Material and Methods: A retrospective analysis of 277 patients treated between January 2007and November 2007.Of the 277 patients, 36.06% treated with palliative intent and 63.95% with radical intent.
Results: 85% of patients interrupted their treatment at least once, 62% twice and 20.58% four times. 87.5% stopped for 1−2 days, only a patient stopped for 9 days by acute toxicity. Public holidays were the main cause of stops (52.2%), machine breakdown supposed 33.5%, unknown reasons 9.5% and acute toxicities less than 5%. In the most part of treatment reviewed, interruptions was compensated by adding extra fractions what supposed to prolong OTT. In patients with head and neck squamous cell carcinoma the prolongation of the overall time supposed to reduce TCP on 10.5%.
Conclusions: Prolongation of the overall time has an important impact in terms of local tumour control. We don't recommend additional fractions as standard. We suggest as compensatory measures: to transfer the patient to another machine, twice daily fraction (minimum 6 h interval), weekend treatment, to use biologically equivalent dose (BED) and foresee potencial interruption before to prescribe the treatment.

2047 POSTER

Audit of management of metastatic spinal cord compression

C.E. Lee[1], V. Misra[1], D. Corgie[1]. [1]*Christie Hospital, Clinical Oncology, Manchester, United Kingdom*

Background: Metastatic Spinal Cord Compression (MSCC) is an oncological emergency with devastating outcomes. The ability to walk at presentation and prompt treatment predicts eventual outcomes. Here we present an audit of management of MSCC in our network.
Material and Methods: Our population was all patients with suspected MSCC in 3 hospitals from May to November 2007. Our audit standards were set out by our hospital's MSCC working group members using a combination of published evidence and best practice.
Results: The number of patients with suspected MSCC was 98 and 49% of these had confirmed cord compression. 35% had previously known spinal metastases. Pain was reported in 90% cases. Weakness was reported in 70%. 41% were walking with assistance. An MRI was performed in 99% of patients; the majority (71%) within 24 hours (range 1–113 days). The use of steroids was documented in 77%. For confirmed MSCC 71% had radiotherapy, 23% surgery and 12% best supportive care. 3 patients had both surgery and radiotherapy. Only decompression surgery was performed and none had stabilisation. Median time to surgery was 7 days and 1 day for radiotherapy. Most patients received a single fraction of radiotherapy (46%) (range 4−15 fractions). Of patients treated with radiotherapy the pre and post treatment percentages for independent walking, walking with assistance and not walking were 25% and 7%, 36% and 50%, and 21% and 18% respectively. For surgery these figures were 18% and 0% for independent walking, but for walking with assistance and not walking, these remained the same pre and post treatment at 36% and 18% respectively.
Conclusion: MSCC frequently presents outside tertiary care. This can lead to subsequent delays in investigation, diagnosis and treatment. Mobility and function is dependant on the initial function and the appropriate treatment. Early surgery followed by radiotherapy in suitable patients gives the best outcome. Only 44% of our patients were referred for surgery. None of our patients received optimum surgery. Overall we only managed to achieve compliance in 2 out of our 9 standards. There were delays in MRI scanning and a delay to surgery. Documentation was poor, especially regarding functional status pre and post treatment, and steroid use. At our hospital we have developed and published guidelines for the management of MSCC. These provide a step-wise, multidisciplinary, evidence based approach to managing this condition. We will re-audit our performance 12 months post introduction of the guidelines.

2048 POSTER

Adjuvant radiotherapy of endometrial carcinoma − 6-field vs. 4-field acute toxicity

G. Liposits[1], J. Hadjiev[1], A. Kovacs[1], F. Lakosi[1], D. Gugyeras[1], G. Antal[1], C.S. Glavak[1], I. Repa[1], P. Bogner[1]. [1]*Diagnostic & Oncology Institute, Oncoradiology, Kaposvar, Hungary*

