods. Signed stones were then analyzed by M.T.A. Institute using XRD method and in our hospital laboratory using wet chemical method.
RESULTS: The results for wet chemical method was found 70% incomplete and 40% erronous compared to integrative analysis approach results. The results for XRD method was found all correct but 33% incomplete again compared to integrative analysis approach results. Wet chemical method was observed to determine the minor and negligible formations in mixed type stones which were not detected by XRD method. It is observed that XRD method is incapable of determining mixed type of stones containing calcium phosphate.
CONCLUSIONS: An accurate determination of analysis results can be found by using integrative analysis approach. But, economical and expediency reasons limts this usage. Wet chemical results may lead to significant clinical errors due to unaccuracy. This method should be used as a part of the integrative analysis approach only. XRD is an analytical method that can be used alone regardless of the incomplete results.

A-193
A TEN-YEAR EXPERIENCE ON THE COMBINATION OF POLARISING MICROSCOPY AND X-RAY DIFFRACTION IN THE ANALYSIS OF URINARY CALCULI

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AIMS: Analysis of the urinary calculus is of considerable importance as far as the metaphylaxis -especially of uric acid calculi, of infection-induced stones, cystine- and calcium oxalate stones- is concerned. Great strides have been made in the field of therapeutic methods (ESWL, PNL and URS), however prophylaxis and metaphylaxis are essential factors in the overall treatment of urolithiasis, particularly in view of stone recurrence.
METHODS: Urinary calculi are often made of several components. Of the 6339 samples of urinary calculi examined (between 1991 and 2000), 2085 were mono-mineral, 2396 were made up of two, 1166 of three and 692 of four components. Polarising microscopy
(granular preparations) and x-ray diffraction were used to make analyses. Combination of both methods have stood the test.
RESULTS: As far as the combination was concerned we took a particular interest in two complexes of problems:

1. Phosphatic urinary calculi Quantitative determination of phosphate is not possible using x-ray diffraction (x-ray amorphous), however it is possible when polarising microscopy is applied.
2. Analysis of uric acid calculi.

Uric acid and urates have similar optic properties, crystal structures, however, vary. The method of choice here is x-ray diffraction.
CONCLUSIONS: Our procedure with these calculi (phosphate calculi n = 1212, uric acid calculi n = 753) is described and results of testing are presented.

A-194
ROLE OF SCANNING ELECTRON MICROSCOPY IN THE ANALYSIS OF URINARY CALCULI

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AIMS: To evaluate role of scanning electron microscopy (SEM) and energy dispersive X-ray system (EDS) in microanalysis of composition of renal calculi.
METHODS: Fifty urinary stones collected after pyelolithotomy from the patients of age 1 year to 60 years. Stones were fractured through the middle using a knife, nidus pieces were mounted on aluminum stub then coated with gold in vacuum coater. Coated specimens were analysed for morphological examination of crystals by SEM and for elemental analysis by EDS microanalysis. All stones were also analysed by IR spectroscopy.
RESULTS: Out of 50 urinary calculi, the nidus composition was in: 12 (24%) calcium oxalate monohydrate (COM), 8 (16%) calcium phosphate (CaPO4), 6 (12%) calcium oxalate dihydrate (COD), 4 (8%) ammonium acid urate (AAU), 3 (6%) struvite (ST), 3 (6%) uric acid (UA), 2 (4%) sodium acid urate (NAU), cystine 1 (2%), Xanthine 1 (2%) and mixed stone 10 (20%). The crystal structure by SEM was the main diagnostic criteria of evaluation in urate and UA stones as EDS analysis was not possible in these calculi. SEM and EDS combination was the best predictor of core composition in AAU and its mixture with COD and COM.
CONCLUSIONS: Scanning microscopy and EDS analysis are helpful tools in determining composition of the nidus of mixed stones. This applies specially to urate and uric acid containing stones and mixture of these compounds with Ca oxalate.

A-195
BONE MINERAL DENSITY EVALUATION IN PATIENTS WITH UROLITHIASIS

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AIMS: To study the prevalence of osteopenia and osteoporosis in patients with recurrent urinary tract stones.
METHODS: 24 male patients, aged 30–50 years old, who had recurrent urolithiasis and were referred to extracorporeal shock wave lithotripsy (ESWL) unit were studied. Exclusion criteria were: 1- Factors affecting Bone Mineral Density (BMD) such as thyroid diseases, corticosteroid usage. 2- Calcium intake restriction. To perform a case–control study, we also evaluated 24 healthy male controls of a comparable age group. Both groups had similar diets. The technique to study BMD was Dual–Energy–Xray– Absorptiometry (mg/cm^2). BMD of two parts, lumbar spines (L2 – L4) and femur region, were studied and included in the study. The patients ages, body mass index ($weight/height^2$), stone disease duration (time spent between first clinical presentation or imaging study and BMD
evaluation) and BMD (osteopenia, ostesporosis) were studied and compared in both groups. Co-variance analysis, regression test and paired t-test were used to analyse the data.
RESULTS: Mean patients age was 38.4 ± 6.7 years. It was similar to control group (39.3 ± 6.8 years). Body mass index was 26 ± 3.75 and 25 ± 4.5 kg/m^2 in patients and controls respectively. BMD of lumbar was 1018 ± 168 and 1153 ± 155 mg/cm^2 in patients and controls respectively. BMD of femur area of patients and controls were 888 ± 117 and 1017 ± 144 mg/cm^2 respectively. Excluding confounding factors, BMD difference in both lumbar and femur region between patients and controls were statistically significant ($p < 0.01$). BMD results were quite independent of age and body mass index. According to regression analysis, there was a significant correlation between BMD of lumbar and duration of urolithiasis ($p < 0.001$, $r = -0.73$). The same significant correlation between BMD of femur and duration of disease, although it was not as strong as the previous one ($p < 0.01$, $r = -0.52$).
CONCLUSIONS: BMD decreases in patients with urolithiasis may herald a primary defect of bone metabolism. As 30% of patients were osteopenic, calcium intake and its restriction should be monitored in these patients.

A-196
BONE MINERAL DENSITY IN PATIENTS WITH IDIOPATHIC CALCIUM NEPHROLITHIASIS

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AIMS: In order to evaluate bone involvement in patients with idiopathic calcium nephrolithiasis we have determined bone mineral density as well its relationship with urinary excretion of calcium, citrate and parameters involved in the dietary habits. In fact, recently, in the pathogenesis of nephrolithiasis a greater emphasis has been placed in the intake of animal proteins and salt as well as in the loss bone mass.
METHOD: We studied 41 patients with idiopathic calcium neprolithiasis (14 males and 27 females. mean age $46.98 + /-12.51$). Daily urinary excretion of calcium, citrate, nutrient intakes value end urinary pH on morning urine sample were calculated. Bone mineral density (BMD) on the lumbar spine and neck was measured using dual–energy x-ray absorpiometry (Lunar DPX) and was expressed as T score according WHO classification. Statistical analysis were evaluated with linear regression.
RESULTS: Our data show that loss bone mineral density in calcium neprolithiasic patients is common (the osteopenia and osteoporosis incidence was respectively 48% and 26%). without significant difference between males and females. A significant

correlation was found between BMD (spine and of neck) and excretion of sodium ($p = 0.036$ and $p = 0.042$), phosphate ($p = 0.023$ and $p = 0.039$), urea ($p = 0.02$ and $p = 0.028$), urinary pH ($p = 0.008$ and $p = 0.001$) and citrate ($p = 0.05$ and $p = 0.04$) respectively. No correlation was found between urinary excretion of calcium and BMD.
CONCLUSIONS: Our results confirm that osteopenia and osteoporosis are common in idiopathic stone formers. Dietary habits seem to influence bone mineral density, confirming their role in the pathogenesis of nephrolithiasis. Osteopenia and osteoporosis occur in nephrolithiasis patients with or without hypercalciuria. A correlation between bone mineral density and urinary excretion of citrate could support the protective role of citrate not only in the nephrolithiasis, but also in the prevention of loss bone mass. Further studies with ampler casitiche could confirm our hypothesis

A-197
HIGH PREVALENCE OF OSTEOPENIA AND HIGH BONE TURNOVER IN PATIENTS WITH UROLITHIASIS

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AIMS: This study examined frequency and severity of the bone changes in patients with urolithiasis by measurements of bone mineral density (BMD) with dual-energy absorptiometry, biochemical markers of bone turnover (osteocalcin, bone-specific alkaline phosphatase, parathyroid hormone (PTH), vitamin D metabolites, ionized calcium, phosphate.
METHODS: The study was performed in 52 patients (34 female, 18 male, mean ade 47.6 +/− 12.5)with urolithiasis. Bone mineral density was measured in the lumbar spine, proximal femur and distal forearm.
RESULTS: Bone mineral content, expressed as T score, was assessed as normal ($T > -1.0$) in 31% of patients, osteopenic ($-1.0 > T > -2.5$) in 55%, and osteoporotic ($T < -2.5\%$) in 14%. 65% of all patients had high bone turnover as assessed by high levels of osteocalcin and/or bone-specific alkaline phosphotase. The levels of calciuria correlated positively with levels of bone turnover ($p < 0.05$). Five patients (9.6%) had high levels of PTH. Three of them also had low levels of vitamin D metabolites. And two were diagnosed as having primary hyperparathyroidism.
CONCLUSIONS: The results suggest that bone metabolism is closely related to the pathogenesis of urolithiasis

A-198
OUR CURRENT INDICATIONS FOR OPEN STONE SURGERY

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AIMS: Following the introduction of extracorporeal shockwave lithotripsy (ESWL) and the development of minimally invasive endourological procedures (URS, PNL), the management of renal and ureteral calculous disease has dramatically changed and the number of patients requiring open stone surgery greately reduced. In this study we aim to review the our indications for open stone surgery.
METHODS: All patients underwent ESWL, endourological procedures such as ureteroscopy, intracorporeal lithotripsy, and open stone surgery between May 15, 2002 and December 1, 2002 were reviewed retrospectively.
RESULTS: Of 130 procedures performed for urinary stone disease, the majority was ESWL 57%, n:75), while 4% (n: 6) was ureteroscopy with intracorporeal lithotripsy. Open stone surgery rate was 38% (n: 49) which included 5 Pyelo-nephrolithotomies, 18 pyelolithotomies (simple or extented), 20 ureterolithotomies, and 6 cystolithotomies.
The most common indications for open stone surgery were large stone burden (10%, n:5), failure of ESWL (25% 3, n:12) and anatomic abnormality (39%, n:19), patient's preference (20%, n:10), the resident training (3%, n:2), and cost-effectivity (2%, n:1). Stone free rate and morbidity rate was 90% and 5% respectively. (PNL is not performed in our department because of the lack of technical equipment and experienced surgeon.)
CONCLUSIONS: Although majority of patients with urinary tract calculi can easly be treated with ESWL and minimally invasive procedures, open stone surgery remains a viable treatment option for a small cohort of patients with complex calculous disease associated with anatomic abnormalities, and when ESWL device is abscent or ineffective. The traditional open stone surgery is cost-effective method in some selected patients, compared to ESWL. Finally open stone surgery should also be considered in the training of young residents. Therefore the current indications of open stone surgery may be widened.

A-199
ACCEPTABILITY OF OPEN NEPHROLITHOTOMY IN SURGERY FOR STAGHORN AND/OR MULTIPLE NEPHROLITHIASIS

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AIMS: Nephrolithotomy (NLT) is considered to be the best and sometimes the only possible method of calculi removing in the most severe cases of staghorn and/or multiple nephrolithiasis (SMN). Less traumatic and bloodless performance of this operation makes for its success.
METHODS: For recent ten years 48 of 369 (13%) patients (pts) with SMN (31 male and 17 female, average age was 36.5) underwent NLT. The left kidney was affected in 19 pts, while the right kidney-in 18 pts. 11 pts had bilateral SMN. For these pts were performed 49 NLT procedures (additional pyelolithotomy was required in 20 cases). We have performed NLT on both kidneys at different times in one patient for bilateral SMN. In 35 cases, when renal parenchyma was safe enough, we performed posterior transversal NLT on the border of middle-superior or middle-inferior kidney segments with obligatory compression of the renal artery. Furosemide (3 mg/kg) and Verapamil (0.2 mg/kg) were administered i.v. 15 minutes before the compression and just after restoration the blood circulation in the kidney to protect it from ischemia. The average compression time was equal to 18.5 minutes (tmax-33 minutes). During the first 5 days after operation a patient proceeded receiving the same dose of Furosemide and Verapamil under blood electrolytes balance control. The idea was to remove post-operational kidney stress.
RESULTS: We have performed one secondary nephrectomy for post-operational pyo-inflammatory process in the kidney. Not a case of intra- or post-operational bleeding was observed. 3 pts with initial $Hb < 70$ g/l underwent blood transfusion of 500 ml.7 (14.3%) pts returned with residual stones.
CONCLUSIONS: Open NLT is still effective and suitable method of calculi removing in pts with SMN. The above mentioned modification with anti-ischemic kidney protection with Furosemide and Verapamil permits to reduce at most operational and ischemic trauma and gives a surgeon an opportunity to free manipulations and through kidney inspection without a risk of hemorrhage.

