locorregional relapse occurred in 6 patients, 94.4% were alive without disease, 5% were alive with disease and 0.6% died from tumor.
Conclusion. Concomitant boost is feasible and safe for patients with breast cancer underwent to conservative treatment.

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Dosimetric comparison between IMRT vs 3D-EBRT in bilateral breast cancer

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Bilateral breast cancer is rare but increasing because of better diagnosis. Treatment with radiotherapy is difficult because match-line overlap must be avoided and Organ at risk (OAR) spared. This study evaluated dose distribution, homogeneity and dose to OAR in women with advanced bilateral breast carcinoma undergoing radiotherapy to breast and regional nodal using standard 3D external beam radiotherapy (3DEBRT) versus IMRT after breast conserving surgery and chemotherapy. Volumes were delineated on 6 patients. The 3DEBRT technique involved bilateral tangential fields for breast and two oblique, one anterior and one posterior, to the supraclavicular fossa. IMRT technique involved several multifield coplanar inverse planning. The prescription dose was 50 Gy in 25 fractions. Dose-volume histograms, dose homogeneity and dose to OAR were evaluated. IMRT results were superior to 3D-EBRT with significant improvements in achieving lower mean lungs dose and reducing the volume of heart in the medium-high dose region V30. PTV coverages were always equal to or greater in IMRT than 3D-EBRT technique. IMRT is ideal for treating complex treatment volumes in bilateral breast cancer, improving dose homogeneity and coverage. Moreover reduces normal tissue complications through organ at risk sparing.

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Dosimetric comparison of three-dimensional conformal radiotherapy (3D-CRT) versus two IMRT techniques in breast cancer

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Introduction. Dosimetric studies have established intensity-modulated radiotherapy (IMRT) as superior to 3D-CRT in terms of target coverage, conformity, and sparing of normal tissues and equivalent for survival outcomes. However, concern has been raised regarding its hypothetical higher integral dose to normal tissues and the potential carcinogenic risk. We compare three different radiotherapy modalities for real clinical situations.
Material and methods. 10 patients with early breast cancer treated with conservative surgery were referred to receive radiotherapy to our clinic. After individualized evaluation in a clinical meeting, all patients were proposed to undergo IMRT treatment (step and shoot). Every patient was re-planned with 3D-CRT and Volumetric Modulated Arc Therapy (VMAT).
Objectives. Compare the dosimetric results by 3D-CRT, IMRT step and shoot and VMAT.
Results. We analyzed dosimetric results created by the three plans. The data provided by Dose-volume histogram analysis showed each patient dose constraints for organ at risk and PTV coverage.
Conclusions. IMRT techniques show to be superior to 3D-CRT not only in terms of coverage and homogeneity, but also decreasing integral dose according to our dosimetric data.

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Dosimetric evaluation of 3-D conformal radiotherapy and intensity-modulated radiotherapy for left breast cancer after conservative surgery

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Background. Breast cancers are more frequently diagnosed at an early stage and have improved long term outcomes. Late normal tissue complications induced by adjuvant radiotherapy must be avoided. New breast radiotherapy techniques have been developed. Aim of study was to compare dosimetric parameters of the planning target volume (PTV), organs at risk (OARs) between conformal radiation therapy (3DCRT) and intensity-modulated radiation therapy (IMRT) after breast-conserving surgery.
Methods. 20 patients were studied who had early stage left breast cancer, received adjuvant radiotherapy after conservative surgery, CT-scan was used, 10 patients treated by 3D-CRT and 10 by IMRT, dose was 50 Gy in 25 sessions. Plans were compared

