AbstractID: 6848 Title: Variations of rectal dose estimation using rectal markers in HDR cervical brachytherapy

Purpose: In the treatment of cervical cancer using high-dose-rate (HDR) brachytherapy, high rectal dose often limits the tumorcidal dose. In film based brachytherapy, rectal dose is usually computed using rectal markers. However, positions of these markers can vary relative to the anterior rectal wall. This retrospective study analyzes the potential inaccuracy in rectal dose estimation due to variations of marker placement in a multi-fractionated HDR treatment regimen.

Method and Materials: Five Patients treated with multiple-fraction tandem and ovoid HDR brachytherapy were selected. By adequate packing the vagina, there was little inter-fractional variation of the actual rectum position. Therefore, variations of rectal makers were due to their locations relative to the wall. For each patient (with 3-4 fractions), the plan of the first fraction was selected as the reference plan. Simulation films of all the other fractions were matched with the films of the reference plan based on bony anatomies. Rectal dose points specified based upon the rectal markers of all different fractions were then digitized into the reference plan after film matching. Dose prescription and dwell weights in the reference plan were set to be identical to the original treatment plan. The rectal doses within each group of rectal points were then analyzed.

Results: Our results have shown that inter-fractional variations of rectal marker locations to specify the rectal dose are up to 0.5-0.8 cm. The resulting differences in rectal dose values are 42.4%, 23.3%, 25.6%, 6.8% and 50.4% for each patient, respectively.

Conclusion: Care should be taken when using rectal markers as reference points for estimating rectal dose in HDR cervical brachytherapy. Positions of the markers inside the rectum relative to the wall can vary and cause underestimation of the dose to the rectum. The true rectal dose should be determined by the most anterior point among all fractions.