vesicles); (4) IMRT SIB (51 Gy, 28×1.82 Gy, to pelvic lymph nodes and 59.4 Gy, 28×2.12 Gy, to prostate and seminal vesicles) followed by IMRT boost plan for prostate and seminal vesicles (17 Gy, 8×2.12 Gy). The dose for rectum, bladder and small bowel was estimated based on dose-volume histograms (DVH).
Results: While giving an higher dose per fraction to lymph nodes, a good normal tissue-sparing dose sparing was achieved with SIB (pelvis with prostate) and sequential IMRT boost. For example, 70 Gy was delivered to 32.5% of rectum with 3D RT for pelvis and sequential 3D boost, 16.7% with IMRT plan for pelvis and sequential IMRT boost, 14.3% with IMRT SIB (pelvis with prostate), 10% with SIB (pelvis with prostate) and sequential IMRT boost. 70% of bladder received 67 Gy with 3D RT for pelvis and sequential 3D boost, 48 Gy with IMRT for pelvis and sequential IMRT boost, 51 Gy with IMRT SIB (pelvis with prostate), 48 Gy with SIB (pelvis with prostate) and sequential IMRT boost. 5% of small bowel received 54 Gy with 3D RT for pelvis and sequential 3D boost, 47 Gy with IMRT for pelvis and sequential IMRT boost, 52 Gy with IMRT SIB (pelvis with prostate), 50 Gy with SIB (pelvis with prostate) and sequential IMRT boost.
Conclusions: The present study demonstrates a better organ at risk sparing with a SIB IMRT plan to pelvic lymph nodes plus prostate and seminal vesicles followed by a IMRT boost plan, while giving a higher dose per fraction to lymph nodes compared to a whole SIB plan (1.82 Gy versus 1.6 Gy) and a moderate hypofractionation to prostate plus seminal vesicles.

2040 POSTER

Dosimetric characteristics of standard and micro MOSFET dosimeters for clinical electron beam

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Background: To assess and compare the dosimetric characteristics of standard and micro MOSFET dosimeter for clinical photon and electron beam irradiations.
Materials and Methods: Five identical TN-502-RD (Standard) and TN-502-RDM (micro) MOSFET dosimeter were used for measurements. Dosimetric characteristics of MOSFET dosiemter such as linearity, reproducibility, dose rate dependence, energy dependence, directional dependence were studied with Varian Clinac 21EX accelerator. The dose-linearity in the range of 50–600 cGy was studied at the depth of maximum dose. For reproducibility measurements, the standard and micro MOSFET dosimeters were repeatedly exposed to 100 MU five times on the phantom. To evaluate the average dose-rate dependence, the response of MOSFET dosimeters measured for different dose rate levels ranging from 100 to 600 MU/min. The directional dependence measured for difference gantry angles of 0–360 degrees with interval of 90 degrees.
Results: Two type MOSFET dosimeters showed excellent linearity against doses measured in the dose range of 50–600 cGy for electron beam of 9, 12 MeV energies. Reproducibility of all MOSFET dosiemters excepted one standard MOSFET was less than ±3%. Dose-rate dependence of two types MOSFET was within ±3%. Energy dependence of 6−20 MeV electron beam shows the maximum variation of 4.8% at 6 MeV based on 9 MeV electron beam. The other energies were within ±3%. However, for directional dependence, standard MOSFET dosimeter shows remarkable difference relative to gantry angles than that of micro MOSFET dosimeter.
Conclusions: This study shows dosimetric characteristics of standard and micro MOSFET dosimeters for clinical electron beams. Two type MOSFET dosimeters are suitable for dosimetry of electron beams in the energy range of 6−20 MeV. However, the dose verification of radiation therapy used multidirectional electron beam treatments allows for better use of micro MOSFET which has a reduced directional dependence than that of standard MOSFET dosimeter.

