AbstractID: 4377 Title: Improving IMRT plans delivery for head and neck cases using aperture-based MLC segments.

Purpose: To investigate the possibility of performing IMRT in head and neck treatment sites with less segments and monitor units (MU).

Materials and methods: Six pharyngeal cases (n = 6) were analysed and four cases (n = 4), in the sinonasal region. For each one, an IMRT plan was first realized using a commercial software (P^3IMRT, Pinnacle^3 – IMFAST segmentation algorithm). These patients had to receive 32 fractions of simultaneous integrated boost external beam radiotherapy at 1.8 and 2.15 Gy/fraction, respectively to the low and high risk planning target volumes (PTV1 and PTV2). Then, an-in-house inverse planning system, called *Ballista*, based on predetermined segments, was used to realize comparable plans. Its segments are generated with the subtraction of the projection of the OARs with the PTV (planning target volume).

Results: For the pharyngeal *Ballista* plans, the average volume of the PTV that received at least 100% of the prescribed dose (V_{100}) was 85.0±4.5% for the first prescription (PTV1) and the V_{100} for the second prescription (PTV2 – simultaneous integrated boost –) was 78.5±10.9%. With Pinnacle^3,the V_{100} value was 86.6±4.8% and 81.5±12.4% respectively for PTV1 and PTV2 (see figure 2a and 2b). On average, *Ballista* plans have required 932±124 MU and 52±10 segments compared to 1238±230 MU and 117±7 segments for Pinnacle^3. For the sinonasal *Ballista* plans, the average V_{100} obtained was 80.0±3.1%. With Pinnacle^3, the V_{100} gave 75.7±2.7%. *Ballista* plans have required an average of 406±54 MU and 22±1 segments compared to 697±133 MU and 99±14 segments for beamlet-based IMRT.

Conclusion: In step-and-shoot head and neck IMRT, an anatomy-based MLC optimization system can achieve similar dosimetric plans comparable to traditional beamlet-based IMRT with less number of segments and MU.
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