A-200
ASSESMENT OF RENAL FUNCTIONS AFTER ANATROPHIC NEPHROLITOTOMY

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AIMS: Anatrophic nephrolitotomy is a surgical technique used in limited number of patients with complex staghorn calculi. We

aimed to determine the effects of this technique on renal functions.
METHODS: Between March, 1999 and March, 2002 anatrophic nephrolitotomy was performed on 24 patients in SSK Okmeydani Training Hospital. Renal functions were assessed with serum creatinine levels, creatinine clearance, intravenous urography and 99 m Technesium DMSA renal scintigraphy preoperatively. These tests were reperformed in 3rd month after operation for comparison of renal functions.
RESULTS: There were 16 male and 8 female patients with an average age of 45.2 years (18–57). Mean operation time was 110 minutes, peroperative blood loss was 275 ml and the mean hospitalisation time was 6.4 days. Five patients had residual calculi. Mean serum creatinine level and creatinine clearance were 1.12 mg/dl and 83 ml/min preoperatively, 1.23 mg/dl and 80 ml/min postoperatively respectively. Separated renal function determined by 99 m Technesium DMSA renal scintigraphy decreased from 40% preoperatively to 37% postoperatively. There was no statistical difference between these values ($p = 0.18$).
CONCLUSIONS: Anatrophic nephrolitotomy is a reliable and effective surgical technique for preservation of renal functions and stone clearance in patients with staghorn calculi.

A-201
LITHIASIS AND ECTOPIC KIDNEY. DIAGNOSTIC AND THERAPEUTIC ASPECTS

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AIMS: The aim of this study is to report eight cases of ectopic kidney with lithiasis and pelvic localization, its diagnostic aspects and surgical treatment. Kidney in ectopic position is dysplasic, and associated to other malformations. The advent of a lithiasis in these conditions rises questions about therapeutic options.
METHODS: We report eight cases of pelvic ectopic kidney with urinary lithiasis, observed between 1990 and 2001. They were six females and two males with a mean age of 28 years. Diagnosis was based on the IVP data, ultrasonography and computed tomography
RESULTS: The clinical symptomatology was dominated by pain and urinary symptoms. Kidney was non functional in five cases, or with normal appearance sized 10 to 12 cm. We performed total nephrectomy in five cases, pyelolithotomy in the other cases. Surgical approach was subperitoneal via iliac route. A dismembered pyeloplasty was associated in one case. All patients did well. Radiologic control at 6 and 12 months showed no
CONCLUSIONS: Pelvic renal ectopy is uncommon, but not rare in our area. This anomaly is associated with a higher than normal incidence of hydronephrosis and lithiasis. The diagnostic techniques most frequently used to evaluate these patients are ultrasound, intravenous urography, cystography and pyelography. When a surgical procedure is performed, the anatomical features of this anomalous condition should be considered, such as abnormal vascularization, pyelourethral anomalies, kidney rotation and absence of perirenal fat tissue

A-202
COMPARATIVE STUDY OF SURGICAL APPROACHES TO URETERAL STONE TREATMENT: PATIENT'S ATTITUDE, OUTCOME, COMPLICATIONS, COST- EFFECTIVENESS

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AIMS: We performed a comparison, in terms of patients' preferences and attitude, efficacy, safety, morbidity, mortality, length of recovery and costs, of a total of 6 different ways to treat a ureteral stone, in our facility.
METHODS: A total of 408 patients, were admitted from 15/6/1997–30/10/2001, in our Department to have a ureteral stone removed, according to EAU guidelines and indications. Before admission all patients answered an anonymous questionnaire regarding their knowledge of their condition, whether they agreed with the procedure doctors proposed, and, if not, why. Imaging tests (i.e. ultrasound and I.V.U.) were performed in all patients, to assess diagnosis, size and position of the stone, and stone characteristics.
RESULTS: Virtually all patients felt they knew enough regarding ureteral lithiasis. 23.5% of patients preferred surgical methods other than those proposed to them. These patients were predominantly males (65%) in there forties, highly educated and of high socio-economical status. Patients with longer lasting disease preferred more radical ones. Females, showed a relative preference towards ureterolithotripsy. Our group of patients' treatment was: a) 218 pts (53.4%) had endoscopical approach, b) 40 pts (9.8%) had ureterolithotomy, c) 18 pts (4.4%) had laparoscopic ureterolithotomy, d) 63 pts (15.4%) had ESWL and e) 69 pts (16.9%) had a combination of the aforementioned methods. Unsuccessful outcomes were more often when the choice of method was made according to patient's preferences. A total of 27 pts were re-admitted for a second ureterolithotripsy or ESWL. Finally all patients were rendered stone free. Median stay in the Hospital was 2 days (1–3 days) for endourological procedures with a median cost of 240 €, while a single ESWL procedure costs approximately 600 €.
CONCLUSIONS: ESWL has found a compete rival, while open surgery remains always an option but in fewer cases. All methods are of satisfactory safety and efficacy. ESLW remains an appealing option to the eyes of patients, mainly because of the reinforcing feedback they get from the media, while laparoscopic ureterolithotomy is virtually unknown to the Greek public.

A-203
THE CHOICE OF URINARY DRAINAGE IN PATIENTS WITH URETERAL CALCULI OF SOLITARY KIDNEYS.

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AIM: To evaluate the safety and efficacy of treatment of patients with ureteral calculi of solitary kidneys (UCSK) in accordance to the way of urinary drainage.
MATERIAL and METHODS: We have studied a total of 55 patients with UCSK in 1999–2002 years, with 15 (27.3%) cases of radio-opaque calculi (ROC) among them. The group included 13 female and 42 male patients 36 to 62 years old. The stone been treated represented the first stone episode for 24 (43.6%) patients. It was proved that stones were mainly located in distal ureter (in 39 patients, 70.9%). Stone size was different, majority of patients (26 persons, 47.3%) had not more than 5 mm wide calculi. We met several reasons for early intervention such as urosepsis, persistent ureteral obstruction and acute pyelonephritis with anuria in 41 (74.5%) persons. There were 2 groups of patients in accordance with the way of urinary drainage: 30 (54.5%) patients with Double-J stents (group A) and 25 (45.5%) – with percutanous nephrostomies (group B). After carrying out conservative methods for stone passage to all patients, we used to perform ESWL (1–3 series) to 40 (72.7%) persons. In some cases we used instrumental experiences, such as ureteroscopy (with electrohydravlic or ultrasonic lithotripsy). Such procedures were done in ineffective trials of the stone removal.
RESULTS: The spontaneous passage rate of UCSK after conservative treatment and ESWL was in 23 (76.7%) patients of the group A and in 21 (84.0%) persons of the group B. In 7 (23.3%) cases with ROC we diagnosed acute back pain and anuria episodes after ESWL and removing Double-J stents. Ureteroscopy was done to all such patients. Percutanous nephrostomy was passed to 5 patients with ROC before endoscopic manipulation.

However, in 2 cases with ROC we used ureteroscopy without previous nephrostomy and we occurred urosepsis and intractable pain in such patients. Also, electrohydravlic lithotripsy was performed in 4 (16.0%) persons of group B after ineffective using of ESWL. Bad results of modern nonoperative method as ESWL could be explained: we have seen sacro-iliacus calculi localization in such cases.
CONCLUSIONS: Using of percutaneous nephrostomy in hard group of patients with radio-opaque ureteral calculi of solitary kidneys could give us a chance to make the lithotripsy more easier. We have ability to undergo different endoscopic evaluations on solitary ureter and to prevent open surgical intervention.

A-204
TREATMENT OF STONES IN CALCULOUS ANURIA REQUIRES A MULTITUDE OF COMPLEMENTARY THERAPEUTIC OPTIONS

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AIMS: Treatment of urinary stones encompasses a spectrum of options ranging from expectant treatment to open surgical removal. The aim of this study is to assess the clinical utility of such options in cases of calculous anuria.
METHODS: The study included 132 cases with an age range from 1.5–72 years and consultation delay of 16 hours–15 days. KUB film suggested the diagnosis of renal and/or ureteric stones in 88 cases and abdominal sonography revealed the presence of stones in 56 cases. In 9 cases the diagnosis of either small or radiolucent ureteric stones was in the course of ureteroscopy (URS) or retrograde ureteropyelography. According to the basic laboratory and imaging assessment, options of treatment were selected. Initial clinical and follow up data dictated subsequent measures.
RESULTS: Dialysis once to thrice was primarily utilized in 9 cases and in extra 8 cases post-interventional. Monotherapy was the choice treatment in the form of URS for 8 cases with ureteric stones and open surgery (OS) for 4 children with large pelvic calculi. In one case, spontaneous stone passage ended the problem. Percutaneous nephrostomy (PCN), external ureteric catheterization (UC) and JJ ureteric stenting were the primary treatments offered for 53, 39 and 18 cases respectively. For those last 119/132 cases (90.2%): URS, OS, ESWL, percutaneous nephrolithotomy (PNL) and chronic haemodialysis was resorted to respectively in 63, 21, 18, 9 and 8 cases as a second treatment line. Interchangeability of the predetermined options entailed 16 (12.1%) cases due to unpredicted operative findings.
CONCLUSIONS: Calculous anuria requires all the treatment modalities adopted for stones presenting in the non-anuric, non-emergent state. The therapeutic options mostly operate sequentially in a complementary manner and to a lesser extent as one-stage procedures. ESWL and PNL are not considered primary treatment resorts.

A-205
INTRAOPERATIVE ULTRASOUND LOCALIZATION OF RENAL CALCULI

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AIMS: We present our 6 year experience with intraoperative ultrasound imaging, facilitating localization of renal calculi, during open stone surgery.
METHODS: Between 1996 and 2002, 28 pyelolithotomies, 19 nephrolithotomies and 35 combined pyelolithotomies + nephrolithotomies were performed in 82 complex stone patients. Intraoperative localization of renal calculi by real time ultrasound (with a 7 MHz transducer) was performed in 50 cases (group A), after the surgeon had recognized and removed all visible or palpable stones. If residual fragments were localized, super selective nephrotomies were performed for stone extraction. The remaining 32 patients were not offered any kind of intraoperative stone localization and they were used as control group B.
RESULTS: In group A, 26% of the stones would have never been identified otherwise (without the U/S), the mean duration of the operation was 120 minutes. 47/50 patients were rendered stone free after the surgery. No serious postoperative complications were observed. 4 patients developed moderate renal failure. In group B, 18/32 patients were stone free after the procedure which had a mean duration of 95 minutes. Postoperative urinary fistulas were observed in 6 patients and 3 patients developed urinary infection and perinephric inflammation. 4 patients presented moderate renal failure during follow up.
CONCLUSIONS: Intraoperative ultrasound calculi localization should be performed during open kidney stone surgery. It is a safe, quick and the most easily accessible method for intraoperative localization of renal calculi. In this way residual fragments can be identified and extracted, nephrolithotomies are even more selective, operative time is shortened and the complication rate is lower.

A-206
PNEUMATIC LITHOTRIPSY THROUGH PYELOTOMY INSICION DURING OPEN SURGERY FOR TAGHORN CALCULI: AN ALTERNATIVE METHOD TO ANATROPHIC NEPHROLITHOTOMY

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AIMS: Our purpose was to remove large-volume staghorn calculi with less morbidity and maximum ease without an anatrophic nephrolithotomy, with the use of a pneumatic lithotriptor during pyelolithotomy to disintegrate the branches of stones extending into the calyces and also retained calyceal fragments.
METHODS: Sixteen patients (17 renal units) with large-volume staghorn stones were evaluated with blood urea nitrogen (BUN), creatinine levels, urine analysis, and culture, excretory urography (IVP), and 99mtechnetium dimercaptosuccinic acid (DMSA) renal scintigraphy preoperatively. Patients were treated with a pneumatic lithotriptor at the time of open pyelolithotomy. Bilateral surgery was performed in 1 patient. The mean follow-up period was 12 (range 6 – 24) months. The patients were re-evaluated postoperatively at 6 months with BUN and serum creatinine measurements, urine analysis and culture, IVP, and renal scintigraphy with DMSA. Data were analysed by one way ANOVA test. A p value < 0.05 was considered statistically significant.
RESULTS: After treatment, 15 of 17 renal units (88%) rendered stone-free while residual fragments remained in two patients. Average operation time was 190 minutes (range 135 to 285) with a mean blood loss of 226 ml (range 140 to 425). No patient required blood transfusion. Six months after surgery, mean BUN and creatinine levels were decreased from 31.2 to 28.2 mg/dl ($p = 0.248$) and from 1.3 to 1.1 mg/dl ($p = 0.001$), respectively. Renal scintigraphy with DMSA revealed an increase in ipsilateral average renal function from 39% to 43% ($p = 0.043$). IVP also revealed a decrease in pelvicalyceal dilatation in almost all patients with a good functioning kidney and without any stone recurrence. No complications encountered postoperatively except a high fever episode in one patient.
CONCLUSIONS: Minimal bleeding without the nephron loss and arterial clamping seem to be the advantages of this simple and easy applicable technique which may be an alternative procedure to anatrophic nephrolithotomy for the majority of patients with staghorn calculi requiring open surgery.

A-207
LAPAROSCOPIC TREATMENT OF URINARY TRACT'S STONES

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AIM: There difference methods of treatment of stone disease. Last time some urologists use laparoscopic technology.
METHODS: We have experience open surgery, TC-lithotripsy and cystoendoscopic lithotripsy. From 1994 we have been making 198 urological operations with laparoscopic technology. From those: pyelolithotomy – 6, ureterolithotomy – 3, cystolithotomy – 3. Some of them were simultaneously with nephropexy and cholecystectomy.
RESULTS: All technology was very few painful and more comfortable (especially who had experience of open surgery) for patients and very beautiful for surgeons. Cystolithotomies were made with original methods. Results were very good. One patient was operated second time with another disease – ureter was found without any sign of surgical damage.
CONCLUSIONS: Laparoscopic technology is good for treatment some patients with stones of urinary tract.

