

## Random Variation of Treated Volumes in Fractionated 2D Image Based HDR Brachytherapy for Cervical Cancer

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**Abstract :** Brachytherapy involves placing a source of radiation near the cancer site which gives promising prognosis for cervical cancer treatments. The purpose of this study was to evaluate the effect of random variation of treated volumes in between fractions in the 2D image based fractionated high dose rate brachytherapy for cervical cancer at National Cancer Institute Maharagama, Sri Lanka. Dose plans were analyzed for 150 cervical cancer patients with orthogonal radiographs (2D) based brachytherapy. ICRU treated volumes was modeled by translating the applicators with the help of "Multisource HDR plus software". The difference of treated volumes with respect to the applicator geometry was analyzed by using SPSS 18 software; to derived patient population based estimates of delivered treated volumes relative to ideally treated volumes. Packing was evaluated according to bladder dose, rectum dose and geometry of the dose distribution by three consultant radiation oncologist. The difference of treated volumes depends on types of the applicators, which was used in fractionated brachytherapy. The means of the "Difference of Treated Volume" (DTV) for "Evenly activated tandem (ET)" length" group was ((X<sub>1</sub>)) -0.48 cm<sup>3</sup> and ((X<sub>2</sub>)) 11.85 cm<sup>3</sup> for "Unevenly activated tandem length (UET) group. The range of the DTV for ET group was 35.80 cm<sup>3</sup> whereas UET group 104.80 cm<sup>3</sup>. One sample T test was performed to compare the DTV with "Ideal treatment volume difference (0.00cm<sup>3</sup>)". It is evident that P value was 0.732 for ET group and for UET it was 0.00 moreover independent two sample T test was performed to compare ET and UET groups and calculated P value was 0.005. Packing was evaluated under three categories 59.38% used "Convenient Packing Technique", 33.33% used "Fairly Packing Technique" and 7.29% used "Not Convenient Packing" in their fractionated brachytherapy treatments. Random variation of treated volume in ET group is much lower than UET group and there is a significant difference (p<0.05) in between ET and UET groups which affects the dose distribution of the treatment. Furthermore, it can be concluded nearly 92.71% patient's packing were used acceptable packing technique at NCIM, Sri Lanka.

**Keywords :** brachytherapy, cervical cancer, high dose rate, tandem, treated volumes

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