

Protons Offer Reduced Normal Tissue Exposure for Patients Receiving Postoperative Radiotherapy (RT) for Resected Pancreatic Head Cancer

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Purpose/Objective(s)

Determine the potential role for adjuvant proton based radiotherapy (RT) for resected pancreatic head cancer.

Materials/Methods

From 6/08 to 11/08, 8 consecutive patients with resected pancreatic head cancers underwent optimized intensity modulated radiotherapy (IMRT) treatment planning. IMRT plans utilized between 10 and 18 fields and delivered 45 Gy to an initial PTV with an additional 5.4 Gy boost to a reduced PTV volume. PTVs were defined according to the US Intergroup/RTOG 9704 RT guidelines. 95% of PTV volumes received 100% of the target dose and 100% of the PTV volumes received 95% of the target dose. Normal tissue constraints were as follows: Right Kidney V18 Gy to < 70%; Left Kidney V18 Gy to < 30%; Small Bowel/Stomach V20 Gy to < 50%, V45 Gy to < 15%, V50 Gy to < 10%, V54 Gy < 5%; Liver V30 Gy to < 60%; Spinal cord maximum to 45 Gy. Optimized 2 to 3 field 3D conformal proton plans were retrospectively generated on the same patients. The team generating the proton plans was blinded to the dose distributions achieved by the IMRT plans. IMRT and proton plans were then compared. A Wilcoxon paired T-test was performed to compare various dosimetric points between the 2 plans for each patient.

Results

All proton plans met all normal tissue constraints and were isoeffective with the corresponding IMRT plans in terms of PTV coverage. Proton plans offered significantly reduced normal tissue exposure over the IMRT plans with respect to: median small bowel V20Gy (15.4% with protons vs. 47.0% with IMRT - $p = 0.03$); median gastric V20 Gy (2.3% with protons vs. 20.0% with IMRT - $p = 0.03$); and median right kidney V18 Gy (27.3% with protons vs. 50.5% with IMRT - $p = 0.02$).

Conclusions

By reducing small bowel and stomach exposure, protons have the potential to reduce the acute and late toxicity of postoperative chemoradiation in this setting