AbstractID: 13280 Title: A New Technique for Rectal Endocavitary Radiotherapy: Treatment with an Electronic Brachytherapy Source

Purpose: To present the design aspects and clinical implementation of electronic brachytherapy treatment for early stage rectal adenocarcinoma. A dosimetric comparison between the historically used RT-50 (Papillon technique) unit and a customized system utilizing the Xoft electronic brachytherapy source is investigated.

Materials and Methods: Two proctoscope cones were manufactured by ElectroSurgical Instruments (ESI). Four custom surface applicators were manufactured by Xoft, Inc. and are designed to fit and interlock with the proctoscope cones from ESI. Dose rate, Half Value Layer (HVL), Percentage Depth Dose (PDD), and Exposure measurements were made with both the RT-50 and the Xoft systems.

Results: The Xoft system has a lower dose rate than the RT-50. The average Xoft dose rate is approximately 2 Gy/min while the RT-50 is 10-11Gy/min. Typical patient treatments are 20-30 Gy, resulting in a 10-15 minute treatment time with the new system compared to 2-3 minutes with the RT-50. The HVLs and PDDs between the two systems are comparable resulting in similar doses to the target. The exposure rate in the direction of the beam are higher with the Xoft system. Lateral to the beam, the exposure rates are lower, most likely due to higher attenuation in the new stainless steel proctoscope.

Conclusions: The RT-50 unit is an older radiotherapy machine with limited replacement parts. Additionally the unit is cumbersome to use in an operating room due to its large size. The use of a custom-designed proctoscope and commercial Xoft surface applicators allows delivery of a well established treatment with the ease of a modern radiotherapy device. While the treatment time is longer with Xoft, the treating staff may stand farther away from the radiation producing device, thus reducing radiation exposure. The availability of a modern radiotherapy system may result a renewed interest in performing endocavitary radiation therapy.