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Clinical Investigation

Long-Term Bone Marrow Suppression During Postoperative Chemotherapy in Rectal Cancer Patients After Preoperative Chemoradiation Therapy

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Summary

We quantified long-term bone marrow suppression resulting from preoperative chemoradiation therapy experienced by rectal cancer patients during postoperative chemotherapy consisting of oxaliplatin and 5-flurouracil. Greater volumes of pelvic bone marrow and lower pelvic bone marrow receiving between 25 and 40 Gy or greater mean doses were associated with grade ≥3 hematologic toxicity during postoperative chemotherapy. Sparing of the pelvic bone marrow may reduce myelotoxicity of adjuvant chemotherapy.

Purpose/Objective(s): To quantify ensuing bone marrow (BM) suppression during postoperative chemotherapy resulting from preoperative chemoradiation (CRT) therapy for rectal cancer.

Methods and Materials: We retrospectively evaluated 35 patients treated with preoperative CRT followed by postoperative 5-Fluorouracil and oxaliplatin (OxF) chemotherapy for locally advanced rectal cancer. The pelvic bone marrow (PBM) was divided into ilium (IBM), lower pelvis (LPBM), and lumbosacrum (LSBM). Dose volume histograms (DVH) measured the mean doses and percentage of BM volume receiving between 5-40 Gy (i.e.: PBM-V5, LPBM-V5). The Wilcoxon signed rank tests evaluated the differences in absolute hematologic nadirs during neoadjuvant vs. adjuvant treatment. Logistic regressions evaluated the association between dosimetric parameters and ≥ grade 3 hematologic toxicity (HT3) and hematologic event (HE) defined as ≥ grade 2 HT and a dose reduction in OxF. Receiver Operator Characteristic (ROC) curves were constructed to determine optimal threshold values leading to HT3.

Results: During OxF chemotherapy, 40.0% (n=14) and 48% (n=17) of rectal cancer patients experienced HT3 and HE, respectively. On multivariable logistic regression, increasing pelvic mean dose (PMD) and lower pelvis mean dose (LPMD) along with increasing PBM-V (25-40), LPBM-V25, and LPBM-V40 were significantly associated with HT3 and/or HE during postoperative chemotherapy. Exceeding ≥36.6 Gy to the

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