PD-0480
Single dose IORT for early-stage breast cancer in elderly women: tolerance and results
A. Ciabattoni1, A. Spera1, S. Dragó1, L. Leone1, G.B. Grassi1, A. Petrucci1, R. Consorti1, F.P. Mangiacotti1, M.A. Mirr1
1Azienda Complessa Ospedaliero San Filippo Neri, UOC Radioterapia, Roma, Italy
2Università degli Studi di Palermo, Scuola di Specializzazione di Radioterapia, Palermo, Italy
3Azienda Complessa Ospedaliero San Filippo Neri, UOC Chirurgia Generale e Oncologica, Roma, Italy
4Azienda Complessa Ospedaliero San Filippo Neri, UOSD Fisica Sanitaria, Roma, Italy

Purpose/Objective: Rationale of accelerated partial breast irradiation (APBI) is the prevention of local relapse in breast area with the highest probability of recurrences in strictly selected patients. Intraoperative Radiotherapy (IORT) is one of the most promising techniques of APBI. The aim of this study is the preliminary evaluation of toxicity, cosmetic effect and 5-years rate of ipsilateral breast recurrences in patients treated with exclusive single dose IORT with electrons after quadrantectomy (QUAD) for early stage-breast cancer.

Materials and Methods: Between January 2008 and June 2014 thirty-one women were treated with single dose IORT in our Institution. Thirteen were enrolled into a multi-centric randomized trial (coordinated by Regina Elena Institute of Rome) and eighteen were treated with single dose for age and co-morbidities, that contraindicate external beam radiotherapy (EBRT). Patients underwent QUAD with sentinel lymph node biopsy. All of them were older than 60 years or in post-menopausal status, with a single tumour sized 2 cm or less, histological proven invasive ductal or lobular carcinoma and clinically N0. IORT was delivered with a mobile Linear Accelerator (NOVAC7 by SIT) with a total dose of 21 Gy. An electron energy 7 to 9 MeV was used. A perspex shield was placed under the mammary gland, to reduce dose to the chest wall, heart and ipsilateral lung. Acute and late toxicities were evaluated one month after the treatment, chest wall, heart and ipsilateral lung. Acute and late toxicities were evaluated one month after the treatment, chest wall, heart and ipsilateral lung.

Results: The median follow-up was 54,6 months (range 5 to 78). Mean age of the patients was 72,5 years (range: 62-80). Pathologic findings identified twenty-six patients as infiltrating ductal carcinoma and 5 as infiltrating lobular carcinoma. Patients presented N0 or M1mic status, except for two cases with N1a, and negative surgical margins. Average diameter of applicators was 60 mm (range 40-80). Treatment was successfully completed in all patients with an average lengthening of the operative time of about 20 minutes. At the long follow-up only one woman presented local relapse after 55 months from IORT; she underwent re-excision followed by EBRT. Acute toxicity was G0 in 19 patients, G1 in 8 cases and G2 in 4 patients. No G3/G4 toxicities occurred. As early side effects 6 patients experienced seromas and one patient complained wound healing difficulties. G1/G2 late toxicity occurred in 6 patients. No lung or heart toxicities were observed. Cosmetic valuation was excellent/good in 25 patients; 6 cases were scored as fair/poor.

Conclusions: IORT with a single dose in early breast cancer is feasible and well tolerated technique. In our experience it resulted in a significant shortening of radiotherapy time and gain in quality of life in elderly patients. In eligible cases (according to age and clinical staging) it seems a valid treatment option for adjuvant radiotherapy.

PD-0481
Local control and cosmetic outcome on 100 early breast cancer treated with exclusive IORT
M. Dessena1, G. Gambula2, B. Demontis2, L.P. Grosso2, G. Murenu1, M. Dessi3, P. Porru1
1Centro Oncologico Busino, Experimental Surgery Unit, Cagliari, Italy
2Centro Oncologico Busino, Oncologic Radiotherapy, Cagliari, Italy
3Centro Oncologico Busino, Health Physics, Cagliari, Italy

Purpose/Objective: To evaluate local control and cosmetic outcome of intra-operative radiation therapy (IORT) as an exclusive treatment of early stage breast cancer in patients with criteria as GEC-ESTRO (good candidates).