Background and Purpose: To compare the additive benefit of the 6 field planning technique over the 4 field box technique in the postoperative radiotherapy of patients with endometrial carcinoma. The examined parameters were the following: dose delivery of the target, organs at risk (OARs) and the rate of acute side effects.
Material and Methods: Between 2006 and 2008, 40 patients (pts) with I-III stage endometrial carcinoma received surgery and postoperative radiation therapy. 13 pts received 3D conformal external beam radiotherapy (3D EBRT) alone, while 27 pts were treated with combined irradiation (3D EBRT +vaginal brachytherapy). The prescribed dose of EBRT was 50.4 Gy in 28 fractions.
20 pts were planned using the 4-field box technique, while in the other half of the pts the 6-field beam arrangement was used. The defined OARs were the urinary bladder, rectum, bowels and femoral heads. We recorded and classified the acute side effects according to the CTCAE version 3. scoring system.
Results: Acute side effects were noted in 77.5% of the cases. In the 4-field group, the observed acute gastrointestinal (GI) and genitourinary (GU) toxicity were the following: GI Gr. 0−1: 19 pts (Gr. 1:10), Gr.2: 1 pts; GU Gr. 0–1: 17 pts, Gr. 2: 3 pts. In the 6-field group, the toxicity rate was quite similar: GI Gr. 0−1: 19 pts (Gr.1:7), Gr. 2: 1 pts; GU Gr. 0–1: 17 pts, Gr. 2: 3 pts. No Grade 3 or worse acute side effects were observed in either group.
Conclusion: Based on our experiences the routine use of the 6-field planning technique in adjuvant radiotherapy setting may not have a significant advantage over the conventional 4-field box technique in terms of acute toxicity in patients with endometrial carcinoma. Inclusion of a higher number of patients is planned in the near future.

2049 POSTER

CyberKnife radiosurgery for metastatic spine tumours: clinical experience in 231 cases

I.B. Choi[1], S.H. Lee[2], Y.J. Kim[1], J.H. Seo[1], H.J. Shin[1], M.H. Kim[1], J.M. Shim[1], H.J. Lim[1], J.S. Jang[2], J.H. Jeong[3]. [1]*Seoul Wooridul Hospital, Radiation Oncology, Seoul, Korea;* [2]*Seoul Wooridul Hospital, Neurosurgery, Seoul, Korea;* [3]*Seoul Wooridul Hospital, Institute for Biomedical Science and Technology, Seoul, Korea*

Background: The authors conducted a retrospective study for preliminary analysis of the results from CyberKnife radiosurgery for metastatic spine tumours.
Material and Methods: The authors analyzed the treatment records of 231 cases of CyberKnife radiosurgery for metastatic spine tumours between December 10, 2007 to December 10, 2008 in Seoul Wooridul Hospital (Seoul, Korea). The total number of patients was 115 (55 males and 60 females) and their mean age was 59 years (range, 25−79 years). Cases of primary tumours consisted of 36 breast cancer, 26 lung cancer, 16 hepatoma, 8 renal cancer, 6 prostatic cancer, 5 colon cancer, 5 sarcoma, 4 stomach cancer, 4 rectal cancer, and 5 unknown primary cancer patients. They received single or fractionated radiotherapy 3 times on average (range, 1−5 times) and the marginal tumour dose ranged from 800 cGy to 4000 cGy (mean, 2000 cGy), which was delivered at mean 80% (range, 70−90%) of marginal tumor isodose line. The irradiated tumors volume was 0.46 cc-428.5 cc (mean, value 13.07 cc).
Results: The follow-up results for 231 cases were analyzed. The mean Visual Analogue Scale was 4.5 before treatment, which improved to 3.3 after treatment. The mean Oswestry Disability Index decreased from 26.5% before treatment to 23.4% after treatment. The 98 patients were evaluated in the follow up PET-CT study, in which there was overall 85% CR change in cyberKnife treatment. For complications, five patients experienced temporary nausea and three patients were attacked by radiation pneumonitis, but fully cured by appropriate symptomatic therapy and steroid therapy. No patient experienced radiation myelitis.
Conclusions: This study found that CyberKnife radiosurgery for metastatic spine tumours can relieve the pain of the patients by non-invasive method and effectively manage spinal disability. According to the results of this follow up study, PET-CT had a significant impact on cyberKnife treatment.

2050 POSTER

Treatment planning comparison of tangential coplanar beams versus non-coplanar beams in whole breast irradiation

G. Mazzarella[1], A. Bufacchi[2], A. Bonanni[1], A. Petrone[1], F. Tortoreto[1], C. Guidi[1], O. Caspiani[1], M. Leone[1], R. Capparella[2], L. Marmiroli[1]. [1]*Ospedale "S. Giovanni Calibita" Fatebenefratelli Isola Tiberina, U. O. di Radioterapia, Rome, Italy;* [2]*Ospedale "S. Giovanni Calibita" Fatebenefratelli Isola Tiberina, U. O. di Fisica Sanitaria, Rome, Italy*

