

correlation between the different variables and cardiac damage is ongoing.

Poster: Clinical track: Breast

PO-0672

Ten years experience of breast reconstruction after mastectomy in previously irradiated patients

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Purpose or Objective: To evaluate the rate of complications and the aesthetic outcome in previously irradiated patients who underwent mastectomy and subsequent prosthetic reconstruction in 2 times.

Material and Methods: Eighty-three patients who underwent immediate postmastectomy reconstruction with tissue expander between January of 2003 and June of 2012 at the Campus Bio-Medico University Hospital in Rome were retrospectively divided into two groups: Group A (study group) included 30 patients with previous quadrantectomy and radiotherapy who underwent salvage mastectomy after local recurrence and Group B (control group) included 53 patients submitted to primary radical mastectomy. Patients and disease characteristics were analysed and complications were correlated to treatment group.

Results: The median follow-up time for the whole group was 36 months (range= 12-144 months). Between group A and group B, there were no significant differences in terms of age, body mass index, comorbidities, pathological stage, treatments data (p=NS). In Group A 25/30 patients (83.33%) completed heterologous reconstruction. In 5 patients (16.67%) a conversion to combined or solely autologous reconstruction was needed. In Group B, 52/53 patients (98.11%) completed heterologous reconstruction. In 1 case (1.88%) the expander was removed due to infection and an autologous reconstruction was performed. Revision surgery was needed in 5 patients (9.4%). Autologous salvage reconstruction was more frequent for Group A patients (relative risk 10.4, p=0.02). The overall rate of complications was not different between the two groups (66.6% vs 58.5%; p=0.49) even if major complications (vast necrosis of mastectomy flaps with or without partial implant exposure, with or without implant removal, all III and IV-degree capsular contractures, either requiring or not requiring further surgery) were non significantly higher in the irradiated group (53.3% vs 32.0%; p= 0.07). However, analysing capsular contracture, a significantly higher risk of grade III-IV were recorded in Group A (40% vs 15%; relative risk 3.75, p=0.02). In Group A the median time from RT to reconstruction was 24 months (range= 9-192 months) and the incidence of major complications was not related to time from RT to reconstruction (p=0.313).

Conclusion: Heterologous reconstruction after salvage mastectomy in previously irradiated patients, is still possible with satisfactory results.

PO-0673

Common European mitochondrial haplogroups in the risk of RT-induced breast fibrosis

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Purpose or Objective: Germline polymorphisms in oxidative stress response genes have been postulated to be involved in

the development of late normal tissue complications following radiotherapy. Despite the key role of mitochondria in the production of reactive oxygen species, the contribution of mitochondrial DNA variations to clinical radiosensitivity is still largely unknown. In the present study, we evaluated the association between mitochondrial DNA haplogroups and the risk of radiation-induced subcutaneous fibrosis after postoperative radiotherapy in breast cancer patients.

Material and Methods: Subcutaneous fibrosis was scored according to the Late Effects of Normal Tissue-Subjective Objective Management Analytical (LENT-SOMA) scale in 286 Italian breast cancer patients who received radiotherapy after breast conserving surgery. Eight mitochondrial DNA (mtDNA) SNPs that define the nine major haplogroups in the European population were determined by PCR-RFLP analysis on genomic DNA extracted from peripheral blood.

Results: In a Kaplan-Meier analysis evaluated by the log-rank test, carriers of haplogroup H were found at lower risk of grade ≥2 subcutaneous fibrosis (P=0.018). In the multivariate Cox regression analysis adjusted for clinical factors (BMI, breast diameter, adjuvant treatment, dose per fraction, radiation type and acute skin toxicity), the haplogroup H emerged as significant protective factor for moderate to severe radiation-induced fibrosis (HR: 0.50, 95% CI 0.27-0.92, P=0.027).