according to dose-volume histogram analysis in terms of PTV homogeneity and conformity indices (HI and CI) as well as OARs dose, volume parameters.
Results. HI and CI of PTV showed no difference between 3DCRT and IMRT, IH: 11.6/12.5, IC: 0.95/0.96 respectively. V95 gave 97.8% coverage for 3DCRT versus 99% for IMRT, V107 volumes were recorded as 11%, and 1.3% respectively for 3DCRT, IMRT. PTV showed volume receiving isodose V107 is most important in 3DCRT than in IMRT. Tangential beam IMRT increased volume of ipsilateral lung V5 average of 90% and reduced by 25% with 3DCRT. Ipsilateral V20 lung volume was 13%, 19% with IMRT and 3DCRT respectively. Patients treated with IMRT, heart volume encompassed by 60% isodose line (30 Gy) was reduced by an average of 42% (4% versus 7% with 3DCRT), mean heart dose by an average of 35% (495 Gy versus 1400 Gy with 3DCRT). Minimal heart dose average 356 Gy, in IMRT versus 90 Gy in 3DCRT.
Conclusion. IMRT reduced irradiated volumes of heart and ipsilateral lung in high-dose areas but increased irradiated volumes in low-dose areas in patients treated on left side.

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Dosimetry comparison of sequential versus simultaneous integrated boost (SIB) in adjuvant breast radiotherapy

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Introduction. The most common adjuvant radiotherapy strategy after breast conserving surgery consists of irradiation of the whole breast followed by irradiation of the tumour bed. Overall treatment duration can be shortened, compared to conventional radiation scheme, by integrating the boost irradiation in daily whole breast treatment.
Purpose. To compare dosimetry parameters of sequential versus integrated boost in breast adjuvant radiotherapy with 3D conventional radiotherapy.
Material and methods. Retrospective dosimetry comparison of treatments delivered in 2011 in our department. Standard treatment was delivered in 23–25 fractions (2.13–2 Gy/fraction) to a total dose of 48.99–50 Gy to whole breast, followed by boost irradiation of 10, 16 or 20 Gy depending on histopathological risk factors. SIB was delivered with doses of 2.30, 2.47 or 2.58 Gy/fraction to the tumour bed at the same time as the irradiation of the whole breast at 2.13 or 2 Gy/fraction. Dose equivalence was calculated according to the Linear Quadratic Model considering an alpha/beta of 4.6 Gy. We compared dosimetry of both treatments taking into account V95PTV, D2%PTV, V95PTVboost, D2%PTVboost, D2%whole body, V20Lung and Median Dose to the heart (in left breasts) Statistic analysis performing T student with SPPS programme V10.
Results. 63 women were treated in our department in 2011 with adjuvant radiotherapy to whole breast + sequential boost, while 57 women were treated in the same period with SIB. Mean difference (MD) for PTV95 = 0.20 (95%CI: −1.25, 1.67); MD PTVD2% = 0.69 (95%CI: −0.13, 1.51): MD PTVboost95 = 0.86 (95%CI: −0.77, 2.49); MD PTVD2% = −0.001 (95%CI: −0.53, 0.52); MD D2%whole body = 1.55 (95%CI: −0.29, 3.41); MD V20Lung = 1.67 (95%CI: −0.93, 4.28); MD DMediaHeart = 0.296 (95%CI: −1.25, 1.84).
Conclusions. The mean differences of the dosimetry parameters analyzed were not significant with a confidence interval of 95%.

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Effect of metallic expander on dose distributions for breast IMRT

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Introduction and objective. The aim of this work is to assess the accuracy of the dose calculation performed with a commercial TPS for breast IMRT radiotherapy in presence of metallic expanders. A Monte Carlo method is used as gold standard for this evaluation.
Materials and methods. Three breast patients with metallic expanders (model McGhan Style 150) were enrolled in this study. A dynamic IMRT plan consisting of two tangencial fields was planned for each case using Eclipse TPS (v 10.0). The AAA algorithm was used for 6MV beams. On the other hand, EGSnrc Monte Carlo algorithm was used to obtain the dose distribution for each plan generated previously by the Eclipse TPS. MC simulations were performed using the BEAMnrc code for the treatment-head simulation and the DOSXYZnrc code for the patient dose calculation. Dose volume histogram (DVH) for PTV was the metric used to evaluate the accuracy of the AAA algorithm to calculate clinical dose distributions in the presence of a tissue expander.
Results. Small dose differences (<2%) for PTV DVH were found between AAA and MC algorithms. Eclipse AAA algorithm overestimates the mean target dose about 2%.
Conclusions. Eclipse TPS (AAA algorithm) is able to compute reliable dose distribution when an expander is placed in the breast. The clinical impact of the expander on the target dosage seems to be negligible.