facilitate MRI-based dosimetry and MR image-guided prostate brachytherapy.

OR28 Presentation Time: 6:00 PM

Registered ultrasound and fluoroscopy for intraoperative dynamic dosimetry in prostate brachytherapy

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Purpose: Clinical outcomes following permanent prostate brachytherapy are highly dependent upon dosimetric results achieved intraoperatively. Factors such as tissue deformation, prostatic edema, and source migration create dynamically changing intraoperative dosimetry, yet currently available brachytherapy techniques do not allow identification of source positions after they have been deposited into the prostate.
We developed and clinically tested a system which spatially coregisters fluoroscopy images with ultrasound in order to provide dynamic dosimetry intraoperatively.
Methods and Materials: The registration of ultrasound to flouroscopy system (RUF) utilizes a non-invasive, radio-opaque fiducial mounted onto the needle guidance template, as well as a unique software algorithm which runs on a laptop computer interfaced with the treatment planning system (Interplant, Computerized Medical Systems, St. Louis, MO). Otherwise no additional hardware is required. For seed position reconstruction, a set of 4-5 non-coplanar X-ray images are acquired with a non-isocentric C-arm. The seed coordinates are calculated by formalizing seed matching as a network flow problem. Calculated seed positions are then imported into the treatment planning software, and the treatment plan re-optimized.
Results: Six patients were treated on an IRB-approved protocol. C-arm images were obtained and RUF calculation of seed positions was performed 3 times during each case, and subsequent seed placement modified as determined by physician judgment. Seed counts identified by RUF matched the number of seeds actually placed. Based on RUF data, 3–10 seeds were added to the original treatment plan to alter areas of visualized underdosing. Day 0 CT dose-volume histogram data are as follows: prostate D90 of 98–139%, V100 of 88–99%, urethral D30 98–143%, urethral D5 114–154%, rectal R100 of <0.1 cc. One patient (D90 = 98% and V100 = 88%) was identified intraoperatively as having an area not covered by the prescription isodose line, but all available seeds had been utilized.
Conclusions: Dynamic intraoperative dosimetry was achieved using our system of registered ultrasound and fluoroscopy. Further work is directed at streamlining the image processing workflow and developing a system which eliminates the need for the entire fiducial to be captured in every image. A Phase II clinical trial is planned to confirm the dosimetric results achieved in this pilot trial.

MISC ORAL PRESENTATION SESSION
Monday May 5, 2008
8:00 AM–9:00 AM

OR29 Presentation Time: 8:00 AM

External beam radiotherapy and interstitial brachytherapy, with or without chemotherapy in the conservative treatment of anal canal carcinoma

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Purpose: Radiotherapy is the standard treatment of anal canal carcinoma. The aim of this retrospective analysis is to study the effect of addition of high-dose-rate (HDR) brachytherapy boost along with course of external beam radiotherapy series (EBRT) with or without chemotherapy.
Methods and Materials: This retrospective analysis included 116 patients with anal cancer who underwent interstitial implant between 1985 and 2004. Five patients were stage I, 95 stage II, 2 stage IIIA and 14 stage IIIB. Fifty-seven (49%) patients underwent external radiotherapy followed by an interstitial implant, remaining 59 (51%) patients received chemotherapy (Mitomycin & 5-FU) in addition to EBRT and brachytherapy boost. The mean EBRT dose was 48 Gy and implant dose was 21 Gy.
Results: The median followup was 51 months (range: 3–186 months). Disease-free survival (DFS) and overall survival (OAS) at 5 years for the whole group was 71% and 78%, respectively. Recurrence of disease was seen in 34 (30%) patients, 15 (27%) in the CT+ RT group and 19 (33%) in the RT group. Of the 28 (24%) patients with either persistent disease or locoregional recurrence 11 (39%) were salvaged by surgery. The crude rate of anal preservation was 87% while 3 (3.75%) patients who were locoregionally controlled underwent defunctioning colostomy due to anal stricture.
Conclusions: The integration of the HDR boost in EBRT regimen with or without chemotherapy resulted in excellent sphincter function without an increase in severe complications and with rates of LRC, DFS, and OS, which can be compared favorably with those reported in the literature. The addition of chemotherapy did not seem to alter the failure.

OR30 Presentation Time: 8:10 AM

Long-term results of function preservation by transrectal ultrasound (TRUS)-guided fractionated HDR brachytherapy boost complementary to external beam radiation ± chemotherapy in anal cancer

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Purpose: In this prospective observation we analyzed the long-term results of endosonography (TRUS)-guided target definition and implantation procedure as well as of real-time volume optimized treatment planning and fractionated radiation delivery in the interstitial boost brachytherapy of anal cancer. Interdisciplinary cooperation and the use of the RASHA-applicator aimed resulting in an improvement in long-term outcome at the function preservative treatment of anal cancers.
Methods and Materials: Fifty patients with biopsy proven primary cancer of the anal canal (n = 38) or-margin (n = 12) without distant metastases were treated between 1993–2001. Before treatment all pts received TRUS and sphincter function measurements. The treatment started with 45 Gy EBRT to the pelvic region with conventional fraction and in case of N+ or T3-T4 in combination with chemotherapy. Within 2–4 weeks after completing EBRT a high-dose-rate intensity modulated interstitial brachytherapy boost (IMBT) was administered to the tumor bed/residual tumor using two fractions of 4–6 Gy and the RASHA applicator. Fraction dose was defined at the surface of the TRUS visible target volume, needle geometry followed the rules of the Paris system. Mean followup was 34 months (6–96).
Results: Ninety-two per cent of the patients demonstrated a complete tumor remission after completing the treatment. Local recurrence occurred in one patient 15 months after treatment. Disease-specific 5-year survival rate was 82%. Five patients received abdomino-perineal resection (3 pts with persistent tumor, 1 with a local recurrence and 1 because of suspected recurrence). Four out of these 5 patients died on progressive disease. Because of the observed mild proctitis (2/50) and severe sphincter necrosis (3/50) we reduced the initial 2x6 Gy HDR fraction dose to 2x4 Gy. In the following there were no acute severe side effects due to