Conclusion: Our results support a protective role of the mitochondrial haplogroup H in the development of radiation-induced fibrosis in breast cancer patients. Further prospective studies with larger sample size and different populations are nevertheless warranted to corroborate the possible influence of mitochondrial haplogroups on late normal tissue radiosensitivity.

PO-0674

Factors influencing patient reported cosmetic outcome: results of the Young Boost Trial

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Purpose or Objective: The Young Boost trial (YBT), a multicenter RCT (NCT00212121), investigates whether a higher boost dose leads to a lower recurrence rate in young patients treated with breast conserving therapy. Cosmetic outcome is the secondary objective. The aim of the current analysis is to investigate the factors influencing the patients' opinion about cosmesis.

Material and Methods: From 2004-2011, 2421 breast cancer patients ≤ 50 yrs were included in The Netherlands, France, and Germany. All patients were treated with lumpectomy, followed by 50 Gy whole breast irradiation. Patients were randomized to receive a standard 16 Gy (n=1211) or a high 26 Gy boost (n=1210) to the tumour bed. Cosmetic outcome data at 4 years of 807 patients were used for the current analysis according to the following two scoring systems:

1. BCCT.core: Digital photographs were analyzed using a software program to extract an overall cosmetic score: excellent, good, fair or poor. This score is based on symmetry, skin color and scar visibility. The 7 features of symmetry in the BCCT.core program are: nipple position (pBRA), level of lower breast contour (pLBC), level of nipple (pUNR), distance from nipple to inframammary fold (pBCE), length of breast contour (pBCD), area of the breast (pBAD) and non-overlapping area between left and right breast (pBOD). 2. Patients' score using a validated patient's questionnaire about the breast appearance, including an overall score: very satisfied, satisfied, not dissatisfied, dissatisfied or very dissatisfied. First, we analyzed the 7 features of BCCT.core in a proportional odds model, to

investigate which parameters were related to the patients' opinion about cosmesis. In addition, we analyzed whether firmness, presence of rib pain or quality of life (QoL) aspects (EORTC QLQ C-30 questionnaire) at 4 years were related to the patients' opinion on cosmetic outcome.

Results: Of the 7 BCCT.core parameters, pBCE and pBCD were significantly related to patients' score at 4 years. Patients with any difference in firmness rated their cosmesis worse than patients without any difference, even when the objective score (i.e. BCCT.core) was similar. This effect was larger by increasing difference. Worse perception of cosmetic outcome was also independently related to lower global QoL, lower emotional functioning and higher scores in the depression scale. The presence of rib pain had no influence.

Conclusion: The patients' opinion on cosmetic outcome was significantly related to objective parameters like distance from nipple to inframammary fold (pBCE) and length of breast contour (pBCD), but also to subjective factors, i.e. severity of firmness, depressive feelings, global QoL and emotional functioning.

PO-0675

Radical radiotherapy in oligometastatic breast cancer patients

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Purpose or Objective: The primary endpoint of this phase II study was to determine the progression-free survival (PFS) of oligometastatic breast cancer patients treated with radical radiotherapy to all metastatic sites.

Material and Methods: Patients affected by oligometastatic breast cancer were enrolled in this phase II trial. Inclusion criteria were the following: 1) histologically confirmed diagnosis of breast cancer, 2) 5 or fewer metastatic lesions, 3) no brain metastases, 4) primary tumor controlled. Radiotherapeutic treatment was SBRT (30-45 Gy in 3 fractions) or fractionated IMRT (40-60 Gy in 15-25 fractions). Primary endpoint was PFS; secondary endpoints were local-control (LC), overall survival (OS), and toxicity, which was assessed using the CTCAE v4.0 scale.

