Dosimetric and Volumetric analysis in endobronchial brachytherapy treatment of carcinoma lung patients: A pilot study

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Background: To analyze the radiation doses received by Organ at Risk (OAR) nearby the target volume and volumetric changes in the target volume in carcinoma lung patients irradiated in three treatment session of endobronchial brachytherapy (EBBT).

Methods: Dosimetric analysis was conducted on patients of carcinoma Lung received three session of Endobronchial brachytherapy treatment in High Dose Rate brachytherapy unit with Ir-192 source. A flexible Lumencare catheter was inserted into the bronchus and positioned catheter tip at the tumor. Length of the implanted catheter was measured with the source position simulator device. Acquired three dimensional CT image data set with x-ray marker was sent to TPS to generate an optimized treatment plan. The OAR's and target volume were delineated for the accurate assessment of doses in each brachytherapy treatment session. The prescribed dose was normalization at 1.0cm from the center of the catheter. Doses to OAR's and target volume were noted down from the DVH and detailed dose volume table from TPS. The prescribed dose was 7Gy per fraction in three fractions. Doses to OAR's and Target volumes were also evaluated for each treatment session of the patient. The change in the volume of the target irradiated was noted down from the dose volume table in TPS.

Results: Thirty sessions were evaluated in this study as these were infrequent procedures to perform. Average mean dose to Esophagus was varied from 1.18Grey to 0.85Grey, average maximum dose to Heart was varied from 4.77Grey to 3.69Grey and average maximum dose to left coronary artery was varied from 0.44Grey to 0.91Grey. Average changes in the volume of a Target volume was found in varied from 20.45cc to 13.70cc in each treatment session and found there is signification volume reduction in the target volume irradiated.

Conclusion: This study showed that the doses to OARs are significantly increased in second and third session of EBBT and the doses to OAR's were in their tolerance limit. There is a significant volume reduction in volume of the target in second and third treatment EBBT session. It implies that the EBBT is much effective in the treatment of lung carcinoma patients having disease lesion in primary and secondary bronchus.

Keywords: Endobronchial brachytherapy, Oncentra Master Plan Treatment Planning System, Organ at Risk, Target Volume, Fraction, dose-volume-histogram