Materials and Methods: A comparative study between two groups matched for age, surgical technique, size, nodal status and adjuvant treatment was performed. The control group received conservative surgery and standard EBRT 50-60 Gy in 5-6 weeks. The experimental group received conservative surgery with IMIMBI for perioperative PBI 34 Gy in 10 fractions.

Results: A total of 160 patients, 80 in control group and 80 in the experimental were analyzed. The median age and follow up were 56 vs. 60 years (p> 0.05) and 55 vs. 33 months (p<0.05), respectively. Surgical technique in control vs. experimental group includes Lumpectomy alone in 10% of each group, lumpectomy with sentinel lymph node dissection in 82% vs 88% and lumpectomy with axillary dissection in 5% vs. 1%, respectively. The median tumor size was 11 mm vs. 12 mm in control and experimental group, and all patients were pN0. Median number of catheters were 9 (6-14), double plane implant in 100%, median D90 of 3.3 Gy median V100 and V150 of 35 and 10 cc respectively with DHI 0.72. Minor complication (infection, seroma, bleeding) were recorded in 14 patients (8.7%) seven in each group and major complication (reintervention due to bleeding o dehiscence) in 2 patients (1.2%) one in each group. Median operative time, hospital stay and time from surgery to end of radiation were 97 (range 27-309) vs. 123 (range 72-234), 2 days for each group and 130 vs. 11 days in the control and experimental groups respectively. No local failure or distant failure were observed and excellent cosmetics results were recorded in more than 80% of both groups.

Conclusions: The optimal time to perform MIT is intraoperative because is safe, fast, effective and provides a significant improvements in logistical issues like reduction in overall locoregional treatment. Also allows to take advantage of excellence in dosimetry derived of MIT avoiding a second invasive procedure.

PO-1013
CTV definition in perioperative breast brachytherapy with closed cavity for APBI
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Purpose/Objective: Accelerated partial breast irradiation (APBI) is used increasingly. Clinical Target Volume (CTV) definition with multicatheter implant is not easy when closed cavity technique is used for breast conserving therapy. A perioperative implant allows us to know the right location of the tumour bed and CTV. We analyze clinical and dosimetric aspects of CTV definition with perioperative brachytherapy for APBI.

Materials and Methods: We review 10 cases of women with low risk breast carcinoma that underwent conserving surgery. During the same procedure, with the opened cavity, a perioperative multicatheter implant with parallel plastic tubes was performed, using the reference of the surgeon to place the tubes at the exact position. One central catheter, or guide-tube, was inserted perpendicular to the skin scar at the bottom where the tumour was located, and then the surgeon closed the cavity usually marked with clips. The rest of the tubes were inserted forming triangles in two or three planes to cover a security margin. A planning CT scan was performed 2-4 days later. The area above the guide-tube was drawn with central clips if present, and a margin of 1-1.5cm was expanded avoiding 1cm from skin and pectoral muscle. The resulting volume was adjusted to cover the lateral plastic tubes with a margin of a few mm to obtain the CTV. The prescription dose was 4 Gy to the CTV per eight fractions twice a day.

Results: Four patients required nine catheters in two planes and six patients 10-12 catheters in three planes. The mean CTV volume was 83.9cc (67.7-116.6cc). Mean dose non-uniformity ratio (DNR) was 0.32 (0.28-0.35). Mean dose to the 90% of the CTV (D90) was 4’04Gy. Maximum dose per fraction to the lung was 1.75Gy (0.75-2.28Gy), and to the heart in 5 left breasts was 1 Gy (0.65-1.3Gy). Clips were placed in six cases and half of them were far from the implanted area and were not included in the CTV. In six cases several small air cavities were detected some of them outside of the CTV area.

Conclusions: Perioperative implants are the most exact way to define the right CTV. The guide-tube is a good system to define the central area of the CTV in the planning CT when the cavity is closed. Clips and small air cavities are related to the area manipulated by the surgeon, the surgical bed, but are not always useful to define the tumour bed, which is the real area to be irradiated (Fig 1). With perioperative brachytherapy, less number of catheters are required and the CTV volume is smaller than usual with postoperative multicatheter technique for APBI.
fractions in cervical cancer intracavitary-interstitial MR/CT-based BT.

**Materials and Methods:** 45 consecutive patient cervical cancer patients treated between January 2013 and May 2014 were considered. FIGO stage distribution was the following: 4 had stage IB, 33 had IIB (7 out of 33 with distal parametral invasion), 7 had IIIB tumors (all because parametral invasion up to pelvic wall) and 1 had IVA tumor. Treatment consisted in 3DCRT (45 Gy in 25 fr.) with concomitant chemotheraphy (weekly cisplatin 40 mg m2) followed by MR/CT based IGABT (4 fractions of 7 Gy within 2 insertion with 1 week interval with Elekta Utrecht applicator). A stringent bladder filling and bowel preparation protocol is routinely used at our institution. At 1st application, T2 MRI and i.v. contrasted CT (day 1 CT) with applicator in place were performed with an interval of 30 min (MR slice thickness 3,5 mm without gaps; CT thickness 2mm). Direct applicator reconstruction on MR images was performed and dose optimized to target volumes and OAR delineated on MR according GEC ESTRO recommendations. After patient treatment, original MR and CT datasets were fused based on the applicator coordinates and HRCTV contours from MR dataset transferred to CT. Further OARs were re-delineated on day 1 CT, applicator reconstructed and the original MR optimized plan recalculated on CT images. DVH parameters for OAR delineated on day 1 CT were recorded (Intrafraction variability).