2041 POSTER

Initial clinical experiences using a newly developed image-guided radiotherapy system

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Background/Purpose: We are developing a newly designed image-guided radiotherapy (IGRT) system. The aim of this study is to present the results of the initial clinical experiences with this system.
Material and Methods: We are developing a newly designed IGRT system which has the following four characteristics: an ultra-light X-ray head, gimbals mechanism, an O-ring shaped gantry, and an imaging subsystem. The beam is positioned onto the isocenter accurately by active compensation using the gimbals. Positional errors are automatically calculated by image-fusion software based on bone structures, and can be corrected by a precise couch unit both in translation and in rotation. The system has a potential of a real-time tracking radiotherapy for a moving target. After the approval of this new IGRT system by the government of our country in January 2008, we started the clinical application from May 2008 at our institute. Note that the following clinical experiences were performed with static treatment mode, because this approved system does not include pursuing irradiation function.
Results: Between May 2008 and March 2009, 60 patients were treated at our institute. We started treatments of patients with bone metastases or lymphnodes metastases for palliative intent. After that, we moved to more precise radiotherapy. Almost half of patients were treated to bone metastases, others were treated for curative intent with multiple conformal beams, including 6 patients of prostate cancer with IMRT, and 1 patient of brain metastasis with stereotactic radiosurgery. All patients were setup with IGRT method based on the bony structure. The typical IGRT for bone metastases took less than 10 minutes including patient setup, image-guidance, verification, and beam delivery. High precision radiotherapy, such as IMRT or multiple static non-coplanar beam deliver, took around 15 to 20 minutes. We acknowledged the usefulness of image setup using frontal and lateral view radiographies compared with oblique views because they allowed medical staffs to recognize the anatomy and to confide in the image-fusion results. Image-guided setup verification after couch correction demonstrated that the mean setup error of all patients was about 0.4 mm. The whole operation was easy because of the system integration.
Conclusions: This new IGRT system was successfully applied to initial clinical treatments maintaining high geometrical accuracy. In the future, further clinical procedure build-up in pursuing irradiation are going to be accomplished.

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The acute toxicity of half body irradiation

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Background: HBI (half body irradiation) is commonly performed treatment of painful skeletal dissemination. The goal of it is pain reduction with minimal adverse effects. The aim of this study is an evaluation of the acute toxicity of single fraction HBI.
Material and Methods: The material is comprised of 92 patients. UHBI, LHBI and MHBI (upper, lower and middle half body irradiation respectively) were performed in 34 cases, 49 cases, and 9 cases respectively. 6 Gy for upper, 8 Gy for lower, and 6 or 8 Gy for the middle part of the body were delivered. The patients weight was measured on the HBI day. Two weeks later, the patient weight, blood parameters (leucocytes and platelets number) were checked, and diarrhea, skin toxicity (scale from 0 to 4), and nausea and vomiting intensity (scale from 0 to 3) were evaluated using WHO Toxicity Criteria. Items of all evaluated symptoms were summarized, and the mean values of sums were calculated.
Results: Weight loss after HBI was 0.7 kg. One patient had grade 4 toxicity (trombopenia). Grade 3 toxicity appeared in 9 cases (nausea and vomiting [5], leucopenia [1] and trombopenia [3]). None had radiation pneumonitis. The mean of summarized items was bigger for UHBI than for LHBI (1.9 and 1.4 respectively). The means of the summarized items were 1.6 for 8 Gy and 1.8 for 6 Gy. UHBI provokes a higher incidence and intensity of nausea and vomiting than LHBI; on the contrary, LHBI causes a higher incidence and intensity of diarrhea than UHBI. The remainder of the evaluated toxicities are similar for both halves of the body irradiations.
Conclusion: The obtained results permit one to conclude that single dose (6−8 Gy) HBI is a safe treatment, one causing a low percentage of low-level, acceptable-for-patients adverse radiation sequels.

2043 POSTER

Defining bowel dose constraints for bladder radiotherapy: using data from patients entered into phase III randomised trial

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Background: Radical radiotherapy (RT) is an alternative treatment to cystectomy in the management of muscle invasive bladder cancer.