PO-0991

A noval approach of superficial intraoperative radiotherapy (IORT) using the INTRABEAM® System and novel applicators result in an exposure to the target, as well as an estimation of the dose to the healthy tissue.

Materials and Methods: Each of the so called FLAT (1 - 6cm diameter) and SURFACE Applicators (1cm - 4cm diameter) consists of a radiation protective metal tube and a flattening filter, which converts the spherical dose distribution of the x-ray source into a flat one. The homogeneity of each dose distribution and depth dose measurements were evaluated using a film dosimetry (Gafchromic® EBT2 films, I.P., New Jersey, USA) in a solid water phantom (Gammex 457, Gammex Inc., Middleton, WI, USA) and a soft x-ray ionization chamber (Type 34013, PTW, Freiburg, Germany) in a water tank (Carl Zeiss Surgical GmbH, Oberkothen, Germany).

Results: The FLAT Applicators show the best homogeneity, with a maximum standard deviation of 2.66%, in certain depths. In 1mm depth SURFACE Applicators show a lower field edge dose (compared to the central axis dose) of up to 31%, which corresponds to a geometrical error of 2mm. They also show a higher dose rate (0.53 - 1.78Gy/min in 5mm depth) and a steeper dose gradient compared to the FLAT Applicators (0.17 – 1.24Gy/min in 5mm depth). This results in a treatment time of 1.0 – 6.5min in an instance of a prescription of 10Gy to the surface of the SURFACE Applicators, respectively 9.5 – 1.78Gy/min in 5mm depth) and a steeper dose gradient compared to the FLAT Applicators.

Conclusions: Generating flat dose distributions in a certain depth using the INTRABEAM® System and novel applicators result in an improved homogeneity at the surface of these applicators. To evaluate the exact extent of homogeneity there, further research based on Monte Carlo simulation is needed. But the results show that it is possible to perform a superficial localized IORT with shielding of the surrounding tissue and with minimum radiation protection requirements.

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In vivo dosimetry and shielding disk alignment verification in breast IORT treatment.

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Purpose/Objective: A new method for in vivo dosimetry (IVD) during breast intraoperative radiation therapy (IORT) was carried out to improve informations on the dose actually delivered to the target and on the shielding disk. With this method it is possible to acquire two bi-dimensional dose distributions: one just below the target and the other beyond the shielding disk.

Materials and Methods: Breast IORT requires the protection of the tissues underneath the target volume. This is achieved by the surgeon positioning a shielding disk between the residual breast and the pectoralis fascia. The position of the disk is a very suitable location for performing IVD. In our experience we prepared two layers of radiographic films. Gafchromic® EBT3 of the same size of the shielding disk, we fixed them by sterile tape to both sides of the disk, which was then delivered to the surgeon for subsequent placement. The gafchromic films were calibrated in dose for the two energy (6 and 9 MeV) used in breast cancer treatment to provide a bi-dimensional distribution in term of absolute dose. After each treatment the radiographic films were read by a CCD scanner producing two digital images suitable for subsequent analysis.

Results: The Department of Radiotherapy of Trieste has recently implemented a IORT dedicated electron-beam accelerator, the

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Intraoperative radiotherapy for prostate cancer: preliminary midterm results of a mono institutional study.

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Purpose/Objective: To evaluate the local control and early late toxicity of IORT for localized prostate cancer.

Materials and Methods: Between December 2009 and September 2010, 8 patients with locally advanced prostate cancer or high local/systemic relapse risk were selected. We enrolled patients with ≥ 70 years age, without clinical nodal disease, and at least two of following characteristics: pre-operative PSA ≥ 10 ng/ml and < 20ng/ml, Gleason score ≥ 7; cT3c; or at least one of following characteristics: apical gland involved; pre-operative PSA >20ng/ml and <50ng/ml; Gleason score ≥ 8; cT3. Before the surgery the Ethical Board validated informed consent for adjuvant IORT was obtained. The surgery included radical prostatectomy with iliac-obturator lymphadenectomy and extemporaneous histological examination for nodal metastasis research. After prostate removal the patients were irradiated with IORT receiving a radical dose of 20 Gy in single fraction by 10 MeV electron beam. The IORT procedure was performed after bladder-urethral anastomosis and confirmation of pathological negativity of
obturator nodes. In vivo dosimetry was performed by mosfet dosimeters inserted in rectal and Foley catheters. The toxicity was evaluated according to RTOG scale.

**Results:** Of the 8 patients selected, 1 was excluded from IORT for nodal metastasis found during the extemporaneous histological examination and performed adjuvant external beam radiotherapy afterwards; 7 patients were treated with IORT 20 Gy after radical prostatectomy. One patient died several months after IORT for non-cancer related causes. In 6/8 patients the pathological staging confirmed the clinical staging with the evidence of an high risk of relapse after surgery (see table). In 2 (pT2c pN0 Mo R0) patients prognostic factors for local relapse had overestimate the stage. No patients had acute toxicity. The average time of hospitalization was 6 days (range 5-8). The median follow-up was 28 months (range 26-36). In 6/7 (86%) patients so far alive we didn’t observe biochemical relapse (average PSA <0,008 ng/ml). No patient performed hormonal therapy. No early urinary or rectal toxicity ≥G1 was observed. 2/6 (33%) patients reported late urinary stenosis easily resolved after dilatation. No patients had urinary incontinence.

<table>
<thead>
<tr>
<th>n.positive biopsies</th>
<th>Positive apex</th>
<th>Gleason pre SR</th>
<th>Gleason post SR</th>
<th>Pathological stage</th>
<th>Surgical margins (R)</th>
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<tr>
<td>12+/12 si</td>
<td>3+4</td>
<td>3+4</td>
<td>pT3a pN0 M0</td>
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<td></td>
</tr>
<tr>
<td>6+/13 si</td>
<td>4+5</td>
<td>4+5</td>
<td>pT3b pN0 M0</td>
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<tr>
<td>13+/16 si</td>
<td>4+3</td>
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<tr>
<td>9+/17 si</td>
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<td>4+3</td>
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<td>4+4</td>
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**Conclusions:** Our results, although on a small sample, reported after a median follow up of 28 months show excellent local control obtained with IORT on surgical bed with a very low toxicity.