A-208
LAPAROSCOPIC MANAGEMENT OF LUMBAR URETERAL CALCULI: A REPORT OF 12 CASES

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AIMS: ESWL, Ureteroscopy, classic uretero-lithotomy were proposed in the management of lumbar ureteral calculi. We report 12 cases of lumbar ureteral calculi managed by laparoscopy and we discuss the advantages of this approach.
METHODS: Between September 2000 and December 2002, 12 patients with obstructive lumbar ureteral calculi were managed in our department. mean age were 26 years, 7 patients had right lumbar ureteral calculi, 3 left ureteral and 2 patients had pelvic calculi. Size of the stone ranged from 25 to 37 mm. patients were operated in lumbar position with laparoscopic retroperitoneal access. After dissection of the ureter we made an ureteral incision permitting the extraction of calculi.
RESULTS: Mean operating time were 90 mn (60–120). Double J stent was placed in four cases. Sutures of ureteral incision was done in all cases. We have not be obliged to convert in any case. We note no post-operative complication except a case of urinary fistula during 3 days.
CONCLUSIONS: Laparoscopic ureterolithotomy for lumbar ureteral calculi is used increasingly frequently and this study confirms that is safe, effective and mini invasive approach.

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A3 PORT ACCESS FOR RETROPERITONEAL LAPAROSCOPIC TREATMENT OF LARGE URETRAL CALCULI NOT AMENABLE FOR LESS INVASIVE PROCEDURES

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AIMS: To evaluate 3 port access for retroperitoneal laparoscopic ureterolithotomy as an alternative line of treatment for ureteral stones not amenable for other less invasive procedures such as ESWL and endoscopy.
METHODS: A 3 port access retroperintoneal laparoscopic ureterolithotomy was tried in 46 patients with impacted upper ureteral stones 37 patients and middle ureteral stones [9 patients]. Mean stone size was 18 mm. [ranged from 13 mm. to 24 mm.]. Thirty five patients were males and 11 patients were females. Mean age was 36 years [ranged from 18 to 54 years].
RESULTS: The procedure was successful in 41 cases [89.1%] and converted into open surgery in 5 cases [10.9%]. Mean operative time [time spent from the begining of retroperitneal acess till the end of the manoeuver] was 55 min. [ranged from 25 min to 90 min]. No major intraoperative complications were encountered. No blood transfusion was needed. Mean hospital stay was 4 days ranged from 2 to 7 days. Post-operative complications in the from of prolonged urinary leakage occurred in 2 patients [4.4%] and high grade fever occurred in one patient [2.2%].
CONCLUSIONS: Three port access retroperitoneal laparoscopic ureterolithotomy is a good minimally invasive alternative line for treatment of ureteral stones in cases not, amenable for ESWL or endoscopy. However, it takes a long learning curve and needs good case selection.

A-210
EX VIVO TRAINING MODEL FOR PERCUTANEOUS NEPHROLITHOTOMY

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AIMS: Percutaneous endourological procedures require an advanced level of skills. To facilitate the training of the proper technique, simulators are helpful. Non-biological models, useful to learn the basic steps, do not represent the clinical situation in an ideal way. Recently, we developed a porcine urinary tract model for ureteroscopy. Proceeding from this experience, we developed a further ex vivo model for training of percutaneous endourological procedures.
METHODS: The kidney with the ureter is dissected off the retroperitoneal organ package of freshly slaughtered pigs. It is embedded in silicon. The renal pelvis can be filled with saline to simulate hydronephrosis, stones can be implanted for percutaneous lithotomy.
RESULTS: This ex vivo model allows for training of all percutaneous endourological procedures (e.g. percutaneous nephrostomy, percutaneous lithotomy, endopyelotomy)
CONCLUSIONS: Our ex vivo model for training of percutaneous endourological procedures is an ideal way to train these techniques. Concerning ''tissue feeling'', the anatomic relations and the great variety of procedures that can be trained, it is superior to non-biological models. Nevertheless, it is easily available and inexpensive.

A-211
INITIAL RESULTS WITH PERCUTANEOUS NEPHROLITHOTOMY IN THE LEARNING CURVE

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AIMS: Percutaneous nephrolithotomy (PCNL) has been established to be the treatment of choice in the surgical management of renal stones since 1980's, but could not access adequate popularity in several developing countries due to need for technical equipment and widespread use SWL. Herein, we present our initial results in the learning curve with PCNL.
METHODS: During a 3-months period, a total of 23 cases (12 men, 11 women) with a mean age of 35.6+/−9.3 (range: 19–50) years wee treated with PCNL due to renal stones. Stones were located in renal pelvis in 12 (52.2%) cases (mean stone size: 7.75+/−4.3cm^2), isolated in lower calix in 5 (21.7%) cases (mean stone size: 4.4+/−2.3 cm^2), while 6 (26.1%) had staghorn stones (4 partial, 2 complete) with caliceal extensions. PCNL procedure was performed using a lower pole access in all cases.
RESULTS: The mean operating time was 110.2+/−27.4 range:75–140) minutes. After a mean followup of 1.9+/−1.2 months, 14 cases (60.9%) were stone free, including 6 cases (26.1%) with clinically insignificant residual fragments. A total of 4 cases (17.4%) underwent SWL for post-PCNL residual stones, and were also rendered stones free. re-PCNL was performed in 1 case and resulted in complete stone removal. Overall, a stone free rate of 86.96% was achieved, while caliceal parts of staghorn stones were not accesible in 3 cases (13%). No significant complication, such as bleeding or infection were encountered.

CONCLUSIONS: A stone free rate of 86.9% was achieved in the initial phase of learning curve, with no complication. Virtually, all renal stones can be removed percutaneously, although branched renal stones diminish stone free rates in the learning curve, and need additional accesses for stone removal.

A-212
CT-GUIDED ACCESS FOR PERCUTANEOUS NEPHROLITHOTOMY

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AIMS: For certain patients with renal calculi and aberrant anatomy, obtaining access for percutaneous nephrolithotomy (PNL) using conventional fluoroscopic guidance carries an increased risk of damage to perinephric structures. In these situations, cross-sectional anatomic imaging may facilitate nephrostomy tube placement. Herein, we review our experience with percutaneous access using CT guidance for patients subjected to PNL.
METHODS: Between June 2000 and December 2001, 154 patients underwent a PNL procedure at our institution. During this period, 5 patients (3%) required a total of 6 percutaneous access procedures utilizing CT guidance. All patients had aberrant anatomic features, including retrorenal colon (2) and severely distorted body habitus due to spinal dysraphism (3).
RESULTS: Access was obtained without complication in all cases. Following subsequent PNL, 4 of 5 (80%) patients were rendered stone-free.
CONCLUSIONS: CT guided percutaneous access is infrequently required for PNL. However, there is a select group of patients with aberrant anatomy who require this procedure to achieve safe and efficacious PNL.

A-213
PCNL: WHEN TO LEAVE A TUBE?

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AIMS: To determine which patients are suitable for early removal of a nephrostomy tube after undergoing PCNL
METHODS: 156 patients underwent 169 PCNLs between 1/04/1998 and 31/03/2001. All the relevant clinical notes and X-ray films were reviewed and cases categorised according to stone position type and number. All cases where the presence of the nephrostomy tube altered management were identified. The chi square test was used for statistical analysis.
RESULTS: Eight patients did not have a nephrostomy tube and 11 patients did not have a post-operative nephrostogram. Nephrostogram findings and outcome are shown below.

Stone type

Tube removed n = 132	Tube not removed and further intervention n = 20		
X2			
Not known	3	0	
Single simple calculi	107	7	
Multiple simple calculi	15	5	$p < 0.05$
Complete or partial staghorn	7	8	$p < 0.001$

Most patients (80%) had their nephrostogram in the second post-operative day, with the majority of patients going home on the second or third post-operative day.
CONCLUSIONS: The incidence of postoperative intervention is significantly higher in those patients with multiple simple calculi or staghorn calculi and we would advocate always leaving a nephrostomy and performing a post-op nephrostogram. Early removal of the nephrostomy tube should be reserved for single calculi and straightforward procedures.

A-214
LASER GUIDED PUNCTURE: A NEW RENAL ACCESS METHOD

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AIMS: We developed a laser pointer device mounted on the image intensifier of a C-arm fluoroscopy named laser-assisted fluoroscopic puncture technique (LAFPT) as an alternative method of accessing into the kidney.
METHODS: The procedure was divided into three consecutive steps: 1: Generating a visible line along the C-arm X-ray axis, 2: Arranging the position of the C-arm, 3: Using the visible line as a guide to target. LAFPT was assessed both in an in vitro model and in a series of cases. In vitro model was composed of foley balloons filled with contrast medium of different volumes (2–6 ml) embedded in silicon pads. Total fluoroscopy times and attempts for a successful puncture with LAFPT were compared to the conventional fluoroscopic access.
RESULTS: The number of attempts to puncture the 2 ml baloons was significantly higher using conventional fluoroscopic technique than LAFPT. The fluoroscopy time in vitro was reduced 50% using the LAFPT. However there was no statistically significant difference between two techniques in clinical series.
CONCLUSIONS: LAFPT is a navigation system that allows accurate positioning of a needle with reduced fluoroscopic assistance. Although this technique did not change the total fluoroscopy time in vivo, it would be of use in teaching novice practitioners how to accurately align the needle fluoroscopically (in a bulls-eye fashion) by teaching alignment along the laser beam.

A-215
THE IMPACT OF NEPHROSTOMY TUBE SIZE ON PAIN AFTER PERCUTANEOUS NEPHROLITHOTOMY

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AIMS: Percutaneous nephrolithotomy (PNL) is the procedure of choice for large renal calculi. Recent investigators have focused on reducing the associated morbidity of the procedure and improving post-operative patient comfort. We therefore sought to prospectively evaluate the effect of a reduced diameter percutaneous drainage catheter on post-operative pain.
METHODS: Thirty consecutive patients were randomized to receive either a 10 Fr pigtail catheter or a 22 Fr Councill tip catheter for their percutaneous drainage following PNL. Self-assessed pain scores were collected at 6 hours post-operatively as well as at the first and second post-operative days (POD). Total narcotic usage was tabulated using morphine equivalents. Complications, including change from baseline hematocrit, were reviewed.
RESULTS: Demographics were similar between the smaller catheter cohort and those receiving the larger catheter, as was the rate of supracostal access (47% vs. 43%, respectively). There was no significant difference in the change in hematocrit (6.8 vs. 6.2 percentage points, respectively). Those patients with the smaller catheter noted lower pain scores at 6 hours post-operatively as well as at POD#1 and #2 (3.75 vs. 5.3, $p = 0.03$; 1.9 vs. 2.9, $p = 0.07$; and 1.25 vs. 1.9, $p = 0.20$, respectively). The 10 Fr cohort required fewer narcotics 78 mg vs. 91 mg ($p = ns$).
CONCLUSIONS: The use of a small diameter drainage catheter following percutaneous nephrolithotomy is associated with decreased pain scores in the immediate post-operative period. In addition, there is a trend towards reduced narcotic requirements.

There is no apparent increase in patient morbidity with the use of this more comfortable device.

A-216
COMPARISON OF BILATERAL SIMULTANEOUS AND BILATERAL NON-SIMULTANEOUS PERCUTANEOUS NEPHROLITHOTOMY:AN INITIAL REPORT

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AIM: Patients with indication of percutaneous nephrolithotomy (PNL) for bilateral kidney stones may undergo separate sessions of PNL for each kidney or bilateral simultaneous percutaneous nephrolithotomy (BSPNL) in one session. This is an early report of a study in which efficacy, safety and cost comparison is being made between these two treatment modalities.
METHODS: Six bilateral non-simultaneous (nSPNL) operations were compared to 12 BSPNL operations regarding outcomes, complications and cost.
RESULTS: In BSPNL group, mean stone burden per patient was 1010 mm^3, being 440 mm^3 and 570 mm^3 for right and left kidneys, respectively. In nSPNL group, mean stone burden per patient was 1487 mm^3, being 870 mm^3 and 617 mm^3 for right and left kidneys, respectively. Success was determined as clearance of both kidneys completely or with residual fragments smaller than 4 mm. Success rates were 75% (9/12) for BSPNL and 83.3% (5/6) for nSPNL. Total operational time was 190 minutes for BSPNL group and 230 min for nSPNL group. Mean haemoglobin decrease was 2.8 mg/ml in BSPNL group; 2.2 mg/ml and 1.4 mg/ml in two seperate sessions in nSPNL group. One patient had hydrothorax during the operation in nSPNL group. Minor complications were more frequent in BSPNL group. Hospitalization times were 4.7 days and 9.6 days for BSPNL and nSPNL groups, respectively. Total cost of treatment was 2610 USD for BSPNL and 4314 USD for nSPNL operations.
CONCLUSION: Success rates of BSPNL and nSPNL in the treatment of bilateral kidney stone disease are similar. Complication rate is higher but anaesthesia risk, operational time, total hospitalization time and cost of the treatment is lower in BSPNL. Although this is an initial report that does not lead to strict conclusions, BSPNL seems to be the treatment of choice for bilateral stone disease unless a complication occur during the operation for the first kidney side.