Background: To evaluate dose homogeneity, target coverage, organs at risk irradiation by comparing two irradiation techniques for whole breast irradiation: tangential wedged coplanar beams versus tangential wedged non-coplanar beams.
Materials and Methods: We selected 4 patients with breast cancer who had to undergo to only whole breast irradiation, after quadrantectomy, without nodes irradiation, with relatively large breast volume. For each patient, two treatment plans were created and compared, using Varian Eclipse 6.5 planning system: a 3D two-field tangential coplanar treatment (CT) and a 3D two-field tangential non-coplanar treatment (NCT, rotated coach in the range 14–20 degrees), both wedged, with collimator rotation

(range 0–20 degrees) and with the same photon energy (6 or 15 MV), for a conventional treatment of 50 Gy, 2 Gy per fraction. Measurements were performed in the planning target volume (PTV, 1 cm margin around clinical target volume), controlateral breast, ipsilateral lung, heart (for left sided tumors).
Results: Through visual inspection of the dose distribution for all CT slices, dose distribution in the PTV was almost identical for both plans; the 90% of prescribed dose was delivered to a mean of 91.2% (±5.6) of PTV with the CT and to a mean of 92% (±5.9) with the NCT. In the controlateral breast the dose delivered to 5% of volume was 1.8 Gy (±0.3) with CT and 1.3 Gy (±0.3) with NCT. Ipsilateral lung received a mean dose of 7.8 Gy (±1.6) and a V20 at 14% (±2.8) with CT; with NCT mean lung dose was 6.8 Gy (±1.8) and V20 was 12% (±3.3). In the 2 left sided treated breast, heart received a V33 at similar volume for both treatments.
Conclusions: A treatment technique utilizing two non-coplanar wedged beams offers a better solution compared to standard coplanar treatment for patients with difficult breast anatomy (i.e. large breast), in terms of lung and controlateral breast sparing, while maintaining the same PTV coverage.

2051 POSTER

RapidArc: dose distribution and irradiation time in relation to sliding window and dynamic arc

K. Buth[1], W. Oehler[1], K. Wagner[1], D. Strauss[1]. [1]*Südharz-Krankenhaus, Klinik für Radioonkologie und Strahlentherapie, Nordhausen, Germany*

Purpose: RapidArc is a combination of sliding window and dynamic arc with additional dose rate modulations or gantry speed control. The introduction of RapidArc into the clinical practice is only rational because of the benefit for the patient. The benefit for the patient can be a shorter irradiation time with related dose distribution or a better dose distribution with the same irradiation time.
Material: For this examination we used patients with head and neck, breast, prostate, lung and brain tumors. Each patient has been planned for all three techniques and the dose distributions were compared referring to the dose homogeneity of PTV's and the protection of organs at risk. The comparison of irradiation time was executed with detecting the number of monitor units and the setup time for the patient.
Results: The comparison of the dose distributions shows many plans with similar results for head and neck and prostate tumors for RapidArc and sliding window, but the irradiation time for RapidArc plans is less than 50%-70% compared to sliding window plans. Comparison of the same tumors between RapidArc and dynamic arc shows mostly better dose distributions for RapidArc and for some cases similar dose distributions, but the irradiation time is approximately identical.
Dose distribution comparison for head and neck, breast and lung between the three methods shows sometimes advantages for RapidArc and sometimes advantages for sliding window, according to the PTV-contours. Dynamic arc is equivalent referring to dose distributions for some cases.
All Plans show a benefit for Rapid Arc and dynamic arc referring to irradiation times.
Conclusion: All three irradiation methods are possible for the patient treatment, but which one is to use must be decided for each patient individually, any criteria for these decision are the dose distributions (dose homogeneity of PTV's and the protection of organs at risk), the irradiation time and the planning time.

2052 POSTER

Clinical and therapeutic aspects in elderly patients with Merkel Cell Carcinoma: special focus on radiotherapy

A. Levy[1], A. Assouline[2], C. Krzisch[2], C. Chargari[3]. [1]*Pitie Salpetriere University Hospital, Radiation Oncology, Paris, France;* [2]*Amiens University Hospital, Radiation Oncology, Amiens, France;* [3]*Val de Grace Hospital, Radiation Oncology, Paris, France*

