

Comparison of the Dose Reached to the Rectum and Bladder in Two Treatment Methods by Tandem and Ovoid and Tandem and Ring in the High Dose Rate Brachytherapy of Cervical Cancer

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Abstract : Cervical cancer refers to an unusual growth of cells in the cervix. The cervix is the lower part of the uterus, which connects to the vagina. Various risk factors such as human papillomavirus (HPV), having a weakened immune system, smoking or breathing in secondhand smoke, reproductive factors, and obesity play important roles in causing most cervical cancers. When cervical cancer happens, surgery is often the first treatment option to remove it. Other treatments might include chemotherapy and targeted therapy medicines. Radiation therapy with high-energy photon beams also may be used. Sometimes combined treatment, including radiation with low-dose chemotherapy, was applied. Intracavitary brachytherapy is an integral part of radiotherapy for locally advanced gynecologic malignancies such as cervical cancer. In the treatment of cervical cancer, there are different tools for doing brachytherapy. Two combinations of different applicators for this purpose are Tandem and Ovoid and Tandem and Ring. This study evaluated the dose differences between these two methods in the organs at risk of the rectum, sigmoid, and bladder. In this study, the treatment plans were simulated by the Oncentra treatment planning system and Tandem, Ovoid, and Rings of different sizes. CT scan images of 23 patients were treated with HDR_BT Elekta Flexitron system were used for this study. Contouring of HR-CTV, rectum and bladder was performed for all patients. Then, the received dose of 0.1 and 0.2cc volumes of organs at risk were obtained and compared for these two methods: T-Ovoid and T-Ring. By doing investigations and dose measurements of points A and B and the volumes specified by ICRU, it seems that when comparing ring and ovoid to tandem and ovoid, the total dose to the rectum was lower by about 11%, and the bladder was 7%. In the case of HR CTV, this comparison showed that this ratio is about 7% better. Figure 1 shows the amount of decrease in rectum dose in the T-Ring method compared to T-Ovoid. Figure 2 indicates the amount of decrease in bladder dose in the T-Ring method compared to T-Ovoid. Finally, figure 3 illustrates the amount of HR-CTV coverage in the T-Ring method compared to the T-Ovoid.

Keywords : cervical cancer, brachytherapy, rectum, tandem and ovoid, tandem and ring.

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