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Dosimetric analysis in patients of breast cancer treated with image based high dose rate multicatheterinterstitial brachytherapy as a boost following whole breast irradiation

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Background: Breast conserving surgery followed by adjuvant radiotherapy has been established as the standard of care. The rationale for use of boost following whole breast irradiation is to decrease the risk of local relapse in the tumor bed area.

Purpose: To analyse the dosimetric data and perform quality assessment of treatment plans in patients of breast cancer treated with image based high dose rate interstitial brachytherapy as a boost following whole breast irradiation.

Materials and methods:Fifteen patients who received boost with interstitial implant were included. All patients underwent breast conserving surgery and received whole breast irradiation with dose of 40Gy in 16 fractions to breast and drainage area. Under ultrasound guidance, cavity was identified and needles were inserted into and surrounding the lumpectomy cavity to deliver adequate dose to tumor bed. The target volume was contoured on CT images. The total dose delivered by brachytherapy boost was 15 Gy in 5 fractions at 3 Gy per fraction with an inter-fraction interval of 6-8 hours. Dosimetric indices were calculated to assess the quality of interstitial implant.

Results:The mean age of patients was 43 years. The mean tumor size was 2.6 cm with range of 1.5-4.2 cm. The mean treated length was 4.7 cm (range 3.5-7 cm). The median number of needles inserted were 8. The mean D90 of target volume was 103±15%. The mean V100 for target volume was 53.1 cc (range 24-81.6cc).The mean coverage index,dose homogeneity index, over-dose volume index, dose non-uniformity ratio, conformal index, uniformity index and quality index were 0.87±0.07, 0.78 ± 0.04, 0.43±0.06, 0.42±0.07,0.87±0.07, 1.06±0.06 and 1.12±0.07, respectively.

Conclusion:Analysis of dosimetric parameters is important to evaluate the quality of implant as it corelates with the long-term outcome as well as acute and late effects. These dosimetric indices help in estimating the risk of developing local relapse and breast fibrosis.

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