

# **Dosimetric Comparison of Pelvic Bone Marrow Preservation between Volumetric-Modulated Arc Therapy and Intensity-Modulated Radiotherapy in Radical Radiotherapy of High-Risk Prostate Cancer**

**Ehab Saad** <sup>1, 2</sup>, **Khaled Elshahat** <sup>2, 3</sup>, **Hussein Metwally** <sup>2, 4</sup>

*<sup>1</sup> Department of Clinical Oncology and Nuclear Medicine, Kasr Al-Ainy School of Medicine, Cairo*

*University, Cairo, Egypt; <sup>2</sup> Department of Radiation Oncology, Dar Al-Fouad Hospital, Giza, Egypt; <sup>3</sup>*

*Department of Clinical Oncology, Al-Azhar University, Cairo, Egypt; <sup>4</sup> Department of Clinical*

*Oncology, Fayoum University, Fayoum, Egypt*

## **Background:**

Pelvic bone marrow (PBM) preservation is one of the factors that should be taken into consideration while choosing a technique for radiotherapy of pelvic malignancies.

## **Aim:**

To dosimetrically compare between volumetric-modulated arc therapy (VMAT) and intensity-modulated radiotherapy (IMRT) in PBM preservation in radical treatment of high-risk prostate cancer.

## **Methods:**

In 26 patients with high-risk prostatic carcinoma, dual arc VMAT and 7 fields IMRT plans were generated. In every patient, two targets were defined, clinical target volume (CTV) including the prostate and seminal vesicles (CTVPSV) and CTV including pelvic lymph nodes (CTV-LN). The organs at risk delineated were the rectum, urinary bladder, small intestine, bulb of the penis, femoral heads bilaterally and PBM. The dose prescribed to the CTV-PSV was 76 Gy in 38 fractions given over 7.5 weeks and the dose to CTV-LN was 54 Gy in 38 fractions given over 7.5 weeks.

Planning target volume (PTV) was created from the CTV with a margin of 5 mm in all direction. For assessment of PBM dose, V10, V20, V30, V40, V50 and mean dose were calculated. The dose volume histogram of PTV and PBM for both techniques was compared.

## **Results:**

The mean dose of PTV 54 Gy was achieved in both techniques adequately with better sparing of organs at risk with the VAMT

technique. The mean dose for PBM in the VMAT technique was significantly less than that in the IMRT (21.7 Gy vs. 25.8 Gy, respectively;  $p < 0.001$ ). The significant differences in PBM doses were in the range of 20 Gy to 40 Gy.

**Conclusion:**

In radical treatment of prostate cancer, VMAT technique can offer comparable conformality to IMRT with better PBM preservation. Awareness of PBM delineation and reduction of its doses using VMAT can help to decrease the hematological toxicity