Materials and Methods: From October 2008 to December 2013, 100 patients underwent wide breast cancer excision or quadrantectomy followed by IORT on tumor bed with accelerated electrons (Novac 7 NRT) at the dose of 21 Gy. Patients were aging at least 50 years with unicentric, unifocal, pt1-2

Results: The average age was 63.89 (range 50-89) with an average follow up of 33 months (range 6-65). The pathologic stage of the lesions resulted pT1 in 82 cases (82%); in particular: 5 cases pT1a (6,1% on 82 cases), 38 pT1b (46,3%) and 39 pT1c (47,6%); 11 cases (11%) was pT2 with a diameter of 2,5 cm. The Grading was G1 in 21 cases (21%), G2 in 59 cases (59%) and G3 in 13 cases (13%). The toxicity, evaluated according to the EORTC-RTOG criteria, was G0 (37%) in 37 cases, G1 (48%) in 48 cases, G2 in 6 case (6%); only 2 was G3 (2%). We observed 9 case of lymphocele (9%); there were no infections of the surgical wound nor any mastitis, neither in the treated quadrant nor in the other ones.

We observed a light fibrosis in 14 cases (14%), moderate in 9 (9%) and liponecrosis in 10 cases (10%). As regards local control, there was 2 (2%) local relapse and 1 second tumor. The global survival was 100%.

Cosmetic outcome, evaluated in four levels (Danoff and co.), was excellent in 17 cases (17%), good in 63 (63%), sufficient in 11 cases (11%), never insufficient.

Conclusions: The IORT in early breast cancer, at the doses used in this study on patients according to GEC-ESTRO criteria, provided itself as a secure technique, repeatable, with good local control and cosmetic outcome.

PD-0482
Early breast cancer treated with an electronic IORT system: report of the first patients treated in Portugal
P. Costa1, F. Oliveira1, G. Fonseca1, A. Costa1, J. Moutinho2, M. Ribeiro1, J. Vale1, F. Ponte1
1Instituto CUF Porto, Radiation Oncology, Senhora da Hora - Matoiosinhos, Portugal
2Instituto CUF Porto, Breast Surgery Unit, Senhora da Hora - Matoiosinhos, Portugal

Purpose/Objective: To describe the initial experience of the first institution in Portugal in treating early breast cancer with intraoperative radiotherapy (IORT) with an electronic brachytherapy system.

Materials and Methods: We retrospectively analyzed the data of 30 women who underwent intraoperative irradiation during breast conserving surgery between April 2012 and November 2014. Treatment was performed in a single
fraction for all patients, using a balloon applicator (ranging from 3-4 and 4-5cm in diameter) placed into the surgical bed. Distance from the applicator to the skin surface was verified intraoperatively through ultrasound monitoring. Energy of 50 kV was used, in a dose of 20 Gy prescribed to the surface of the balloon, with a mean treatment duration of 550 seconds. Protection of the chest wall was performed with an attenuation disk that varied between 4 and 6 cm in diameter. Clinical, surgical and pathologic parameters, as well as the immediate and late toxicity were evaluated using the EORTC score.

Results: The median age of the patients was 65 years (range 42 to 89), stage pT1N0M0, pT2N0M0, and pT3N0M0. All patients had sentinel node assessment in the OR. Tumor size ranged between 0.4 and 2 cm. In 57% of the cases, the pathology revealed invasive ductal carcinoma without an extensive intra-ductal component. There were no post-operative complications and the immediate skin reaction was mild, without any grade 3/4 acute toxicity or delayed healing. Two cases of seroma and two cases of mild subcutaneous fibrosis were reported. With a median follow-up of 18 months, there were no local recurrences. There was one case of axillary recurrence one year after treatment.

Conclusions: IORT using the Electronic Brachytherapy System by Xoft as part of the conservative treatment of breast cancer is a safe procedure, with low morbidity. The low incidence of side effects as well as the short treatment time inside the OR has led to a growing interest in using this treatment solution. Following these patients will allow us monitoring any delayed reactions and subsequent cosmetic effect as well as the local control rate and survival.

PD-0483 Evaluation of IOERT with reduced dose in selected early breast cancer: mono-institutional experience
M. Guenzl, G. Blandino, D. Alo, E. Configliacco, S. Garelli, M. Gusinu, R. Corvò
1IRCCS San Martino IST, Oncology Radiotherapy, Genova, Italy

Purpose/Objective: Intraoperative Electron Radiation Therapy (IOERT) has been demonstrated to be a good method of treatment of early breast cancer (BC) in selected patients (pts). In this study we evaluate the efficacy of a single dose of 18Gy given to the tumor bed during the surgery in order to reduce late toxicity with respect to the standard 21 Gy dose.