A-217
BILATERAL SIMULTANEOUS PERCUTANEOUS NEPHROLITHOTOMY: OUR INITIAL EXPERIENCE

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AIM: Bilateral simultaneous percutaneous nephrolithotomy (BSPNL) operations performed in our clinic between 2000 and 2002 were evaluated regarding efficacy and safety of this procedure.
METHODS: Thirteen BSPNL operations performed on seven male and five female stone patients with a mean age of 31.2 years were evaluated.
RESULTS: Mean stone burden per patient was 1010 mm^3 with burdens of 440 mm^3 and 570 mm^3 at right and left kidneys, respectively. Stone free rate was 58.3% (7/12) postoperatively. Two patients were left with clinically insignificant stone fragments. Success rate, determined as the sum of these two subgroups was found to be 75% (9/12). Success rates in right and left kidneys were 83.3% (10/12) and 58.3% (7/12), respectively. For three patients with residual stone fragments, auxiliary procedures like second-look PNL, ESWL and ureterorenoscopy were performed. By these, one patient was rendered stone free and another with insignificant fragments, increasing the success rate to 91.6%. General anaesthesia was given for a mean of 190 minutes. A mean of 17 litres of saline was used for irrigation and the body temperature decreased with a mean of 2°C. Mean haemoglobin decrease was 2.8 mg/ml and four of the patients were transfused with 12 units of blood. Two patients with perforations of the collecting system healed without any problems by prolonged nephrostomy drainage. Four patients with urinary infections were treated with appropriate antibiotics. Patients were hospitalized for 4,7 days.
CONCLUSION: For patients with bilateral stone disease, BSPNL is an effective modality of minimally invasive surgery. Although minor complication rates were higher than unilateral PNLs in our series, we think that it is vice to operate two kidneys with stones in one session, decreasing anaesthesia risk, hospitalization and convelescence times and the cost

A-218
OUR EXPERIENCE IN PERCUTANEOUS NEHPROLITHOTOMY

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AIMS: To review the results of percutaneous nephrolithotomy (PNL) in 722 renal units (RU).
METHODS: Between December 1997 and December 2002, 722 percutaneous nephrolithotomy (PNL) were done in 398 adult male, 222 adult female and 58 children with a mean age of 41.7 (3–77). 324 right, 398 left kidneys were involved.
RESULTS: The stone free rate was found 77.3% (558/722). When residual fragments less than 4 mm were defined as "insignificant", success rate raised to 95% (686/722). Analysis of 126 RUs with staghorn calculi, revealed 56% (70/126) and 163 RUs with lower pole calyx calculi 88% (144/163) complete stone clearance. A single session PNL was successful in 651 (90%) RUs, but repeat PNL and/or ESWL were necessary in the remaining 71 RUs. Postoperative hemorrhage requiring transfusion was encountered in 143 (19.8%) patients. One patient underwent nephrectomy because of avulsion of the upper ureter. Renal vascular angiography and selective embolization were performed in 5 patients because of long lasting bleeding. In 8 (1%) patients hydro-hemothorax were seen after operation. In four, thorax tube were applied, others were treated conservatively. Two patients (0.3%) were lost because of septic complications.
CONCLUSIONS: In view of these results, PNL appears as an effective and safe treatment modality for renal calculi.

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PERCUTANEOUS NEPHROLITHOTOMY: OUR EXPERIENCE WITH 71 CASES

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AIMS: To evaluate the results of percutaneous nephrolithotomy (PNL) performed at 2 hospitals of our university.
METHODS: Medical records of all patients who underwent PCNL from May 1996 to January 2003 at 2 hospitals were retrospectively reviewed. A total of 64 patients (39 male, 25 female) and 71 renal units were treated. Mean patient age was 47.4 and ranged from 5 to 80 years. 39 stones were in the right and, 32 in the left kidney. 17 stones were located in the renal pelvis, 25 were caliceal stones, and 29 were in multiple localizations or staghorn calculi. Stone size was calculated at KUB and ranged between 91 to 5000 mm^2 (mean = 662 mm^2). 8 patients had solitary functioning kidneys, 1 patient had a horseshoe kidney and 5 patients had UPJ obstruction.
RESULTS: Mean operation time was 154 minutes and ranged from 60 to 375 minutes. 65 procedures were performed through a

single tract, and 6 procedures through 2 tracts. Access was obtained through the lower calices in 42 procedures. In 5 procedures a supracostal route was used. Tract dilation was performed with Amplatz type dilator set (64%), balloon dilator (27%), or telescopic dilators (8%). Intracorporeal pneumatic or ultrasound lithotripsy was used in 52 procedures. A 20 Fr percutaneous catheter was placed routinely at the end of the operation and removed once the haematuria cleared. Double pigtail stents were placed in 52 procedures. Mean hospital stay was 6 days and ranged between 3 and 13 days. 34 kidneys were stone-free and 10 kidneys had CIRF thus the success rate of PCNL as a single procedure was 62%. Additionally, 8 kidneys (11%) became stone-free with postoperative ESWL treatment. In 19 kidneys (27%) the procedure failed. Blood transfusions were given in 30 procedures. Major bleeding occurred in 4 patients, 2 of these were treated with nephrectomy, 1 with open repair and 1 with arterial embolization.
CONCLUSIONS: PCNL is a highly successful choice of treatment for appropriately selected kidney stones. The most common complication is bleeding. As it becomes more common in Turkey, increasing number of patients will enjoy the advantages of this minimally invasive procedure.

A-220
LAPAROSCOPIC PYELOLITHOTOMY IN A PELVIC KIDNEY

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INTRODUCTION: For the stones in ectopic-pelvic kidneys percutaneous nephrolithotomy under laparoscopic guidance may be a treatment of choice. But pyelolithotomy incision done with laparoscopic approach is a good alternative for the stones in renal pelvis.
PATIENT AND METHOD: A 37 year-old male patient with a stone in the renal pelvis of his left ectopic kidney underwent laparoscopic pyelolithotomy and the stone was found easily by the help of intraoperative fluoroscopy.
RESULT: In this video, laparoscopic exploration of the left ectopic kidney, accidental pyelotomy, extracting the stone and suturing of the pyelotomy site and some radiological images are presented.
CONCLUSION: For patients with a stone in the renal pelvis of an ectopic kidney, laparoscopic pyelolithotomy provides an effective approach.

A-221
REMOVAL OF THE STAPLE STONES FROM A KOCK RESERVOIR AND KIDNEY

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INTRODUCTION: It is not rare to see urinary tract stone disease as a late complication of continent diversion surgery, especially in immobile patients with neurologic disorders. Using stapler devices in Kock continent reservoir surgery with nonabsorbable staples is the main drawback of this type of surgery because stones are tend to form on these staples.
PATIENT AND METHOD: A 42 year-old female patient, who had a history of Kock continent diversion operation for neurogenic bladder 8 years ago, was presented with large stone burden in her reservoir and in her both kidneys. During the endoscopic treatment by using a pneumatic lithotriptor, staples were found inside the broken stones in her pouch and in her left kidney.
RESULT: In this video, endoscopic management of the pouch stones through the stoma with the technique similar that of renal percutaneous procedures followed by percutaneous extraction of kidney stones, in three different sessions, were presented.
CONCLUSION: Endoscopic management of the urinary stones is a safe and a minimally invasive procedure even in patients with urinary diversions. Using absorbable materials during the pouch construction may reduce the risk of staple stones and close followup of the patients with urinary diversions may result in early detection and management of stones.

A-222
URIC ACID MONOHYDRATE - A NEW URINARY CALCULUS PHASE

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AIMS: Among 90,000 stones that have been analyzed in our lab since 1972, 15 samples of similar characteristics from 8 patients could not be sufficiently identified by standard laboratory methods, i.e. polarization microscopy, infrared spectroscopy and X-ray diffraction. Therefore, an extended spectrum of physical methods had to be applied to get insight into the true nature of this new component.
METHODS: The chemical composition was investigated using spectral analytical and electron microprobe methods. Powder diffraction patterns of one sample of the unknown urinary substance were recorded on a two-circle diffractometer. Thereby the lattice constants and the crystal symmetry could be determined. The crystal structure of the unknown substance was studied by an X-ray structure analysis from powder diffraction data using special computer programs. Solid state nuclear magnetic resonance (NMR) measurements were performed on a DMX 400 widebore spectrometer.
RESULTS: The unknown substance was identified as uric acid monohydrate. This substance crystallizes in the monoclinic space group P $2_1/c$. Acid and water molecules are connected by hydrogen bonds forming infinite layers in the crystal. By contrast, for the anhydrous as well as for the dihydrate form of uric acid three-dimensional hydrogen bond networks were found. All investigated stones consisting of the monohydrate contained as additional amorphous component a large amount of long aliphatic chains reminiscent of the structure of fatty acids.
CONCLUSIONS: To our best knowledge uric acid has not reported so far to crystallize in its monohydrate form. Accordingly, uric acid monohydrate was as yet unknown as urinary stone component. In contrast to uric acid and uric acid dihydrate the monohydrate form appears to represent very rarely the major stone constituent according to our observations. However, because of the similarity of the infrared spectra of the monohydrate and of the dihydrate form of uric acid, a more frequent contribution of a small proportion of the monohydrate in urinary stones cannot be excluded. X-ray diffraction results in a more distinct pattern. Therefore, this approach appears to be most convenient to identify this new substance in routine stone analysis

A-223
EPIDEMIOLOGY OF HYPERCALCIURIAS

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AIMS: Hypercalciuria is a biochemical syndrome consisting of an exaggerated urinary excretion of calcium exceeding the upper normal limits. The figure of prevalence of hypercalciuria in the population varies according to its definition and to some factors such as age, gender, race and diet. The aim of this study was to investigate the influence of age, gender and dietary intake on urinary calcium.
METHODS: Data were obtained on 182 subjects (88 males and 94 females) chosen at random from the records of a general practitioner excluding those with a history of kidney stones or a history or evidence of any disease or abnormality which could predispose to kidney stones. Participants completed a 24-hour dietary record and 24-hour urine samples were collected over the same period.

RESULTS: Daily urinary calcium was slightly higher in men (170 + /−98 mg/day) than in women (155 + /−89). It rose over the first two decades (63 + /−38, 114 + /−91) and remained constant during adult life (185 + /−22, 177 + /−96) until the last two decades (168 + /−92) when it was significantly reduced in both sexes. The highest values of calcium/creatinine ratio were observed in the first decade. The ratio fell over the second decade and it remained relatively constant in men whereas it rose during the fifth and sixth decades in women. The calcium/body weight ratio remained constant with age until the eight decade when it fell without any difference between sexes. Calcium excretion was related to the dietary intake of protein.
CONCLUSIONS: The wide range of mean urinary calcium excretion values observed in different series can be explained by differences in the selection of the sample of population examined, in the modality of collection of urinary samples and in the laboratory methods, but also by changes of dietary habits over the years or related to the geographical area.

A-224
LITHIASIC COMPLICATION IN AUTOSOMAL DOMINANT POLYCYSTIC KIDNEY DISEASE: AN EXPERIENCE OF 18 YEARS

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AIMS: To study the frequency and responsible factors of nephrolithiasis in 180 patients autosomal dominant polycystic kidney disease patients during a period of 18 years.
METHODS: For anatomic evaluation, the patients underwent renal ultrasonography to determine cyst number, predominant cyst size and stones. A plan abdominal X-ray for some patients was performed. For metabolic evaluation urine analysis, urine culture, urinary pH, calcium, oxalate, citrate, uric acid, phosphate, magnesium, creatinine levels in a 24-h urine specimen were performed in all patients. Serum calcium, phosphate, uric acid, magnesium, and creatinine levels were also determined.
RESULTS: Kidney stones were present in 81 of our patients with autosomal dominant polycystic kidney disease (45%), with a mean age 404.2 years (range from 16 to 67 years). Forty-six of patients with nephrolithiasis (61%) were women. 75% of our patients were symptomatic and only two of them (3.6%) required the surgery. The stones were composed primarily of urate (47%) and calcium oxalate (39%), and other compounds 14%. The calculi were associated with an abnormal low urinary pH (ŏ0.3) (62%). Of the patients studied, hypocitraturia was found in 43%, hyperuricemia in 28%, hyperoxaluria in 17%, hyperuricosuria in 42%, and hypercalciuria in 12%. In 40% of patients the presence of calculi was associated with a history of urinary tract infections and flank pain.
CONCLUSIONS: In our study nephrolithiasis was present in 45% of patients, more than the frequency reported in literature. Both anatomic and metabolic factors are believed to contribute to stone formation in our patients with autosomal dominant polycystic kidney disease, as reported in literature. But, on the other hand, this high frequency of nephrolithiasis in our patients may be related to the fact that Albania is being considered as an area for endemic urinary stone disease.

A-225
THE METABOLIC ABNORMALITY IN PATIENTS WITH CALCIUM CONTAINING STONE PATIENTS AND THE IMPACT OF MEDICATION ON STONE RECURRENCE AFTER SHOCK WAVE LITHOTRIPSY

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AIMS: To demonstrate the prevalence of metabolic abnormality in calcium containing stones patients, 24 hours urine collection was examined. We also focused on stone recurrence in patients with or without the medication for prophylaxis after SWL treatment.
METHODS: We retrospectively analyzed data from 611 consecutive calcium stone formers (423 males, 188 females) who underwent radiological and laboratory evaluation at our institutes between 1984 and 2002. The composition of urinary stone was investigated by infrared spectroscopy. To demonstrate the prevalence of metabolic abnormality, calcium, oxalate, uric acid, magnesium, citrate were determined on 24 hours urine collections on free diet before any medical treatment.
Some of these calcium containing stone patients received medication (allopurinol and potassium/sodium citrate) as prophylaxis for stone recurrence. To evaluate the impact of these medication on stone recurrence, stone/patients/year were calculated after complete stone free status following SWL.
RESULTS: Stone analysis revealed pure calcium oxalate (CaOx) 52.8%, calcium oxalate-calcium phosphate (Cox-P) 42.4%, CaOx-Urate(CaOx-Ua) 4.8% in male, and CaOx 47%, CaOx-phosphate 52%, CaOx-Ua 1% in female. Hyperoxaluria 40.7% and 25.7%, hypocitraturia 33.0% and 27.2%, hypomagnesuria 31.1% and 45.1%, hyperuricosuria 19.4% and 5.2%, hypercalciuria 18.4% and 26.9% were observed respectively in male and female patients. Gender difference in metabolic abnormality was observed to some extent. Mean followup after shock wave lithotripy was 4.0 years. Stone formation rates stone/patients/year) were not significantly different between control groups and medication groups.
CONCLUSIONS: Gender differences in metabolic abnormality were observed and the medical prophylaxis medication showed no long-term effect on stone recurrence.

