PD-0036

Three dimensional image based adaptive high dose rate brachytherapy for lip cancers

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Purpose/Objective: Radical brachytherapy results in good function and organ preservation for lip cancers. However there are changes in geometry due to tumor shrinkage and reduction in the post treatment oedema which can have impact on the dose distribution. The aim of this paper was investigate the need for adaptive brachytherapy using 2 plans done before and after 5th fractions.
Materials and Methods: Twelve consecutive lip cancer patients with T1 and T2 tumors who underwent radical bachytherapy during July 2009 to July 2011 were considered for this prospective study. Interstitial brachytherapy was done using flexible nylon catheter technique under general anesthesia. After the procedure, for each patient postimplant planning computerized tomography (CT) scans were taken with 2 mm slice thickness and images were transferred to PLATO Sunrise treatment planning system. Dosimetry was geometrically optimized on volume and the dose was prescribed to the isodose covering the implant volume as evaluated on the axial slices. The dose-volume histograms were generated for each plan and the coverage volumes of 100%, 150% and 200% were obtained. Dose Nonuniformity Ratio (DNR), Dose Homogeneity Index (DHI) and Overdose volume index (ODI) were also documented. The dose of 35-49 Gy was given in 10-14 fractions (350cGy/fraction), twice daily. Treatment planning CT scan was repeated before 6th fractions and re-planning was done taking into considerations change of soft tissue edema.
Results: Mean D100 was 5.76 CC (SD 1.37) and 5.17 CC (SD 1.35) at 1stfraction and before 6th fraction respectively. Mean D150 were 1.62CC (SD 0.37) and 1.47 CC (SD 0.42) respectively Mean D200 was 0.773 CC (SD0.16) and 0.66 CC (SD 0.17) respectively. Mean DNR was 0.2836 (SD 0.0343) and0.2856 (SD 0.0342) for 1st to 5th fraction and from 5thto last fraction respectively. Mean DHI was 0 .7164 (SD 0.0343) and 0.7144 (SD0.0342) before and after 5th fraction respectively. Mean ODI was0.1361 (SD 0.0163) and 0.1288 (SD 0.118) before and after 5thfraction. Change in the active loading lengths and change in the prescription isodoses of the 2 plans were also documented.
Conclusions: Tumor shrinkage and reduction in oedma resulted in change in the loading lengths. There was reduction in the high dose volume of 150 and 200% isodose resulting reduction of ODI. Change in the prescription isodose was required in 2 patients. Adaptive brachytherapy results in decrease in the high dose region and improved coverage and hence should ideally be considered for all patients who are treated with nylon tube technique for radical brachytherapy of lip cancer.

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Brachytherapy and radiochemotherapy in patients with extrahepatic cholangiocarcinoma

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Purpose/Objective: To evaluate the outcomes of two perspective studies about patients affected by unresectable extrahepatic cholangiocarcinoma treated with radiotherapy (ERT) and concurrent chemotherapy (CT) with or without intraluminal brachytherapy (BT).
Materials and Methods: We analyzed patients with unresectable non metastatic extrahepatic bile tumors treated in our Institution in two different periods: between 1991 and 1997, the patients received external beam radiation therapy and concomitant chemotherapy with 5-fluorouracil (Group 1). Among them, some patients received a boost of intraluminal (low dose rate) brachytherapy with ^{192}Ir, 1 cm from the source axis. Instead, between June 1998 to December 2010, the patients underwent chemotherapy with Gemcitabine concurrently with the same radiotherapy schedule (Group 2) and boost of high dose rate brachytherapy. The outcomes of patients was evaluated in terms of response to therapy, local control (LC),overall survival (OS) and toxicity.
Results: We analyzed atotal of forty-four patients treated with radiochemotherapy: 17 patients received 5-fluorouracil (1000 mg/mq/day, 96 h continuous infusion, Days 1-4)(Group 1) and 27 patients (Group 2) Gemcitabine (300-350 mg/mq/weekly). One patient (of Group 2) received only radiotherapy. Twelve patients of Group 1 and 6 patients of Group 2 received a boost of intraluminal BT with ^{192}I wires (30-50 Gy), 1 cm from the source axis. Median follow-up was 132 months (range 16-220) for the entire group of patients. Of group 1, two patients showed a complete response and others two a partial response; instead,of group 2, anyone showed a response. No difference was observed between two groups in terms of Overall Survival (MedianOS was 13.5 months in both gropus p=0.2). Median local control (LC) was 13 months for group 1 and 8.5 months for group 2 (p=0.04). Patients receiving Gemcitabine developed an higher rate of acute toxicity compared to patients treated with 5FU (p=0.03).Patients underwent to BT had a better local control (p=0.03), without an increased toxicity. No impact was on Overall survival.
Conclusions: The comparison of these two study seems to demonstrate a better outcome in patients treated with 5FU-chemoradiation compared to Gemcitabine. In this study the BT seems to improve local control even if its role remains controversial. However, not all patients underwent to brachytherapy boost due to high toxicity from radiochemotherapy. Prospective studies in larger series are needed to better evaluated the possibility to anticipate the boost of brachytherapy before chemoradiation.

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Cyberknife boost for cervical cancer: a dosimetric study

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Purpose/Objective: External beam radiation therapy (EBRT) combined with intracavitary high-dose rate (HDR) brachytherapy given with concomitant chemotherapy is the standard treatment for locally advanced cervical cancer. However, intracavitary brachytherapy is not always feasible. Our aim in this dosimetric study was to compare dosimetric parameters of HDR and Cyberknife (CK) plans for boosts in cervical cancer patients.
Materials and Methods: CT-based HDR plans of 14 patients with FIGO IB-IIIB cervical cancer treated in a single center were analysed. Each patient was treated with weekly cisplatinum concomitantly with EBRT followed with HDR boost of 30 Gy in 5 fractions. Plans were generated using Oncentra Brachy (Elekta) and delivered with microSelectron v2 (Elekta). For each patient, 5 CK plans were generated by an experienced physicist, using MultiPlan for Cyberknife Robotic Radiosurgery system (Accuray). For both modalities, treatment plans were generated using critical organs' dose constraints recommended by GEC-ESTRO. Paired T tests were used to compare bladder, sigmoid, rectum and bowel D0.1cc, D1cc, D2cc and D5 cc. Target volume dosimetric parameters as well as total tissue volume parameters were also compared.
Results: We are presenting preliminary results comparing 30 plans (6 patients) in each modality. Target volume (% of volume) D100 and D90 were significantly better for the CK plans (p=0.00). Total tissue volume (% of prescribed dose) V200 and V150 were significantly higher in HDR plans. Doses to all critical organs were higher for CK plans. However, they were significantly higher only for bladder D5cc (p=0,000) and D0.1cc (p=0.002), sigmoid D5cc (p= 0.000) and D2cc (p=0.015) and small bowel D5cc (p=0.000), D2cc (p=0.001) and D1cc (p=0.022). Low dose parameters for total tissue volume such as V50, V40, V30, V20 and V10 were all significantly higher in CK plans (p=0.000).
Conclusions: Cyberknife plans had better target volume coverage and less dose heterogeneity, while HDR plans demonstrated lower doses to critical organs and consistently lower volume of total tissue receiving low doses. Based on this preliminary dosimetric study, boosting cervical cancer patients using CK could be an alternative in patients that are not eligible for intracavitary HDR brachytherapy. However, further clinical research is needed before this treatment modality can be implemented.