AbstractID: 3613 Title: Anatomy-based MLC field optimization for the treatment of gynecologic malignancies

Purpose: To evaluate the use of a new inverse planning system with anatomy-based field segmentation, as an alternative between "4-field box" and beamlet-based IMRT, to treat whole pelvis of women with resected gynecologic malignancies.

Method and Materials: A solution has been elaborated with the assistance of an in-house optimization tool named *Ballista*. This inverse planning system can generate anatomy-based MLC fields and simultaneously optimize their orientation and weight. The selected geometry consists of 7 coplanar and 2 noncoplanar incidences. For 10 patients planned to receive 45 Gy for resected endometrial or cervix neoplasia, target volume and organ at risk (bowel, region "at risk to find bowel" (B RAR), bladder, rectum, bone marrow) were delineated. Using the *Pinnacle*^{3} planning system, four plans were generated for each patient: conventional 4-field, enlarged 4-field (aperture shaped to PTV),"step-and-shoot" IMRT and *Ballista* plans. Dose-volume histograms, number of segments and monitor units (MU) were analyzed.

Results: Planning target volume (PTV) coverage was similar for enlarged 4-field, IMRT and *Ballista* plans, and follows the ICRU standard recommendations. Only 77.5 ± 1.9% (mean ± SEM) of PTV received the prescription dose if conventional plans were applied ($p<0.001$). The mean volume of B RAR receiving 45 Gy was: 4-field, 49.7 ± 7.1%; enlarged 4-field, 63.4 ± 5.8%; IMRT, 26.4 ± 3.1%; *Ballista*, 29.0 ± 3.0%. No statistical difference was noted between the ability of IMRT and *Ballista* to spare bowel ($p=0.14$), while *Ballista* plans were better than 4-field ($p<0.001$). The mean number of segments for *Ballista* was 33.3 ± 2.3 vs 128.6 ± 2.6 for IMRT and the mean number of MU was 325.0 ± 11.8 vs 731.5 ± 25.0.

Conclusion: Weight optimization, with anatomy-based MLC fields, is a good alternative between manual planning and IMRT for the treatment of gynecologic malignancies. Clinical results of treatment tolerance will follow.