On the following day, a second CT was performed (2mm slice thickness). Furthermore day 2 CT was fused with the day 1 CT on the applicator coordinates and the original MR based HRCTV contours (present on CT day 1) transferred from day 1 CT to day 2 CT. OAR were then delineated on day 2 CT and the original MR optimized plan recalculated on CT day 2 images. DVH parameters for OAR delineated on day 2 CT were recorded (interfraction variability).

We assume in our study design that intra-fraction variability is predominantly due to systematic contouring uncertainties introduced by OAR delineation on different imaging modalities and less importantly by eventual OAR movements. We expect that interfraction variability to be of higher magnitude and predominantly due to OAR movements.

**Results:** Results are summarized in Tab 1. The magnitude of intra- and inter-fraction variability is very low probably with no clinical relevance in the vast majority of patients. Intra- and interfraction HRCTV and OAR variability is similar.

<table>
<thead>
<tr>
<th></th>
<th>HRCTV Day 1/2 CT Day 1 DVH variability (%)</th>
<th>HRCTV Day 1/2 CT Day 2 DVH variability (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bladder O2c</td>
<td>0.11 ± 0.28</td>
<td>0.25 ± 0.42</td>
</tr>
<tr>
<td>Rectum O3c</td>
<td>0.04 ± 0.18</td>
<td>0.14 ± 0.33</td>
</tr>
<tr>
<td>Sigmoid O3c</td>
<td>-0.03 ± 0.55</td>
<td>0.02 ± 0.65</td>
</tr>
</tbody>
</table>

Tab 1: Intrafraction and interfraction dose variability in Gy (mean values ± SD)

**Conclusions:** Presented data together with previously published reports from Lang S. et al. (R&O 2013) seems to suggest that, in a protocol of four fractions within 2 different applications no re-planning is needed to safely deliver the second BT fraction of each application if an OAR filling protocol is applied. Nevertheless before applying this concept in the clinical routine more data are warranted.

**PO-1015**

**High Dose Rate Image guided adaptive brachytherapy for cervical cancer - a single centre experience**

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**Purpose/Objective:** To review doses achieved in the treatment of locally advanced cervical cancer at the Northern Ireland Cancer Centre compared to standards set by GEC-ESTRO since the introduction of image guided high dose rate brachytherapy. To compare outcomes both in terms of recurrence and survival and long term toxicity with published outcomes.

**Materials and Methods:** Retrospective review of clinical notes and radiotherapy prescriptions of all patients with locally advanced cervical cancer treated at the Northern Ireland Cancer Centre from 2008-2013.

**Results:** 188 patients with locally advanced cervical cancer were treated with radical intent with a median age 47.4 years (23.3–79.8, 0.4). Median follow up is 25.5 months. 180/188 had concurrent cisplatin. CT scanning was carried out after each intra-cavity insertion and used to contour OAR and to identify Point A. Equivalent doses in 2Gy fractions (EQD2) were calculated combining external beam radiotherapy and brachytherapy doses. α β 10 was used for tumour and α β 3 used for organs at risk. Median dose to point A EQD2 was 76.4Gy (66.5-79.3) with 68 patients receiving less than 75Gy. Median dose to rectum was 65.5Gy (57.2-82.6) with 3 patients receiving more than 75Gy. Median dose to bowel was 70.7Gy (55.5-79.2) with 26 patients receiving over 75Gy. Median dose to bladder was 80.5Gy (551-97.8) with 3 receiving greater than 95Gy. Pelvic recurrence at 3 years was 12.2% with distant metastasis 8.5% Overall Survival (OS) at 3 years was 74%. There was a documented pelvic or distant recurrence at 3 years in 30.8% of node positive patients and 9.4% of node negative patients (p<0.005). Grade 3/4 late bowel and bladder toxicity was 16% and 7% respectively. There were no significant differences in dose delivered in those patients who developed bladder or bowel toxicity compared to those who did not. Mean dose to bowel in those who had Grade 3/4 toxicity was 71.2Gy and 70.0Gy without (p=0.20). Mean dose to bladder in those with GD3/4 bladder toxicity was 78.9Gy and 79.6Gy without (p=0.81).

Repeat MRI in the final week of radiotherapy was introduced in 2010 and performed in 97 patients. In those who had a complete response at final week MRI (30) there was 1 pelvic recurrence compared to 22 pelvic recurrences in those who had partial response or stable disease (77) (p<0.0035).