AbstractID: 7637 Title: Measurement of the effect of shielding in a Tandem and ovoid applicator used in HDR brachytherapy

Purpose: To analyze the effect of shielding present in a Fletcher Suit Delcos ovoid by comparing the dose distribution around it computed by treatment planning system (TPS) to the dose distribution measured using radiochromic film dosimetry for HDR ^{192}Ir remote afterloader.

Methods and Materials: Gafchromic/EBT films were carefully wrapped around the ovoids [diameter 2.0 & 2.5cm] including its anterior and posterior aspects. Origin was marked at the center of one the sources on the colpostat and on the film for spatial coordination. The ovoid was radiated to a dose of 300 cGy. The films were scanned using Vidar VXR-16 Scanner and analyzed using RIT software. The dose distribution in the planes above, below and on the sides of the ovoid was obtained. 3D analyses of the dose profiles were carried out and the results were compared with the dose distribution computed by TPS which does not account for the presence of shields.

Results: The dose reduction in the anterior part of the colpostat affects maximally the dose to the bladder where a reduction up to 15 % [average 11.6%] was noted. The reduction of dose in the posterior part of the colpostat which is designed to shield rectum was found to be as high as 25%. The effect of shields can be seen in some part beyond the shields in a typical subtended solid angle. In the high dose region in the central plane where the shields are not present, insignificant difference in the measured & computed dose values was noticed.

Conclusions: Shields were more effective in reducing dose to the rectum than for bladder primarily due to the applicator design. The present TPS substantially over-estimates the dose to bladder and rectum including regions which lie in the shadow of the solid angle subtended by the shields.