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BASIC COMPLAINT PATTERNS AT PRESENTATION IN PATIENTS WITH URINARY STONE DISEASE

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AIMS: To expose the complaint forms at presentation and the relationships of these forms with various clinical characteristics in the patients with urolithiasis, and to try to contribute to pretest clinical investigations.
METHODS: The clinical records of consecutive 103 patients with urolithiasis followed at our Department were reviewed retrospectively. Basic complaint patterns determined at first clinical presentation were analyzed in terms of their relationships with age, gender, stone burden, stone side, stone location and presence of hydronephrosis. In statistics, Kruskal-Wallis and chi-square tests were used.
RESULTS: Mean age was 35 (SD:20). The male to female ratio was 62/41. A total of seven complaint pattern at presentation was determined: no complaint (2%); flank pain only (57%); irritative voiding symptoms only (8%); flank pain plus irritative voiding symptoms (10%); flank pain plus radiating pain to the testis (3%); bloody urine (16%); inability to urinate (4%). Among the relationships, only stone side and location were statistically related to these patterns. Substantial portion of renal and ureteral stones caused flank pain only, while substantial portion of bladder and urethral stones caused bloody urine ($p < 0.05$).
CONCLUSIONS: According to our study, 98% of the patients with urolithiasis were symptomatic at presentation. Supravesical urinary stones were prominently presented with flank pain, while vesical and infravesical stones with hematuria.

A-227
BLADDER STONE FORMATION ON INTRAUTERIN CONTRACEPTIVE DEVICE MIGRATED TO THE BLADDER: A REPORT OF TWO UNUSUAL CASES

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AIMS: The aim of this study is to emphasize the likelihood of a migrated IUCD as an underlying cause in female bladder stones by reporting two unusual cases.
METHODS: We diagnosed two cases of bladder stones formed on the migrated IUCD. The first case was 34 years old, and had 5 children. She was referred from the first step health center with irritative voiding symptoms, and urinary tract infection resistant to antibiotic therapy. It was learnt that she had the IUCD for 8 years, but she was said that her IUCD had fallen down 3 years ago, and then oral contraception had been counseled. The second case was 36 years old, and had 6 children. She suffered from irritative voiding symptoms and urinary incontinence for several days. In clinical workup of both cases, physical examination, urinalysis, conventional radiography, helical computed tomography, ultrasonography and cystoscopy were performed.
RESULTS: In the first case, it was determined that 10 mm calcified body placed on the long arm of the Copper-T IUCD on direct radiography was a bladder stone fixed on the posterior bladder wall adjacent to the uterus on ultrasonography. The bladder stone on the tip of the IUCD confirmed by cystoscopy, with the main body of the Copper-T embedded into the uterus removed by open surgery. In the other case, direct radiography and ultrasonography showed 37 mm free bladder stone and bilateral hydronephrosis. The stone was confirmed by helical computed tomography and cystoscopy, and removed by open surgery. In the stone nidus, deformed Copper-T was found out.
CONCLUSIONS: Bladder stones are rarely encountered in females. Therefore, though the migration of IUCDs to the bladder is a very rare condition (only 33 cases up to now), when diagnosed a bladder stone in females, it must be considered that this stone can be caused by an IUCD, particularly Copper-T device, which is partially (case 1) or completely (case 2) migrated from the uterus to the bladder according to our report.

A-228
A DOUBLE BLIND CONTROLLED STUDY ON THE EFFECT OF A HYDROGENCARBONATE-RICH MINERAL WATER ON THE STONE FORMATION RISK IN PATIENTS WITH RECURRENT CAOX-UROLITHIASIS.

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AIMS: Studies in healthy subjects have shown that the risk factors of CaOx-Urolithiasis in Urine can be favourable influenced by the HCO3-rich mineral waters.
In this study, it is tested whether this effect is also relevant in patients with recurrent urine stones remaining under everyday life conditions.
METHODS: 34 patients with recurrent CaOx-Urolithiasis should be included in the study. Patients with causal metabolic disorders and gastro-intestinal diseases were excluded. The patients received in a cross-over-design 1.5 l/day for 3 days once a mineral water with 2.673 mg HCO3/l or as a control the same amount of a low mineralised water (98 mg HCO3/l) respectively.
The diet during the test days was not standardised but exactly recorded. Outcome parameters were pH, Calcium, Oxalate, Magnesium and Citrate in 24-h-urine.
RESULTS: A significant increase was found in the mean values of citrate and magnesium concentrations as well as pH values ($p = 0.002$; Wilks-Lambda; $n = 14$). However, calcium and oxalate concentrations in urine remained unchanged.
CONCLUSIONS: These pre-analysis show that in urine stone patients risk factors of CaOx-urine stone formation can be significantly and positively influenced by drinking additionally a HCO3-rich mineral water even when the patients remain under everyday life conditions.

A-229
URINE OXALATE AS A RISK FACTOR OF CALCIUM STONE FORMATION IN IRANIAN PATIENTS

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AIMS: The aim of this study was to determine urinary oxalate level and hyperoxaluria prevalence in calcium stone formers.
METHODS: From Jan. 2002 till October 2002, 72 patients (51 males and 21 females), with a mean age of 37 years who had at least two episodes of calcium stone formation, enrolled in our study. Their 24-hour urine oxalate, calcium, uric acid, citrate and Mg were measured.
RESULTS: Mean 24-hour urine oxalate was 34.0 ($\pm$ 61.5 mg). We found hyperoxaluria in 16.6% of patients. In 12 patients who had hyperoxaluria prevalence of other metabolic abnormalities were as follows: 58.3% hypercalciuria, 8.3% hyperuricosuria, 16.6% hypomagnesuria and 75% hypocitraturia. We did not find hyperoxaluria as an isolated abnormality. There was significant positive correlations between urine oxalate and urine citrate and Mg.
CONCLUSIONS: We found hyperoxaluria in 16.6% of patients. Coincidcence of hyperoxaluria and other metabolic abnormalities shows that stone formation is a multifactorial process. Significant positive correlation between urinary oxalate and urinary inhibitors of stone formation (citrate, Mg) suggest that urinary oxalate overwhelms their inhibitory effect on stone formation.

A-230
URINE CALCIUM AS A RISK FACTOR IN IRANIN CALCIUM STONE FORMERS

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AIMS: The aim of this study was to determine urinary calcium level and hypercalciuria prevalence in calcium stone formers.
METHODS: From Jan. 2002 till October 2002, 72 patients (51 males and 21 females), with a mean age of 37 years who had at least two episodes of calcium stone formation, enrolled in our study. Their 24-hour urine calcium, uric acid, Mg, citrate and oxalate and serum calcium were measured.
RESULTS: Mean 24-hour urine calcium was 228.0 ($\pm$ 10.2 mg). We found hypercalciuria in 37.5% of patients. In 27 patients who had hypercalciuria prevalence of other metabolic abnormalities were as follows: 25.9% hyperuricosuria, 25.9% hyporoxaluria, 3.7% hypomagnesuria and 88.8% hypocitraturia.There was a significant positive correlation between urine calcium and urine uric acid, Mg and citrate levels. None of patients had hypercalcemia. In 3.7% of hypercalciuric patients there was not any other metabolic abnormalities.
CONCLUSIONS: We found hypercalciuria in 37.5% and isolated hypercalciuria in 1.3% of Iranian calcium stone formers. Significant positive correlation between urine calcium and urine inhibitors of stone formation (Mg, citrate) suggest the probability of increased excretion of urine inhibitors in response to elevated level of urine calcium. Coincidence of hypercalciuria and other metabolic abnormalities shows that stone formation is a multifactorial process.

A-231
URINE URIC ACID AS A RISK FACTOR OF CALCIUM STONE FORMATION IN IRANIAN PATIENTS

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AIMS: The aim of this study was to determine urinary uric acid level and hyperuricosuria prevalence in calcium stone formers.
METHODS: From Jan. 2002 till October 2002, 72 Patients (51 males and 21 females), with a mean age of 37 years who had at least two episodes of calcium stone formation, enrolled in our study.
Their 24-hour urine uric acid, calcium, oxalate, citrate and Mg and serum uric acid were measured.
RESULTS: Mean 24-hour urine uric acid was 474.9 ($\pm$211.2 mg). We found hyperuricosuria in 13.8% of patients. In 10 patients who had hyperuricosuria prevalence of other metabolic abnormalities were as follows: hypercalciuria 70%, hypomagnesuria 10%, hyperoxaluria 10% hypocitraturia 90% and hyperuricemia 20%. In 10% of patients with hyperuricosuria there was not any other metabolic abnormalities. There was a significant positive correlation between urine uric acid and urine Mg level.
CONCLUSIONS: We found hyperuricosuria in 13.8% and isolated hyperuricosuria in 1/3% of patients. Coincidence of hyperuricosuria and other motabolic abnormalities in 90% of hyperuricosuric patients shows that stone formation is a multifactorial process. Significant positive correlation between urine uric acid and urine Mg as a stone inhibitor suggests that urinary uric acid overwhelms Mg inhibitory effect on stone formation.

A-232
URINARY TAMM- HORSFALL PROTEIN IN IRANIAN CALCIUM STONE FORMERS

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AIMS: The aim of this study was to determine urinary level of Tamm- horsfall protein (THP) in calcium stone formers and in its subgroups.
METHODS: From Jan. 2002 till October 2002, 72 patients (51 males and 21 females) with a mean age of 37 years who had at least two episodes of calcium stone formation, enrolled in our study. Their 24-hour urine Tamm- horsfall protein were measured through urine protein electrophoresis (SDS- page method). we evaluated 24-hour urinary level of calcium, oxalate, Mg, citrate and uric acid as well.
RESULTS: Mean 24-hour Tamm- horsfall protein was 3.81 ($\pm$ 6.2) mg. 37.5% of patients had hypercalciuria. Mean of THP level was 6.0 $\pm$ 8.5 in hypercalciuric patients but 2.5$\pm$ 4.1 in the reminder. 13.8% of patients had hyperuricosuria. Mean of THP level was 7.1$\pm$ 8.2 in hyperuricosuric patients but 3.3$\pm$ 5.8 in the reminder. 16.6% of patients had hyperoxaluria. Mean of THP level was 4.8$\pm$ 9.5 in hyperoxaluric patients in contrast to 3.6$\pm$ 5.5 in others. Among 12.5% of patients who had hypomagnesuria, mean THP level was 3.5$\pm$6.4 but 3.9$\pm$ 6.3 in others. In hypocitraturic patients who comprises 90.2% of patients, mean THP level was 3.8$\pm$ 6.5 but 3/5$\pm$ 3 in the reminder. Only difference between mean THP level in hypercalciuric patients and the reminder was statistically significant.
CONCLUSIONS: According to literature mean THP level in this series was less than normal mean THP. Significant high level of THP mean in hypercalciuric patients corroborates that it may be increased as a response to elevated urine calcium. It is recommended to perform more studies in order to recognize the impact role of THP.

A-233
VITAMIN C- AN ADDED RISK FACTOR IN UROLITHIASIS

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AIMS: This study was done to find out the effects of Vitamin C in the crystallisation process of different groups of experimental rats.
METHODS: Four groups of five experimental rats – controls, diabetic rats (alloxan induced), diabetic calculogenic (alloxan and oral sodium oxalate) and non-diabetic calculogenic rats. High vitamin C diet for three months was given to the experimental groups. The rats were sacrificed and the histopathological changes in the urinary tract were assessed.
RESULTS: No significant changes noticed in the control group. Grade I and II crystals were seen in the non diabetic calculogenic and diabetic group on high vitamin C group. The diabetic calculogenic rats on high vitamin C diet produced maximum crystal formation (Grade III and IV).
CONCLUSIONS: From this study it was found that in presence of promoters and systemic disorders like diabetes, which causes renal injury vitamin C will enhances urinary crystal aggregation and stone formation. Role of nutritional deficiencies particularly vitamins has received a great deal of attention with reference to their effect on pathogenesis of stone formation. Vitamin C supplementation could augment oxalate excretion and in large doses could increase urinary calcium as well. Ingestion of mega doses of vitamin C has been implicated in causing higher incidence of kidney stones.