Introduction: Merkel Cell Carcinoma (MCC) is a rare and aggressive primitive malignant epidermal cancer mostly affecting elderly people. While the place of adjuvant radiation therapy (RT) is widely recognized, it remains debated whether elderly patients would fully benefit from adjuvant RT.
Material and Methods: Between March 1996 and March 2007, 29 patients with histologically confirmed MCC were treated in Amiens hospital, France. Mean age was 75.6 years (54.7–95.2), including 12 patients (41.4%) being more than 80 years-old. At diagnosis, 25 patients (86.2%) were stage I (localized disease) and 4 patients (13.8%) had stage II (regional lymph node invaded, no metastases spread) or III disease (visceral metastases). All patients but one underwent a surgical excision of the primary tumor and classical adjuvant RT was performed in 14 patients (50%) on tumor bed with margins of 3 to 5 cm, mean dose of 46 Gy (range 30–60 Gy), using 2 Gy per daily fraction. Ten out of them received also RT of lymph node drainage area with mean dose of 44.3 Gy (26–50).
Results: For the whole cohort, the median overall survival (OS) was 18.9 months (3–122 months) and the median time to progression (TTP) was 5.5 months (1–26 months). For stage I patients, 5-year OS was 41.1% (IC95: 17–65%), *versus* 0% in patients with stage II or III disease ($p < 0.0001$). Most frequent sites for recurrence were nodal (34.5%), then local (24.1%) and metastatic (17.2%). After RT, 5-years OS was 47% (IC95: 12–82%), *versus* 27% (IC95: 5–49%) if no RT ($p = 0.032$). When focusing on patients more than 70 years-old, 8 (36.5%) remained disease-free at last follow-up, 8 (36.5%) died from disease-related cause, and 6 died from unrelated cause (27%). No patient died from treatment-related cause. In this subgroup, the TTP was 6 months (2–19 months) and median OS was 19 months (4–87 months). In patients more than 80 years-old, median OS was 20.8 months (4–73 months). The age was not a significant factor for disease-related death. All acute toxicities were less than grade 2. No significant difference was reached according to the age.
Conclusion: The impact of local control on survival remains uncertain but it is believable that the benefice of RT in elderly patients would not be drastically different from that in younger patients. It is associated with low toxicity and improved outcome. Multicentric prospective trials are needed to better refine and validate the optimal strategy.

2053 POSTER

Does electronic portal image device really impact set-up practice? A first step introducing a displacement correction protocol and PTV margin re-design

X. Maldonado[1], J.J. Rovira[2], J. Saez[2], M. Molla[1], V. Reyes[1], E. Puertas[1], I. Giraldo[1], J. Giralt[1]. [1]*H. Vall d'Hebron, Radiation Oncology, Barcelona, Spain;* [2]*H. Vall d'Hebron, Physics, Barcelona, Spain*

Materials/Methods: 237 Electronic portal images (EPID) from 39 consecutive radical prostate cancer treatments were reviewed. Patients were treated in the supine position with a knee support, full bladder and empty rectum. Initial patient setup displacements were determined by dosimetry requirements and performed daily using reference skin marks and laser alignment. For each beam, a digitally reconstructed radiography (DRR) was created and matched with its correspondent EPID image to obtain setup displacements. The symphysis, obturator holes and acetabuli were drawn in DRRs as bone references.
Mean displacement and its inter-fractional standard deviation were determined for each patient in orthogonal directions. In a given direction, inter-fraction standard deviation and mean displacement standard deviation were calculated taking into account all patients and were interpreted as systematic (Σ_{setup}) and random (σ_{setup}) setup displacement uncertainties, respectively. Both the systematic and random deviations were assumed to follow a Gaussian distribution in the three directions.
Results: The following are our systematic and random setup displacement uncertainties in the three directions according to our measurements and calculations after offline matching performance.

	LR (mm)	SI (mm)	AP (mm)
Σ_{set-up}	2.7	2.9	3.9
σ_{set-up}	2.6	2.0	2.8

LR, left-right; SI, superior-inferior; AP, anterior-posterior.

Conclusion: Our calculated systematic and random displacement uncertainties are in agreement with the literature. Next, we plan to introduce our results in the Van Herk [1] formula for PTV margin design and to use data to decide when displacement is statistically significant.

References

[1] van Herk M, et al. *The probability of correct target dosage: dose-population histograms for deriving treatment margins in radiotherapy.* Int. J. Radiat. Oncol. Biol. Phys 2000;**47**:1121−35.

2054 POSTER

Sequential evaluation of prostate edema after permanent seed prostate brachytherapy

T. Chang[1], K. Karasawa[1], M. Shinohara[2], Y. Yamada[2], H. Ichikawa[2], S. Natsui[2], S. Maekawa[2], N. Kamata[3]. [1]*Tokyo Metropolitan Komagome Hospital, Division of Radiation Oncology, Tokyo, Japan;* [2]*Tokyo Metropolitan Komagome Hospital, Department of Urology, Tokyo, Japan;* [3]*Tokyo Metropolitan Komagome Hospital, Division of Radiology and Nuclear Medicine, Tokyo, Japan*

Background: The postoperative dosimetric analysis of permanent prostate brachytherapy requires a subjective delineation of implant volume in