COULD BONE MARROW SPARING REDUCE HEMATOLOGIC TOXICITY IN PROSTATE CANCER? A PREDICTIVE MODEL

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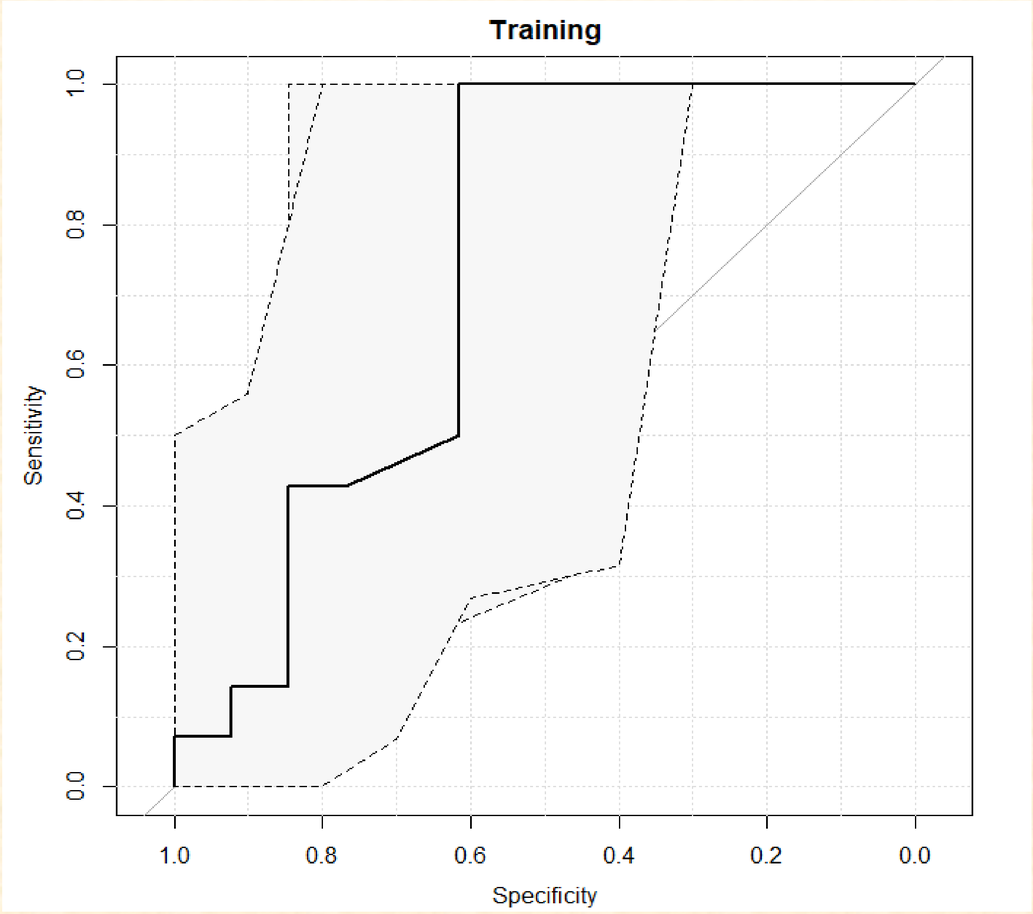

Figure 1: ROC Curve

BACKGROUND

Radiation therapy (RT) for Prostate cancer (Pca) involves bone marrow in field of treatment and consequently may cause a reduction on circulating blood cells. The aim of this study is to assess the clinical benefit of pelvic bone marrow (BM) sparing and predict the hematologic toxicity (HT).

METHODS

Data from consecutive patients treated between July 2021 and August 2022 were retrospectively collected. Bone Marrow was delineated distinguishing three different sub-sites: Lumbosacral BM (LSBM) extending from the superior border of L5 somatic body to whole sacrum, Lower Pelvis BM (LPBM) composed of bilateral pubic bones, ischium bones, acetabula and proximal femurs from the upper limit of the femoral heads to the lower limit of the ischial tuberosities, Iliac BM (IBM) extending from the iliac crests to the upper border of femoral heads. Whole BM was the merged structure of the others three: LSBM, LPBM and IBM. Hematolgic Toxicity was reported according to Common Terminology Criteria for Adverse Events (CTCAE) v5.0. The Wilcoxon Mann–Whitney test, setting a value of $p<0.05$ as significance level, was used to assess the correlation between presence of HT and dosimetric bone marrow parameters. A linear regression model was then calculated, and the predictive performance was evaluated in terms of area under Receiver Operating Characteristics (ROC) curve (AUC).

RESULTS

Twenty-seven patients were enrolled, 20 (74%) of them underwent to Whole Pelvis Radiotherapy (WPRT) and 7 (26%) to Prostate-only RT were analyzed. Seventeen (63%) patients were treated using Intensity Modulated Radiotherapy (IMRT), the others 10 (27%) were treated with Volumetric Modulated Arc Therapy (VMAT). A significant statistically correlation ($p < 0.012$) was found between D50% IBM and probability to onset of lymphocytopenia ≥ G2 at the end of RT. This correlation results in a predictive model with an AUC of 0.74 (Fig 1). A value of D50% IBM > 34 Gy correlates with a probability of HT of 52% at the half of RT and 64% at the end of treatment.

CONCLUSIONS

BM delineation could be a valid option to reduce hematological toxicity. IBM dose may predict, according to constraint (D50% > 34 Gy), the probability to onset of lymphocytopenia ≥ G2. More research is necessary to address the potential benefit of bone marrow sparing radiotherapy.