A-234
IN VITRO STUDIES ON LITHOLITHIC EFFECT OF HERNIARIA HIRSUTA

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AIMS: Medicinal plants extracts were used for a long time to treat urolithiasis in traditional medicine and are still widely used through the world. Nevertheless, the actual activity of such plants often misses scientific basis. We attempted to assess the effectiveness of Herniaria hirsuta (whole plant extract), which is commonly used for treatment of urolithiasis in Morocco.
METHODS: Herbal extract was prepared using a procedure similar to that often used by patients: 2 grams of the dried and grinded herbal material were brewed in 100 ml of a boiling buffer solution (pH 6.55), then filtered and tested. The dissolution experiments consisted in adding pure calcium oxalate monohydrate stone (10 mg) to 10 ml of a herbal extract solution at 20 g/L or of a sodium citrate solution at 3 and 5 mmol/L (pH 6.55) at room temperature with stirring. After 1, 7 and 15 days, dissolved calcium was measured in the solution.
RESULTS: In presence of Herniaria extract at 20 g/L, calcium concentration in the solution progressively increased from 0.38 to 0.76 and 1.78 mmol/L at day 1, 7 and 15 respectively. Comparatively, calcium concentration in 3 mmol/L and 5 mmol/L citrate solution was 0.26, 0.23 and 0.26 mmol/L for the lower citrate concentration and 0.31, 0.44 and 0.46 mmol/L for 5 mmol/L of citrate. We calculated the rate of dissolved calcium from the stone for each experiment at day 15. In Herniaria solution, it represented 26.2% of the calcium contained in the calculus. In contrast, in citrate solutions, the rate of dissolved calcium was low, ranging from 3.8% with 3 mmol/L to 6.8% with 5 mmol/L of citrate.
CONCLUSIONS: These preliminary results suggest that Herniaria hirsuta could act as a chemolytic agent. Further studies are needed to both demonstrate such a mechanism in vivo and identify molecules responsible for this activity.

A-235
COMPARISON OF SERUM AND URINARY TRACE ELEMENT LEVELS IN UROLITHIASIS AND NORMAL CONTROLS

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AIM: Urinary calculous disease is a global health problem and the aetiology of this disease is under investigation. In recent years the role of trace elements in urolithiasis has received steadily increasing attention. We investigated serum and urinary levels of the trace elements in patients with urolithiasis and normal subjects.
METHODS: Fifty two patients with urinary tract stones (renal, ureteric and vesical) ranging in age from 3 to 78 years (mean 44.418.1)and 52 normal healthy controls ranging in age from 18 to 67 (mean 41.216.4) were included in this study. Concentrations of Zn, Fe, Mg, and Cu were determined in serum and urine. The measurement of these trace elements in serum and urine was performed using atomic absorption spectrometry.
RESULTS: There was no significant difference in the serum levels of zinc, magnesium and copper in stone formers and control group, the values being 3.743.8 ppm and 3.733.87 ppm for Zn; 38.6021.93 ppm and 41.6111.47 ppm for Mg; 2.241.84 ppm and 2.671.26 ppm for Cu, respectively. Serum iron level was significantly high in control group (16.677.25 ppm) as compared to stone formers (8.949.9 ppm) ($p < 0.001$). The mean urinary Zn, Fe, Mg, and Cu levels in the control group were 0.550.63 ppm, 0.170.48 ppm, 80.5147.28 ppm, and 0.00.0 ppm, respectively. The mean urinary Zn, Fe, Mg, and Cu levels in stone formers were 2.812.01 ppm, 5.013.8 ppm, 138.8185.67 ppm, and 0.160.50 ppm, respectively and were significantly higher than control group ($p < 0.001$). We found a negative correlation between urinary and serum Mg levels in stone formers ($p < 0.05$, $r = -0.22$).
CONCLUSIONS: Urinary trace element levels are significantly high in people with stone disease than normal controls. Trace elements may play a role in stone formation. But the possible role of trace elements in stone formation should be investigated in further studies.

A-236
ANALYSIS OF ZINC, IRON, MAGNESIUM, COPPER, LEAD, AND NICKEL CONTENT OF URINARY TRACT STONES AND HAIR FROM PATIENTS WITH STONE DISEASE BY ATOMIC ABSORPTION SPECTROPHOTOMETRY

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AIMS: Urinary stones are deposited chemicals in compact form. Although many theories have been put forward to explain the stone formation the cause of this process is still not well known. In this study we have analyzed Zn, Fe, Mg, Cu, Ni, and Pb concentrations of urinary tract calculi and evaluated the relations between stone type and element concentrations. We also determined the element analyses of hair from same patients with stone disease.
METHODS: In this study, 52 urinary tract stones (7 MgNH4PO4, 8 CaC2O4 + Ca3(PO4)2, 37 pure CaC2O4 stones) and hair samples from the same patients in addition to 52 control hair samples were analyzed. Element concentrations were determined by using atomic absorption spectrophotometry.
RESULTS: The mean ± SD stone Zn, Fe, Mg, Cu, Ni, and Pb levels (ppm) were 5.34 ± 6.4, 15.69 ± 21.36, 57.56 ± 47.93, 2.22 ± 2.77, 0.03 ± 0.22, 0.06 ± 0.20, respectively. The mean ± SD hair Zn, Fe, Mg, Cu, Ni, Pb levels in stone formers were 27.63 ± 39.07, 10.69 ± 21.64, 78.07 ± 71.60, 4.13 ± 5.14, 0.03 ± 0.12, 0.00 ± 0.00, respectively. The mean ± SD hair Zn, Fe, Mg, Cu, Ni, Pb levels in normal controls were 16.56 ± 17.87, 10.93 ± 7.8, 47.51 ± 28.56, 5.71 ± 4.1, 0.09 ± 0.37, 0.00 ± 0.00, respectively. There was significantly difference between hair Mg level of the control group and stone formers($p < 0.05$). In MgNH4PO4 stones, Mg and Cu levels were very high compared to those of CaC2O4 and CaC2O4 + Ca3(PO4) 2 stones ($p < 0.05$). In MgNH4PO4 stones iron level was significantly low compared with other stones ($p < 0.05$). We could find no meaningful differences for stones Ni and Pb levels of the subgroups ($p > 0.05$). In general (no group) we found positive correlation between stone Fe and Zn ($p < 0.05$, $r = 0.29$); between stone Mg and Zn ($p < 0.05$, $r = 0.30$); between stone Cu and Zn ($p < 0.05$, $r = 0.30$).
CONCLUSIONS: In MgNH4PO4 stones Mg and Cu levels are high but Fe level is low than CaC2O4 and CaC2O4 + Ca3(PO4) 2 stones. Hair Mg level is significantly high in stone formers than normal controls. The results suggest that some trace elements may have functions in the stone precipitation process. We need more studies about the element status of people with stone disease, and trace element levels of the stones.

A-237
QUANTITATIVE EVIDENCE FOR SELECTIVE UPTAKE OF URINARY PROTEIN BY CALCIUM OXALATE CRYSTALS

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AIMS: Growing calcium oxalate (CaOx) crystals in urine, in vitro, has been a valuable means of investigating associated macromolecules and matrix material in the absence of blood products. Such investigations have shown that the proteins found in, or on the crystals are not representative of the total urinary load, implying a selective and specific process. This conclusion largely rests on non quantitative comparisons of proteins from crystals and in the urine. Here we approach this question from a different perspective and perform quantitative comparisons.
METHODS: Human urine (free of haematuria) was adjusted to pH 6.0. Urinary calcium was increased to 6 mM. CaOx crystallization was induced by the addition of 15 ml of 50 mM Na2 oxalate to 250 ml of the adjusted urine at 37°C followed by incubation for 2–3 hr with intermittent shaking. Crystals were harvested by centrifugation and rinsed twice with methanol. When diluted urine was used, it was diluted with artificial urine. In sequential batch experiments the supernatant urine from the first crystallization was used to prepare 3 subsequent batches of crystals in the same manner as above, after readjusting the urine pH and total calcium concentration. Crystals were demineralised with EDTA. Protein was measured by Bradford's method.
RESULTS: Protein recovered from crystals varied from about 0.2 to 2% (w/w).There was a positive linear relationship between crystal protein and urinary protein ($R = 0.88$, $p < 0.001$) which corresponded to the uptake of 3.4% of the total protein available. In 6 dilution experiments this relationship was confirmed ($R = 0.98$, $p < 0.05$), corresponding to a 4.6% uptake. In 6 sequential batch experiments the recovered protein diminished exponentially ($p = 0.006$).The crystal yield was unaffected by dilution or sequential batching ($p > 0.05$).
CONCLUSIONS: Only about 4% of the total urinary protein became associated with CaOx crystals grown in vitro while protein uptake from urine by these crystals was almost completely abolished within four sequential batch experiments (> 90% of the initial protein was still available). This gives independent confirmation that CaOx crystal-protein interactions are selective and specific.

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CALCIUM OXALATE HYDROMORPHS AND PROTEIN BINDING

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AIMS: Interactions between urinary proteins and calcium oxalate (CaOx) are often studied by in vitro precipitation in urine. This suffers from the disadvantages that the hydromorph formed (mono-, di- or tri-hydrate) can not be controlled and that the

crystal-protein interactions take place in an actively crystallising medium which involves both surface absorption and intracrystalline incorporation. Here we investigate urinary protein binding to calcium oxalate mono- and di- hydrate.
METHODS: CaOx monohydrate and dihydrate (COM and COD) were grown in inorganic solutions. Desalted urinary macromolecules (UMM) were isolated from urine, some of which was treated to remove Tamm-Horsfall protein (THP). Artificial urine (AU) was prepared to give a solution saturated with CaOx. Crystals were incubated at 2 mg/ml for 2 hours at 37°C in AU with added UMM. Crystals were recovered, examined by SEM and the proteins extracted and analysed by SDS-PAGE and western blotting.
RESULTS: The crystals neither grew nor dissolved (no change in size or morphology and no change in solution calcium concentration). Protein uptake by COM and COD crystals was comparable (about 0.6% w/w). On both, THP was the major protein bound. Urinary prothrombin fragment 1 and albumin were also detected is association with COM and COD. There was no evidence of absorption by inter?a?inhibitor or fibronectin. Removal of THP from the medium did not alter the pattern of binding by the remaining proteins.
CONCLUSIONS: Contrary to some reports, we did not observe any marked difference in the capacity or specificity of urinary protein absorption by COM or COD crystals. Nor was this binding greatly influenced by the presence or absence of THP, suggesting that the extent of surface binding is not restricted by competition for limited sites.

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RENAL EXPRESSION OF TAMM-HORSFALL PROTEIN (THP) AND FIBRONECTIN (FN) IN STONE FORMING RAT MODEL KIDNEYS

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AIMS: THP is the most abundant urinary protein and is believed to play important roles in the urinary systems. In calcium oxalate stone formation it is unclear if the role of THP is promoter or inhibitor. FN is a multifunctional protein distributed throughout the extracellular matrix and body fluids. We reported that it may inhibit calcium oxalate crystal aggregation and attachment to cell. We investigated the renal expression of THP and FN in stone forming rat model kidneys by immunohistochemical staining and real time PCR.
METHODS: A stone-forming rat model (Model 1) with marked tubular dilation in an entire kidney was produced by rendering Wister rats (aged 8 weeks) hyperoxaluric and hypercalciuric, through compulsorily feeding with 0.12 ml of 5% ethylene glycol (in two doses daily) and 0.5 microgram of vitamin D3 every other day. Two other rat models were also produced. Model 2 comprised stone-forming rats with minimal tubular dilation, achieved by giving rats the same dose of ethylene glycol once daily and Model 3 comprised stone-free rats with marked tubular dilation achieved by unilateral ureteric ligation. The rats' kidneys were resected. Immunohistochemical staining and real time PCR was performed.
RESULTS: Kidneys in Model 1 had calcium oxalate crystal. Renal expression of THP and FN was found on renal tubules to which the crystals were attached and significantly greater than that of kidneys without calcium oxalate crystals. THP expression in Model 3 was greatest in three models. FN expression in Model 2 and Model 3 was as same as that in Control. The results of real time PCR are similar to that of Immunohistochemical staining.
CONCLUSIONS: The results from this study suggest that THP didn't initiate crystal formation and the strong expression of THP was induced not by crystals but by renal tubular damage caused by tubular dilation and that FN expression can be stimulated by calcium oxalate crystal.

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IMPACT OF LOWER POLE RENAL ANATOMY ON THE OUTCOME OF EXTRACORPOREAL SHOCKWAVE LITHOTRIPSY MONOTHERAPY OF LOWER POLE STONE

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AIMS: To determine the impact of lower pole renal anatomy on clearance of stone fragments after extracorporeal shock wave lithotripsy (ESWL) monotherapy.
METHODS: In a two-year period, 52 consecutive patients with a solitary lower pole stone who underwent ESWL at Singapore General Hospital Urology Center were retrospectively evaluated. Renal anatomy such as lower pole infundibular length, lower pole infundibular width, infundibulopelvic angle and number of lower pole calyces were determined from excretory urograms (IVU). Each anatomical factor and combinations thereof were correlated with stone-free rate based on 3 months of follow-up. Other stone and renal characteristics were determined and correlated with stone-free group, clinically insignificant (<4 mm) fragment group and residual (>4 mm) fragment group.
RESULTS: Overall stone-free rate was 53.8% at 3 months post-ESWL. Mean stone length is 9.4 + 4.6 mm (range 3–25). Mean lower pole infundibular length is 26+ 5.31 mm (range 16–42). Mean lower pole infundibular width is 6.1 + 2.5 mm (range 3–15). Mean infundibulopelvic angle is 52.4 + 12.2 degrees (range 28–85). There was no infundibulopelvic angle of more than 90 degrees. Majority of patients have 2 (65.4%) calyces in the lower pole. In our series, all the renal anatomical factors have no correlation with stone-free rate. However, the functional condition of the kidney has a significant impact on stone-free rate. Interestingly, the side where stone is located is also a determining factor in fragment clearance.
CONCLUSIONS: In our series, renal anatomical factors do not seem to play a significant role in stone clearance after ESWL, while the functional condition of the kidney and the side where stone is located is a major determinant in stone-free rate. Proper patient selection is essential in order to improve clearance of lower pole stone.

