IOERT for Rectal Cancer: The Mayo Clinic Experience

Michael G. Haddock, M.D.

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Abstract

Local control of rectal cancer has historically been poor when surgical margins are close or compromised. Intraoperative radiation with electrons (IOERT) has been used as a technique to increase the effective dose in patients with locally advanced rectal cancer with threatened margins and in patients with locally recurrent disease. In addition to direct tumoricidal effects, the high IOERT dose has microvascular effects resulting in endothelial apoptosis and microvascular dysfunction contributing to response and local control.

At Mayo Clinic, since 1981, 977 patients with rectal cancer have been treated with IOERT as a component of therapy. Central control of disease is excellent even in patients with R1 or R2 resection and is greater than 75% in all patients at 5 years. Complete resection is associated with improved local and distant control as well as survival. Previously irradiated patients have a poorer prognosis, but can be safely be treated with a second course of moderate dose eternal beam radiation and IOERT. IOERT doses of 15 Gy or higher have been associated with increased frequency and severity of painful neuropathy.

Advances in systemic therapy have increased long term survival in patients with rectal cancer, increasing the importance of local control given the severe morbidity often experienced by patients with uncontrolled pelvic malignancies. The current Mayo paradigm is to treat patients with locally advanced primary or recurrent rectal cancer with initial systemic therapy, followed by external radiation with concomitant capecitabine prior to surgery and IOERT. The external beam dose is reduced to 30 Gy in previously irradiated patients and surgery with IOERT takes place 1-2 days after the completion of external radiation instead of the typical 4-8 week waiting time for radiation naïve patients receiving full dose preoperative radiation.

IOERT appears to be a useful component of multimodality therapy resulting in improved disease control. Future studies evaluating local control and toxicity related to IOERT dose are needed.