Results: The analysis was conducted on 37 patients. The median age was 55 years. Twenty-five (68%) had oligometastatic disease at diagnosis, and 12 (32%) had the oligometastatic status induced by systemic treatment. Sixteen (43%) patients had a single metastasis, and 21 (47%) had 2 or more lesions. Thirty-one (84%) patients were treated with SBRT and 6 (16%) with fractionated IMRT. With a median follow-up of 18 months, 1-year and 2-year PFS was 74% and 44%, respectively. No differences were seen in PFS between patients with only 1 metastases vs. those with ≥ 2 metastases, or between patients treated with SBRT vs. fractionated IMRT. Only two patients experienced local failure. One of these two patients had an isolated local failure for a spinal lesion that was treated with a minimum dose of 17 Gy in 3 fractions (being the spinal cord constraint prior on the PTV coverage). Two-year LC was 96%. Two patients died of disease, and 2-year OS was 96%. The proposed treatment was well tolerated; no Grade 3 toxicity was documented. Two patients experienced Grade 2 pain, 4 Grade 1 pain, and 2 developed Grade 2 fatigue.

Conclusion: Radical radiotherapy delivered to all the metastatic sites in oligometastatic breast cancer patients led to promising results in terms of local control and progression-free survival. Treatment was well tolerated. The results of this study may motivate for conducting phase III trials.

PO-0676

Impact of IMN irradiation on the right coronary artery and OAR in right-sided post-mastectomy patients

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Purpose or Objective: Previous studies have shown an increased risk of ischemic heart disease in breast cancer patients treated with radiotherapy (RT). It has recently been reported that the risk of major coronary events increases per gray of mean radiation dose delivered to the heart for patients undergoing either left- or right-sided breast RT. However, the anatomy of cardiovascular damage related to right-sided breast RT has not been well-described, specifically for radiation dose delivered to the right coronary artery (RCA). This may be of particular relevance for regional nodal irradiation that includes the internal mammary nodes (IMNs). In this prospective planning study, the impact of IMN irradiation on the RCA and organs at risk (OAR) in patients undergoing right-sided post-mastectomy RT (PMRT) was assessed.

Material and Methods: CT simulation scans of 60 right-sided post-mastectomy patients were identified from an institutional database. In 30 cases, the IMNs were contoured from the 1st to 3rd intercostal space with a PTV of 5 mm. The RCA, heart, lungs and contralateral breast were delineated as OARs. A four-field modified wide tangent photon plan was created encompassing the chestwall, IMNs, supraclavicular fossa and axilla. For the remaining 30 patients (control group), a four-field plan that excluded the IMNs was generated. All patients were planned to receive 50 Gy in 25 fractions over 5 weeks. Doses were compared between the two groups utilizing the Mann-Whitney test to determine whether there was a statistically significant difference in dose to OARs between these groups.

Results: In the group with IMN treatment, 95% of prescribed dose to the IMN PTV covered a median volume of 99% (range 90-100). There was a significant increase in dose to the RCA in the IMN treated group compared to the control group. The maximum dose to the RCA (3.33 Gy vs 2.35 Gy, $p < 0.0001$) and mean RCA dose (2.41 Gy vs 1.69 Gy, $p < 0.0001$) were both increased. Similarly, the mean heart dose (MHD) was increased (1.3 Gy vs 1.09 Gy, $p < 0.022$). Inclusion of the IMNs increased lung V20 (18 Gy vs 15 Gy, $p < 0.00021$) and mean lung dose (9.1 Gy vs 8.09 Gy, $p < 0.00051$). There was a significant increase in the volume of contralateral breast receiving 3 Gy in the group requiring IMN treatment (3.75 Gy vs 0 Gy, $p < 0.0001$).

Conclusion: Inclusion of the IMNs in patients undergoing PMRT significantly increases radiation dose to the RCA and MHD. An acceptable dose to the RCA has not been well-established but should be as low as is reasonably achievable. The dose and clinical implications of radiation to the RCA needs further evaluation in prospective studies utilizing techniques to minimize cardiac exposure.

PO-0677

Comparing detailed cardiac structure dose-volume metrics in supine versus prone breast irradiation

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