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Hybrid MRI/CT based adaptive intracavitary brachytherapy in the treatment of cervical cancers: A single institution series from South India

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Background: MRI is the gold standard for target volume delineation and organ at risk delineation for intracavitary brachytherapy of carcinoma cervix. However, its high cost and non-availability precludes its use in several centres in developing countries. Many centres use MRI based planning for the first fraction followed by CT based planning for subsequent fractions of intracavitary brachytherapy. In this study, we report our experience with hybrid MRI CT based planning for intracavitary brachytherapy of cervical cancers.

Materials and Methods: Between November 2016 to March 2018, 55 cervical cancer patients were taken up for hybrid MRI CT based planning for intracavitary brachytherapy after an external beam radiotherapy dose of 50Gy. MRI was done for the first fraction followed by CT for subsequent fractions. Gross tumor volume, High risk clinical target volume (HRCTV), Intermediate risk Clinical target volume (IRCTV), Bladder, Rectum and sigmoid were contoured. A dose of 7Gy to point A was delivered in 3 fractions. An adaptive planning strategy was used by manipulating the prescription dose to point A to achieve the organ at risk constraints and to increase the dose to HRCTV. DVHs were generated and the dose volume parameters were analysed in detail.

Results: A total of 165 insertions were analysed. The average high risk clinical target volume was 20.54cc. The average EQD2 dose received by 90% of high risk clinical target volume (D90 HRCTV) was 88.1Gy. The average EQD2 dose received by 2cc of bladder was 88.3Gy. The average EQD2 D2cc rectum was 64.8Gy. 2cc of sigmoid received an average EQD2 dose of 63.05Gy. The average ICRU bladder point dose was 82Gy and the average ICRU rectal point dose was 67Gy. The average EQD2 dose received by D90 HRCTV was more than the average EQD2 dose prescribed to point A in our series. Dose to point A was adapted in 47% of the insertions to achieve the desired outcome.

Conclusion: MRI/CT guidance allows appropriate delineation of target volumes and Organs at risk. Adaptive planning with image guidance helps in reducing the dose to organs at risk and escalating the dose to the target.

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