AbstractID: 10402 Title: Impact of MLC width on IMRT planned dose distributions in the skull base.

Purpose
This study aimed to investigate the impact of MLC width on dose distributions for tumours in the skull base.
Methods and materials
Five cases of skull base meningioma were planned using IMRT to an escalated dose of 60Gy/30#. 4 IMRT plans were calculated for each case, using 2.5mm, 5mm and10mm MLC widths and helical tomotherapy (HT) with a beamlet width of 1mm. Organs at risk (OAR) were not permitted to exceed clinically relevant dose tolerance levels. PTV coverage was assessed using Dmin, Dmax, V90, V95 and V100.
Results
OAR doses were maintained below safe threshold levels in all cases. Average Dmax, Dmin, Dmean and Dmed were similar, with a trend to higher values for the 2.5mm MLC. Average V90, V95 and V100 improved as the MLC width got smaller, the V95 increasing from 65.4% to 80.1% to 89.2% for the 10mm, 5mm and 2.5mm MLC respectively. HT produced similar PTV coverage to the 2.5mm MLC (V95 86.6%). It appears that the magnitude of difference between the MLC widths was greater if the PTV was particularly complex and touching OAR. The number of segments required increased as the MLC width decreased and on average was 36, 47 and 58 for the 10mm, 5mm and 2.5mm MLC respectively.
Discussion
Our findings indicate that MLC width does impact on the ability of an IMRT plan to achieve excellent PTV coverage for skull base lesions, which are generally difficult to dose escalate due to the proximity of OAR. As MLC width reduces, the degree of dose intensity modulation improves, allowing tighter conformation of high dose around the edge of the PTV. There may be no benefit to MLC smaller than 2.5mm, as the outcomes are similar to HT.
Conflict of interest
Clinical fellow funded by Siemens OCS Ltd.