A-241
THE IMPACT OF INFERIOR POLE COLLECTING SYSTEM ANATOMY ON CALYCEAL STONE CLEARANCE AFTER EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY (ESWL)

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AIMS: We evaluate in our prospective study the significance of inferior pole collecting system anatomy on preoperative intravenous urography (IVU) and determine its influence on stone fragment clearance after extracorporeal shock wave lithotripsy (ESWL).
METHODS: We analysed between July 1999 and March 2002, 33 renal units in 31 patients (mean age 48.77) with single or multiple lower pole stones treated with ESWL in our clinic with a Dornier Compact-S lithotriptor. Stone size (8–16 mm.) was measured on plain abdominal X-ray. On preoperative IVU's lower pole infundibular width and length, infundibulopelvic angle (IPA), ureteropelvic angle (UPA) were measured as described by Bagley and Rittenberg.The number of minor and major calyces and renal length and width are noted. Patients with residual fragments not clearing after 6 months of satisfactory fragmentation after ESWL were considered failures. The factors were analysed using the Pearson Chi-Square test and $p < 0.05$ considered statistically significant.
RESULTS: After initial ESWL therapy the overall stone clearance was achieved in about 67% of the patients. Mean lower infundibular length was 30.27 ± 6.2 mm. Mean infundibular width was 5.18 ± 3.5 mm. Mean IPA was 58.12 ± 21.3 degrees.

Mean UPA was 43.36 ± 12.7 degrees. The patients with IPA 45 degrees or more and UPA 45 degrees or more have the chance becoming stone-free of 91.6%. Both factors were statistically significant in stone clearance after ESWL ($p < 0.05$). The number of calyces and renal sizes were not associated with stone- free status. None of infundibular width and length had any statistically significant impact on stone free rate.
CONCLUSIONS: The anatomic features of the lower calix can be easily measured on preoperative intravenous urography. A UPA 45 degrees or more and UPA 45 degrees or more are significantly favorable factors for stone clearance after ESWL. UPA and IPA should be taken into account before choosing a mode of treatment for lower calyceal stones.

A-242
PREDICTING FACTORS OF STONE CLEARANCE IN LOWER CALYX BY SHOCK WAVE LITHOTRIPSY (SWL)

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AIMS: To identify different variables that may influence the outcome of ESWL for the treatment of lower calyceal stones to help in selecting patients that were likely to benefit from the treatment.
METHODS: Between November 2001 and October 2002, 87 patients and 89 renal units with lower calyceal stones were treated with Shock Wave Lithotripsy (SWL). The size, number and area of calculi, length and width of the lower calyx and İnfundibulopelvic angle were measured on intravenous urography (IVU). Cases with residual fragments with in 6 months were considered failures. However; these patients were subjected to adjuvant therapy like inversion exercises and mechanical flank percussion.
RESULTS: Overall stone free rate at 6 months was achieved in 71.4% of renal units. The chances of becoming stone free with all favourable anatomy criteria of infundibular length 30 mm or less, infundibular width 5 mm or greater and infundibular ureteropelvic angle 45 degrees or more was 93%.
CONCLUSIONS: This study revealed that calyceal anatomy has a significant role in determining the stone-free rate following satisfactory fragmentation of stone with ESWL. Thus using these radiographic parameters ESWL can be selected as a treatment modality for a predictably favourable outcome in individual cases.

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IN SITU ESWL OF URETERAL STONES THE DORNIER MPL 9000X VERSUS THE DORNIER LITHOTRIPTER S WITH EMSE F150-X

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AIMS: To evaluate and compare the efficacy of the electrohydraulic Dornier MPL 9000X and the electromagnetic Dornier Lithotripter S equipped with an EMSE F150-P in the in situ ESWL-treatment of ureteral stones.
METHODS: In this retrospective study we compare the in situ ESWL of 175 ureteral stones treated on a Dornier MPL 9000X between Jan 01, 1990 – Aug 31, 1991 and 137 ureteral stones treated on a Dornier Lithotripter S (EMSE F150-P) between Jan 01, 1999 – Aug 15, 2001.
RESULTS:

Treatments results	MPL 9000X	DLS
No of patients	175	137
Retreatment rate	23.4%	10.2%
Auxiliary procedures	27.4%	24.1%
Effectiveness Quotient	66.3	74

CONCLUSIONS: In comparison to the electrohydraulic Dornier MPL 9000X the Dornier Lithotripter S equipped with the EMSE F150-P scores a significantly higher EQ in the in situ ESWL of ureteral stones. Hence the EMSE F150-P could very well contradict the myth that a spark gap SW-source is per definition superior to an electromagnetic SW-source.

A-244
COMPARISON OF CLINICAL OUTCOME OF SWL IN RADIO-OPAQUE VS RADIOLUCENT URETERIC CALCULI

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AIMS: To compare the clinical outcome of shock wave lithotripsy (SWL) in patients with radio-opaque and radiolucent ureteric calculi (UC).
METHODS: Between January 2000 and June 2002, a total of 113 UC (58 radio-opaque [Group 1], 55 radiolucent [Group 2]) were treated with Multimed 2001TM lithotriptor under fluoroscopic monitoring. Localization of radiolucent stones during SWL treatment was achieved after a bolus injection of 1 ml/kg of contrast medium. The shock waves were focused just below the end of contrast medium column. All patients were treated on an outpatient basis under analgesia and light sedation if required. Patients were reevaluated by plain film, ultrasound and/or intravenous urogram 3 months after the treatment.
RESULTS: There were no statistically significant differences in any parameter between groups. The success rate (stone free status) was 87.9% in Group 1 and 89% in Group 2, three months after the treatment. Double J catheter replacement was needed for 3 and 2 patients in Groups 1 and 2, respectively. Two patients from Group 1 and 3 from Group 2 underwent intracorporeal lithotripsy through a ureterorenoscopy. There was no significant difference regarding to auxiliary procedures in both groups. There were also no complications due to contrast medium in Group 2.
CONCLUSIONS: The clinical outcome of SWL treatment is similar for both groups. Therefore, patients with radiolucent UC can be treated with SWL by contrast medium injection even an ultrasonic localization unit dose not exist.

A-245
EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY (ESWL) VERSUS URETEROSCOPY (URS) IN THE TREATMENT OF URETERAL STONES – A PROSPECTIVE STUDY

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AIMS: There is still a controversy on the optimal management of ureteral calculi. We therefore performed a prospective study in 146 patients with ureteral stones not passing spontaneously. Patients were offered two treatment options: ESWL and URS. The stone was treated with the technique preferred by the patient. In case of treatment failure after the first line therapy, patients again could decide on how to proceed.
METHODS: Stone analysis could be obtained from 72.6% patients. ESWL was the primary treatment in 66.4% patients. In two patients, ESWL was the secondary treatment after failed URS. URS was the first line therapy in 33.6% patients. In 29 patients URS was done after failed ESWL. For analgesia, sedoanalgesia or spinal anesthesia were used.
RESULTS: Analgesia was required in 74.2% ESWL and 100% URS sessions. Following ESWL, 70.1% patients became stone free. In 29.9% ESWL failed. Distal stones had a higher failure rate than proximal or mid ureteral calculi. Distal stones treated without success were significantly larger than those treated successfully. Failures were switched to URS. Stone analysis could be obtained in 26 patient with failed ESWL: 23/26 consisted of pure

whewellite or mixed whewellite stones. Clinically relevant complications were not observed. After URS, 94.9% of the patients became stone free. In distal stones, stone free rate was 97.5%. There was only one relevant complication (secondary URS after failed ESWL, large stone): a proximal ureteral lesion requiring surgical repair.
CONCLUSIONS: Our study demonstrated that URS is a safe and highly effective treatment option for ureteral stones. Patients with distal ureteral stones, it should be offered as a first line treatment option. When whewellite as stone mineral is expected, URS is the treatment of choice.

A-246
THE EFFECTIVENESS OF ENDOUROLOGIC MANAGEMENT AND EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY (SWL) IN THE TREATMENT OF DISTAL URETERAL STONES

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AIMS: In the present study we aimed to compare the effectiveness of endoscopic management and SWL in the treatment lower ureteral calculi.
METHODS: Between March 2000 and December 2002, a total of 128 patients were randomized into two groups: 83 (65%) patients with distal ureteral caculi were treated by ureterorenoscopy (URS) and pneumatic lithotripsy (PL) and 45 (35%) patients underwent SWL. The treatment results were discussed in respect to the success rates.
RESULTS: Overall success rate was assessed according to the presence or absence stone. The stone size ranged between 4–17 mm and there was no statistically significant difference between two groups in respect to stone size ($p < 0.05$). In the endoscopic management group, overall success rate was 92.3% whereas, in SWL group it was 57.14%. Larger stones in distal ureter decreased the stone free rate of SWL. Additionally 12% of the patients in SWL group required more than 3 episodes.
CONCLUSIONS: Our results documented that URS is a safe and cost-effective treatment modality in the treatment of distal ureteral stones.

A-247
EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY IN CHILDREN: EXPERIENCE IN USING MPL-9000 LITHOTRIPTOR

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AIMS: To assess the value of extracorporeal shock wave lithotripsy (ESWL) in treating pediatric urolithiasis and to determine the factors that may affect the success in our series.
METHODS: Between January 1993 and August 2002, 129 children with upper urinary tract calculi were treated using a Dornier MPL-9000 lithotriptor (Dornier Medical Systems, Inc., Germany). The series consisted of 77 boys and 52 girls with an age range of 20 months to 14 years (average age: 8.7 years). All ESWL procedures took place under general anaesthesia or sedation with ketamin or fentanyl. Under ultrasonic or fluoroscopic guidance, children were treated with a maximum 2550 shocks at an average of 19.5 kV. Success was defined as the lack of any visible stone fragments on posttreatment radiological evaluation. The patients were assessed 3 months after ESWL treatment and the results compared using the chi-square test to detect factors that might be associated with treatment success.
RESULTS: ESWL was performed in 129 children (134 calculi). Of the stones, 105 had renal, 20 had ureteral, 4 had bilateral renal and 1 had unilateral renal plus contralateral ureteral calculi. One or two lithotripsy sessions were sufficient in most cases (71.6%). In 15 (11.6%) patients, double J stents introduced before lithotripsy and left indwelling until all stone fragments were disintegrated. Overall success rates were 89.5% for pelvic, 85.5% for renal and 75% for ureteral stones. Complications such as urinary tract infection, steinstrasse, small subcapsular hematoma occured in 19 (14.7%) patients. The only significant factor associated with the stone-free rate was the diameter of the stone ($p = 0.02$).
CONCLUSIONS: This study confirmed that the stone-free rate is influenced significantly by stone size. Because children with stone disease are at risk for a longer period than adults, the cumulative likelihood of stone recurrences may be higher in children. Thus, we agree with other authorities that minimally invasive treatment, as ESWL, is mandatory in children with urolithiasis.

A-248
EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY (ESWL) IN CHILDREN

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AIMS: ESWL is succesfully applied in children with urolitiasis. The aim of our study is to evaluate the efficacy of ESWL in pediatric population.
METHODS: Between November 1992 and September 2002, 123 patients, aged from 6 months to 16 years (mean 8.76) were treated for renal, ureteral and bladder stones. Of the cases 72 were boys and 51 girls. Of the cases 92 were treated sedoanalgesia, 31 intravenous analgesia. Our Dornier MPL 9000 lithotripter was upgraded with a system for X-ray localisation. All treatments were performed on outpatient settings. The mean number of shock waves was 1725 (500–2000) in one session. Generator voltage was delivered from 14 to 18 kV and averaged 16. In 26 cases D-J stents were placed prior to ESWL.
RESULTS: Of the stones 102 (82.92%) were located in the renal, 17 (13.82%) in the ureter and 4 (3.25%) in the bladder. Average stone load was 2.07 (0.4–9)cm^2. Stones size and failure rate were 0.5–1 cm^2 = 28 cases (all of them was completely successful), 1.1–2 cm^2 = 48 cases (unsuccessful: 3 cases, 6.25%), 2.1–3 cm^2 = 23 cases (unsuccessful: 2 cases, 8.7%), more than 3 cm^2 = 24 cases (unsuccessful: 3 cases, 12.50%). One hundred twentythree cases were treated in 251 sessions. In 51 patients (41.46%) treatment was completed in one session. After 3 months 70 (56.91%) of the children were rendered stone free and 45 (36.58%) had clinical insignificant residual fragments (CIRF) equal to or less than 0.3 cm^2 in size. After 6 months stone free rate was 79.67% (98 cases), 17 (13.82%) had CIRF. Unsuccessful was 6.51% (8 cases). Other treatment modalities were performed for unsuccessful 8 cases (6.51%). After 12 months 109 (88.61%) of the children were rendered stone free and 2 (1.62%) had CIRF. Regrowth rate was 13.33% (6) in children with CIRF during 12 months follow-up. There were no significant treatment–related complications except for bacteremia in 1 case, renal failure in 1 case.
CONCLUSIONS: We note that with increase stone size the effectivity of ESWL is decrease. ESWL is effective for appropriate stones regarding the size in pediatric population, although follow-ups are required. ESWL is first prefer method in treatment of urinary tract stones.

A-249
SUCCESS OF ESWL AT ISOLATED CALYX STONES IN CHILDHOOD

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AIM: We evaluated success of ESWL comparing lower calyx stones with pelvis and upper-middle calyceal stones in childhood.
MATERIAL AND METHODS: Between January 1992 and february 2002, 125 patients having stones at different sites of kidney were performed ESWL by Siemens lithostar lithotriptor.

