

## World Cancer 2019: Dosimetric benefit of additional oblique needles through an add-on-cap to Vienna-I ring applicator for cervical tumors with lateral parametrial disease- Pushpa Naga CH, Tata Memorial Hospital, India

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**Introduction:** Brachytherapy joined with outside pillar radiotherapy and attendant cisplatin is the standard treatment approach for privately progressed cervical malignancy. Picture based BT (IBBT), which is utilized to recommend the portion to the objective volume, has indicated a bit of leeway for the portion volume histogram boundaries over the regular 2-dimensional methodology with the portion endorsed to point A. In 2005, 3-dimensional (3D) target ideas on the gross tumor volume, the high-hazard clinical objective volume (HR-CTV), and the middle hazard CTV dependent on attractive reverberation imaging (MRI) for BT were acquainted agreeing with the Group Européen de Curiethérapie-European Society for Therapeutic Radiology and Oncology rules. Three-dimensional IBBT utilizing figured tomography or MRI is being utilized in some global focuses and has indicated an improvement in upgrading neighborhood control and diminishing poisonousness rates. Attractive reverberation imaging-based BT is getting progressively predominant; MRI gives better delicate tissue representation than the outline of target volume contrasted and CT. In any case, the use of MRI for BT is troublesome due to the nonattendance of MRI offices in many centers, significant expense, and expanded time required. Registered tomography is increasingly basic in the radiation oncology office accordingly, CT-based BT is simpler to perform, and rules for the depiction of target volume for CT-based BT have been distributed. The sidelong augmentation is typically more noteworthy on CT than on MRI; be that as it may, both CT and MRI are satisfactory for DVH assessment of the organs in danger.

**Background and Purpose:** A newly designed add on cap template which fits to the commercially available Vienna ring applicator allows for additional oblique needles in the lateral parametrium. Here we report a dosimetric comparison of the advanced Vienna Brachytherapy (BT) application utilizing the oblique needles (Vienna-II) as compared to Vienna Application without utilizing the oblique needles (Vienna-I).

**Methods:** A total of 30 cervical cancer patients treated with Vienna-II advanced BT Application between Jan 2011 and Dec 2016 were analyzed. All patients were delivered with 45-50 Gy of EBRT followed by 2 BT applications to a dose of 21-28 Gy in 3-4 fractions prescribed to High Risk CTV (HR-CTV). The EBRT and BT doses were normalized to EQD2 and compiled. Three dimensional treatment planning based on MRI (n=27)/CT (n=3) imaging was done. The planning principles included standard loading pattern for the intracavitary applicator with stepwise dwell weight adaptation and needle loading

optimization (maximum 20% of intracavitary contribution) to achieve an optimal target coverage and organ at risk (OAR) sparing. Optimized plans of Vienna-I application loading only parallel needles were generated retrospectively at a reasonably similar OAR doses to achieve optimum target doses. The resultant DVH parameters of target coverage and OAR's were compared to the treated Vienna-II plan.

**Results:** The mean ( $\pm$ SD) HRCTV volume was  $63 \pm 20$  cm<sup>3</sup>. The mean ( $\pm$ SD) needles loaded in Vienna-I and Vienna-II plan were  $5 (\pm 1)$  and  $8 (\pm 2)$ , respectively. The total oblique needles used were  $3 (\pm 2)$ , while the mean depth of needle insertion was  $4.5 (\pm 0.2)$  cm. Significant differences for Vienna-II as compared to Vienna-I plans were derived for dose application to the target volume; HR-CTV, D98 was  $75 \pm 7$  Gy Vs.  $65 \pm 6$  Gy ( $p < 0.001$ ) and D90 was  $85 \pm 9$  Gy Vs.  $74 \pm 9$  Gy ( $p < 0.001$ ). On the contrary, mean  $\pm$  SD 2cm<sup>3</sup> doses to OAR's were similar for bladder:  $89 \pm 11$  Gy Vs.  $84 \pm 12$  Gy ( $p < 0.001$ ), rectum:  $71 \pm 7$  Gy Vs.  $69 \pm 7$  Gy ( $p < 0.001$ ) and sigmoid:  $70 \pm 10$  Gy Vs.  $68 \pm 10$  Gy ( $p < 0.001$ ). An absolute dosimetric gain of 11 Gy to target volume was achieved with comparable doses to OAR.

**Conclusions:** The Vienna-II BT application using additional oblique needles allows for better target doses with optimal sparing of OAR's in cervical tumors with persistent lateral parametrial disease at the time of BT.