Materials and Methods: From January 2009 to December 2011, 72pts with diagnosis of early BC underwent IOERT as exclusive treatment after breast conservatory surgery. The median age was 66 years (range 47-84). The criteria of eligibility were: tumors smaller than 10mm, sentinel node N0, negative surgical margins (≤5mm). All pts received standard dose of 18Gy with electrons beams of 4-10 Mev, given by a mobile linear dedicated accelerator. The choice of the collimator diameter was based on the primary tumor size and site (range 40mm-60mm): the most used was 50mm, in 48/73 pts (66%). The protection of the thoracic wall was achieved using aluminium discs of diameter 7cm (range 5-8).

Results: With median follow up of 36 months (range 12-60) in all patients the acute and subacute toxicity was mild, there were no delays healing, wound dehiscence or infection. Late toxicity (fibrosis) at one year was G0 in 32pts(43%), G1 in 26pts(36%), G2 in 15(20%). At 2years: G0 in 46pts(64%),G1 in 22 pts(30%),G2 in 4pts(6%). At 3 years G0 in 52pts(73%),G1 in 20pts(17%). At 4 years we have 23 pts in follow-up and only 8pts(35%) have fibrosis G1. The aesthetic result is excellent/good in 87% pts, acceptable in 13%. One patient submitted local recurrence (1.4%)

Conclusions: The short follow up and the limited number of patients do not allow us not to draw definitive conclusions, but at present patients are not experiencing an excess of local relapse with the 18Gy single IOERT dose.

Proffered Papers: Donal Hollywood Award

OC-0484 Rescanning measurements in a 4D anthropomorphic phantom for evaluation of motion-mitigated, PBS proton therapy
1Paul Scherrer Institute (PSI), Centre for Proton Therapy, Villigen PSI, Switzerland
2Institute of Cancer Research, Joint Department of Physics, London, United Kingdom
3CSEM Centre Suisse d’Electronique et de Microtechnique SA (CSEM), Innovative Design, Landquart, Switzerland

Purpose/Objective: To investigate the ability for rescanned PBS proton therapy to recover the dose distributions in mobile lung tumours, with phantom measurements within a dynamic, anthropomorphic, thorax phantom.

Materials and Methods: For dosimetric measurements in a geometry similar to a lung cancer patient, a dynamic, anthropomorphic thorax phantom was employed. This consists of a tumour (wooden sphere) moving within an inflating lung, enclosed in a rib cage, complete with intercostal muscle and skin layers. Three planes of Gafchromic film in the coronal plane were used to measure the dose distributions resulting from PBS proton therapy for a range of rescan factors (≤8) and peak-to-peak motion amplitudes (4-10 mm). A PBS treatment was planned using an in-house planning system. The ITV was generated from the maximum excursion of the target as visualised on the mean projection CT calculated from a 4DCT scan. Two Single Field Uniform Dose (SFUD) fields (1.8 Gy prescribed dose) were employed at the following angles (gantry, couch): (25,30), (45,0). To allow for up to 8-times scaled volumetric re-scanning per field, optimization of each field was performed with an 8-times higher cut-off for the lowest deliverable pencil beam weight. Prior to delivery, phantom and film positioning was checked and corrected using CT imaging, as performed for all patients. Table shifts were applied to match the ribs, and the tumour mid-ventilation position was aligned cranio-caudally by adjusting the position of the tumour in the lung. The phantom was programmed to move with a sinusoidal motion with maximum excursions of up to 4 and 10 mm for deliveries with rescan factors between 1 and 8. Reference films were acquired with the phantom and tumour stationary, and with a moving tumour with no rescanning.

Results: Hot spots of up to 116% of the prescribed dose, with a pattern typically expected with the interplay effect, were clearly observed on the film with 10 mm motions (see Figure 1), while with 4 mm motion, only a faint interplay pattern was observed. However, experimental error translating to an uncertainty in the homogeneity index (D95-D2) of typically 5% shadowed this result. With a rescan factor of 8, even in the case of 10 mm motion, dose homogeneities similar to those of the static case could be achieved (D95-D6) of static and 10 mm