regression of the extra osseous masses, High dose group only had tumor regression (19.5–55%). All sites treated with single fraction had growth of the extra masses after RT and had re-growth of intra masses after 4 months. Seven sites had re-calcification of bone metastases after 4 months, which were all treated with high dose. The median overall survival time was 5.5months.
Conclusion: RT is an effective for pain relief of bone metastases from HCC, but correlation was not found between the total dose and pain relief. High dose group had longer duration of pain relief. Single fraction could not be controlled growth of intra destructive osseous masses after four months. Therefore, high dose RT seemed to be necessary to control osseous masses.

1408 POSTER

Effect of respiration on kidney in radiotherapy

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Introduction: Conformal radiotherapy and Intensity modulated radiotherapy allows improvement in the treatment outcome due to increased targeting accuracy through advanced beam shaping techniques to precisely conform radiation dose to the geometry of the tumor. Organ motion and treatment set-up uncertainties are unavoidable factors that are limiting the accuracy in treatment delivery and have to be accounted during treatment planning. Radiotherapy treatment planning needs optimum definition of the target volume in its relative position to normal tissue. The limited radiation tolerance of the kidneys is an important consideration in radiotherapy to estimate the movement of kidney during respiration. In this study, an effort has been made to quantify the variation of kidney movement during deep inspiration and deep expiration.
Materials and Methods: Twenty radiotherapy patients for whom abdominal imaging is required were selected for this study. Siemens Volume Zoom CT (Spiral CT) was used for this study. The CT imaging of theabdomen was done with both deep inspiration and deep expiration. After imaging the two-CTdatasets for deep inspiration and deep expiration were then pushed to the Eclipse Treatment Planning System through the Dicom network. The difference between the positions of the kidney during deep inspiration and deep expiration was then estimated based on the CT table position.
Results: In four patients the right kidney was found to be displaced slightly more than the left kidney. No difference was found between the right and left kidney for the rest of the patients during the deep inspiration and deep expiration. The maximal vertical motion of the superior and the inferior pole from its end-expiratory to its end-inspiratory position was found to be 1.7 $\pm$0.6 cm for both right and left kidney, maximum 4 cms. The lateral movement for both the kidneys was found be 0.3 $\pm$0.1 cm.
Conclusion: The shift in the kidney during deep inspiration and deep expiration clearly dictates the need for accounting the kidney motion during radiotherapy treatment planning. For tumors close to the kidney care should be taken while giving the margin to the Clinical Target Volume.

1409 POSTER

Radiation therapy in patients with cardiac pacemakers and implantable cardio-defibrillators: a survey of patterns of practice among radiation oncology in Japan

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Backgrounds: Patients with cardiac pacemakers (PM) and implantable cardio-defibrillators (ICD) were increasing, and radiation therapy department should expect to face the prospect of treating a patient with these devices. Although the risk of potentially life-threatening malfunction secondary to electromagnetic interference or ionizing radiation is recognized, there are no practical clinical guidelines for radiation therapy with PM and ICD in Japan. Our objective was to determine the current patterns of practice of radiation oncologist in Japan.
Materials and methods: A survey was sent to 174 main radiation departments in Japan. Questionnaires were consists of experience of radiation therapy for patients with PM or ICD, and policies of management of patients with PM or ICD during radiation therapy.
Results: Total 108 questionnaires were returned (61%). Ninety-one departments had experience of radiation therapy for patients with PM or ICD (84%), and of these, two departments had experiences of malfunction of PM during or after radiation therapy. Policies of management of PM and ICD during radiation therapy were as follows; Keep PM and ICD device outside of the direct radiation beam in 65 departments (60%). Keep the device from 1 cm to 10 cm outside of the radiation fields edge in 34 departments (31%). Keep the device outside the collimated radiation beam during portal filming in 18 departments (17%). Only 18 departments estimated the absorbed dose received by the device before treatment (17%). ECG monitoring during radiation therapy in 19 department (18%). Consult cardiologists in 18 departments (17%), and check the functions of the device before radiation therapy in 21 departments (19%).
Conclusion: Malfunction of PM and ICD during radiation therapy was not recognized enough and practical clinical policies were deferent between departments in Japan.

1410 POSTER

Four-dimensional radiation therapy for lung cancer using the second model 256-detector row CT-scanner

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We developed the second model 256-detecotor row CT was based on the design of the first one, which can obtain approximate 100 mm length in 1 s rotation. Our group previously reported its promise for the amount of diagnostic information and overcomes some of the limitations of present helical CT methods such as shorter scan time in wide cranio-caudal direction, contrast enhancement, cardiovascular circulation, perfusion, and kinematics. The second model 256-detector row CT can solve problems of the first model, especially in temporal resolution. Therefore, we believe the 256-detector row CT is enough to adopt to the four-dimensional (4D) radiation therapy. Here, we describe a preliminary investigation of 4D radiation therapy using the 256-detector row CT and adapted to non-small cell lung cancer (NSCL). The patients in this study were five male patients in our hospital, who were eligible patients having NSCL and American Joint Committee on Caner Stage II. They had given their informed consent to be included in the study and approved by the Institutional Review Board (IRB) of NIRS. All were inpatients of the institute hospital and receiving radiation therapy. The 256-detector row CT used a cine scan mode (continuous axial san with the table remaining stationary) to acquire one respiratory cycle. Scan conditions were 120 kV, 240 mA, 256* 0.5 mm beam collimation, 6 s acquisition time with cine scan mode. The effective dose was estimated as 14.5 mSv (=2.41 mSv/s * 6 s). Eight volumetric cine data (divided one cycle respiratory phase to eight) were transferred to the photon treatment planning system, XIO (CMS, Computerized Medical Systems, Inc. St. Louis, MO) and we planned the photon treatment using commercially available superposition algorithm. The planning target volume (PTV) included the gross target volume (GTV) with a 3 mm setup margin and 5 mm allocated for the penumbra with the MLC, which features a full 40 * 40 mm^2 field and is that offers 5 mm resolution for high precision treatment of small and irregular fields. MLC was used to define the field boundary and changed MLC position by varying the target shape with respiration. The 256-detector row CT showed the potential for 4D therapy and improve accuracy in planning because the 256-detector row CT allows for reconstructions in 0.5 mm isotropic resolution with a high temporal resolution. Although we reached this conclusion using the photon beam, it may be applied to carbon ion beam therapy as well.

1411 POSTER

The utility of multimodality imaging with MRI to determine treatment volumes for chemoradiation in rectal cancer

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Purpose: To compare the gross target volume (GTV) derived from CT simulation alone (CT-GTV) to multi-modality GTV (M-GTV) derived from co-registered CT & MRI simulation and diagnostic MRI images
Methods: 15 patients (10 males, 5 females) with locally advanced rectal cancer (T3 and/or N1 disease) undergoing pre-operative chemo-radiation had co-registered CT and MRI simulation images. All had a diagnostic MRI with pre & post-contrast axial, coronal and sagittal T1 & T2 scans and sagittal STIR images. A diagnostic radiologist with a radiation oncologist defined the GTVs. The CT-GTV was defined from CT simulation images whilst blinded to the MRI. The M-GTV was then defined using co-registered CT & MRI simulation images whilst simultaneously reviewing the multiplanar diagnostic MRI. Assessment endpoints included an analysis of the volume and spatial relationship of the CT-GTV with respect to the M-GTV. The volume relationship was examined by calculating the ratio of the overall CT-GTV/M-GTV volume. In addition the volume ratio of the portion of the CT-GTV/M-GTV contained within the anatomically defined true rectum, the sigmoid and the anus was also calculated individually