According to the stone localization 3 groups were formed; pelvis renalis, upper-middle calyx and lower calyx stones as group 1,2 and 3 respectively., At 12 weeks postoperatively, the results were evaluated by IVU and/or USG as stone free, clinical insignificant residual fragment (CIRF) and ESWL was regarded failed when there was no fragmentation after 3 sessions. Effectiveness quotient (EQ) = Stone free% x 100 ÷ (100% Retreatment% + auxiliary procedure%). Sedoanaljezia was used performing ESWL.
RESULTS: 95 patients (40 female, 55 male) with mean patient age 9.2 years (21monts –16 years) were included in the study and the feaatures and results of 125 are shown in the table. In group 1 ; steinstrass occured in 7 patients (11.5%), fever was seen in 1, and in group 3 steinstrass was formed in only 1 patient.
CONCLUSION: There is no significant difference for success rates between the pelvis, upper-middle and lower calyx stones treated with ESWL.

		GROUP 1	GROUP 2	GROUP 3	p
No. Patient		61	24	40	
Stone burden (range) cm^2		1.4 (0.2–7)	0.9 (0.2–3.3)	0.9 (0.2–4)	0.004
Mean No. of treatment sessions (range)		1.9 (1–6)	1.8 (1–6)	1.8 (1–7)	0.980
Mean No. Shock waves (range)		1603 (500–3000)	1616 (1000–2000)	1644 (1000–2500)	0.877
No. auxiliary1 procedure	Double J (%)	7 (11.5)	3 (12.5)	5 (12.5)	0.531
	PN* (%)	0 (0)	2 (8.3)	1 (2.5)	
Result	Stone-free n (%)	47 (77)	15 (62.5)	25 (62.5)	0.268
	CIRF n (%)	13 (21.4)	8 (33.3)	15 (37.5)	
	Failure n (%)	1 (1.6)	1 (4.2)	0 (0)	
EQ**		50	38.5	40.3	

*Percutaneous nephrostomy **Effectiveness quotient

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EXTRACORPOREAL SHOCKWAVE LITHOTRIPSY IN CHILDHOOD URETERAL STONES

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AIMS: We evaluated the success and complications of childhood ureteral stones treated with SWL.
METHODS:Between July1992–December 2001, 34 patients in childhood were treated with SWL and analyzed. Urine analysis, urine culture, bleeding and clotting times and intravenous urogram was obtained routinely for the preoperative evaluation in all patients. Stonefree and clinically insignificant fragments (CIRF) were defined succesful and SWL was regarded as failed if no fragmentation was noted after the 3rd session
RESULTS: Mean patient age was 9.1 (1.5–16) years in 14 female and 20 male patients. 14 stones were located in the upper ureter, in the mid and lower ureter 1 and 20 stones were located respectively. Patients were treated with Lithostar lithotriptor on outpatient settings. Patients with positive urine cultures were treated under appropriate antibiotics, starting at the day of SWL. All patients were treated with sedoanalgesia except 1 (3%) who were treated under general anesthesia. Shielding of the lung fields or gonads were not used. One patient (3%) was catheterized by percutaneous nephrostomy catheter prior to treatment. Patients with 0.63 (0.15–1.76) cm^2 average stone load were treated for a mean number of 1.7 (1–8) sessions and an average of 1745 (1000-3000) shockwaves. 29 (85.3%) patients were stone free and CIRF were present in 3 (8.8%) after the treatments and total success rate was 94.1%. 25 patients (73.5%) were treated in one session. Ureterescopy was performed in 2 patients regarded as failed. One of the 3 CIRF patients was stone free after 3 months and the 2 others were stabile. Fever that required hospitalization occurred in 1 patient and no other complication was seen.
CONCLUSIONS: ESWL is safe and effective for appropriate ureteral stones regarding the size in pediatric population

A-251
EVALUATION OF HEAT SHOCK PROTEIN 70 (HSP 70) EXPRESSION IN RENAL PARENCHYMA SUBJECTED TO SHOCKWAVE LITHOTRIPSY

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AIMS : Heat Shock Proteins (hsp) are accepted to be induced by a wide variety of environmental or metabolic stresses among which, ischemia was most commonly subjected to research studies. In this experimental study, renal parenchymal hsp70 levels were assessed in an attempt to evaluate the traumatic effects of HESW, which have been found to induce transient ischemia during the procedure, in rabbit model.
METHODS: Eighteen white New Zealand rabbits, each weighing 3–5 kg. were included in the study program. The animals were divided into three main groups and varying numbers of shock waves (1000–1500–2000) were applied to the same kidney of all animals, under fluoroscopic localization with Stonelith V5 lithotriptor. Untreated contralateral kidneys were evaluated as control kidneys. Following HESW application, treated and untreated kidneys of each animal were removed surgically after 24 h and 7 days respectively. Tissue hsp70 levels were assessed by performing immunohistochemistry.
RESULTS: During early follow-up period (24-hour) both treated and untreated kidneys demonstrated moderate to evident degree of hsp 70 positivity. The number of tubules stained with hsp70 increased as the number of shock waves are increased and became evident possibly due to a higher degree of tissue damage. On the other hand again; contralateral kidneys also demonstrated a limited degree of hsp 70 positivity, although it was not as evident as the treated kidneys. Assessment of tissue hsp 70 levels during late follow-up (7 days) in both kidneys demonstrated moderate or limited degree of positivity in the treated kidneys. Limited or no positivity could be demonstrated in contralateral kidneys during this period.
CONCLUSIONS: Taking the certain traumatic effects of HESW and the results of this study into account; increasing positivity of hsp 70 in accordance with the increasing number of shock waves led us to think about a possible limited degree of ischemia formation after this procedure in these kidneys among which the traumatic effects of SWL has been pronounced in terms of tissue hsp 70 positivity.

A-252
THE EFFECTS OF ESWL ON ANTIOXIDANT ENZYMES (G6PDH, SOD AND CAT) IN ERYTHROCYTES

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AIMS: The effects of ESWL on patients undergoing ESWL due to renal stone have been studied using activities of glucose-6-phosphate dehydrogenase (G6PDH, superoxide dismutase (SOD) and catalase (CAT), and levels of malondialdehyde (MDA).
METHODS: The study included 23 patients (8 women, 15 men with an age of range 23–67 years). Blood samples were taken 5 minutes before ESWL, as well as 1 hour and 5 days after termination of treatment. Enzyme activities and MDA levels in erythrocytes were measured spectrophotometrically.
RESULTS: When compared with the values obtained before ESWL, erythrocyte activities of G6PDH, SOD and CAT were found to be reduced at the 1st hour after ESWL, and these reductions were statistically significant ($p = 0.015$, $p = 0.036$ and $p = 0.01$, respectively). At the 5th day after ESWL, erythrocyte enzymes activities were normalized to the values obtained before ESWL. Although there was a significant difference between before and 1st hour after ESWL ($p = 0.003$), no difference was detected between 1st hour after ESWL and 5th day after ESWL ($p > 0.05$) in terms of MDA values.
CONCLUSIONS: The findings of the present study revealed that erythrocyte lipid peroxidation might be induced and antioxidative defence mechanism might be impaired by ESWL.

A-253
SELECTIVE EVALUATION OF TWO ENZYMES (NAG AND AAP) BEFORE AND AFTER UNİLATERAL SHOCK WAVE LİTHOTRİPSY

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AIMS: To evaluate two urinary enzymes activity N-acetyl-B-D glucosamine and alanine amino peptidase before and after unilateral ESWL as markers for renal parenchymal damage.
METHODS: 48 patients kidney stones (meanage 39) who had presented for the first time or at least one after their previous lithotripsy all of them underwent ESWL. Urinary specimens were collected before and, 1, 3, 7 days postlithotripsy. Then, NAG and AAP activities were measured.
RESULTS: These enzymes displayed the greatest activity 24 hours after ESWL with significant difference compared to the control group, ($p < 0.005$ versus 0.002). elevation of urinary enzymes activity correlated with stone size particularly in stones larger than 2 cm. These data suggest that there is some tubular and parenchymal damage induced by ESWL that needs time to be improved.
CONCLUSIONS: The higher urinary enzyme activity in patients with larger stones ($>$ 2 cm) is probably related to resulting from passage of smaller stones, produced after lithotripsy of a large stone and it is suggested that these patients are treated with a safer procedure.

A-254
THE EFFECT OF INFECTION IN COMBINATION WITH PARENCHYMAL TRAUMA ON POSSIBLE ENHANCED CRYSTAL DEPOSITON IN RABBIT MODEL

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AIMS: Taking the histologically proved traumatic effects of Shock wave application on renal structures into account, it was our main goal to evaluate new stone formation as judged by parenchymal crystal deposition in rabbits receiving a lithogenic diet after shock wave application, preceeded by induction of urinary tract infection.
METHODS: 65 New Zealand White Rabbits have been included into the study program and the animals were divided into 5 different groups as follows:

Group I (n:15) Animals fed with 0.75% Ethylen Glycol (EG) in their daily water for 1 month.

Group II (n:15) Animals receiving various numbers (500,1000 or 1500) of HESW in addition to EG administration.

Group III (n:15) Following the induction of urinary tract infection (UTI) by E.Coli strain, animals in this group underwent the same number of shock wave application under lithogenic diet.

Group IV n:15) Animals receiving HESW alone (500,1000 or 1500) without any specific medication.

Group V (n:5) Animals undergoing the entire procedure except for HESW application and EG medication.

All procedures were done under Ketamine HCL (15–20 mg/kg) anesthesia and Stonelith V5 lithotriptor was used. Following the sacrification of the animals after 1-week and 1-month period, evaluation of renal histhology and crystal deposition was performed by Light microscopy and Transmission Electron Microscopy (TEM).
RESULTS: While limited degree of crystallization could be demonstrated in Group I animals in both light microscopy as well as TEM examination; various degrees of crystal deposition were seen in the intracellular areas and intratubular regions in Group II animals. Apart from both intra-tubular and intracapillary spaces; intercellular deposition crystaloid material could also be demonstrated. However, the presence and the crystallization both in intercellular and intratubular parts were markedly increased following the induction of UTI in animals demonstrating evident tissue inflammation and receiving higher number of SW. No pathologic alteration was noted in tissue specimens obtained from sham group animals as expected.
CONCLUSIONS: In the light of our findings and the literature data as well, we may say that the traumatic effects of HESW have to be evaluated as a possible factor for new stone formation during long-term follow-up after SWL. In addition to trauma, urinary tract infection (as judged by tissue inflammation) has been found to stimulate the crystallization procedure. Trauma and infection together markedly increased the extent of crystallization in our animal model. However, we believe that clinical studies including larger series of patients dealing with also other definite parameters are certainly needed in order to give more reliable data.

A-255
FLOW CYTOMETRIC ANALYSIS OF DNA CONTENT AND APOPTOTIC CHANGES IN RENAL TUBULAR CELLS AFTER HYPEROXALURIA

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AIMS: Previous studies demonstrated that increased urinary excretion of oxalate and deposition of calcium oxalate crystals in the renal tubules is associated with renal tubular injury. Taking the injurious effect of hyperoxaluria on renal tubular epithelium as demonstrated by apoptotic changes in the renal parenchyma; an experimental study, aiming to evaluate the flow cytometric analysis of DNA content and that of apoptotic changes in renal tubular epithelial cells, was performed in rabbit model.
METHODS: Totally 40 animals were included into the study program and in the first experimental group of animals (**Group I**, **n = 10**) severe hyperoxaluria was induced by continuous ethylene glycol (0.75%) and histologic alterations including crystal formation together with apoptotic changes were examined. In **Group II** (**n:20**) animals received either K-citrate (1μgr/kg) or Vitamin E (50 μgr/kg) in addition to EG administration to limit these apoptotic changes. Control group animals (**n = 10**) received normal distilled drinking water. Following a period of 7 day and 28 days period, tissue sections obtained from kidneys were examined histopathologically under light microscopy for the presence and the degree of crystal deposition in tubular lumen. Again DNA content and apoptotic changes in renal tubular cells were examined by using flow cytometric analysis with APO-BRDU kit. The

results were compared with the findings obtained with TUNEL method during the same follow-up period.

RESULTS: Crystal deposition was evident in tissue sections obtained from animals undergoing EG administration only during 1 week examination. During 4 weeks examination however, these findings found to be limited itself or disappeared. Again related with apoptotic changes, the percentage of positive nuclei which were stained with the TUNEL method was from 11 to 20% in the first group. Values were 5.6% in animals receiving Vitamin E and 7.4% in animals receiving K-citrate. Finally it was 3.6% in the control group. While a G2-M cycle arrest was the common finding in Group I animals (ranging from 13.04–32.2%) such an abnormal finding in cell cycle has not been noted in animals receiving protective agents or in control group (6.14–9.79%). As the the percentage of apoptotic cells increased, the rate of G2-M arrest did increase in accordance. The percentage of apoptotic cells detected by flow cytometry seemed to be correlated well to the values obtained with Tunel method.

CONCLUSIONS: Our findings in this present study, indicate that both CaOxalate crystals and hyperoxaluria itself may be injurious to renal tubular cells as indicated by apoptotic changes demonstrated by Tunnel method as well as flow cytometry. Again the high percentage of G2-M arrest seen in cells undergoing hyperoxaluria may in turn be responsible in the pathologic course of urolithiasis. Although the exact role of apoptotic changes in renal tubular epithelial cells with oxalate exposure and subsequent crystal formation remains to be elucidated, further studies are certainly needed to outline the real role of apoptosis in membrane associated nucleation and aggregation of CaOx crystals.