AbstractID: 7023 Title: On Optimization of Treatment Planning for Intensity Modulated Spinal Radiosurgery

Purpose: The purpose of this study is to optimize the treatment planning parameters for spinal radiosurgery for maximal target coverage and spinal cord sparing.
Materials and methods: A total of 5 spinal radiosurgery patients with lesions in various locations were randomly selected for the study. The target volume included the entire vertebral body of the involved spine. The spinal cord at the same level of the target, plus 6 mm superior and inferior to the target border, was delineated as the organ at risk (OAR). The normal tissue 12mm outside the target was automatically considered as an OAR. Dose was prescribed at 90% isodose line. Exactly same DVH pre-setting was used for the inverse treatment planning for each patient and each plan. Treatment planning was compared for different beam setups (posterior or all-direction), beam numbers (5-9), and grid/beamlet sizes. The percentage cord dose at 10% volume (D10), dose coverage (V90), and equivalent uniform doses (EUD) of the target and the cord were calculated from the DVH for each plan. The end points were the ratios of D10 toV90 (D10/V90) and EUDcord to EUDtarget (EUDc/EUDt).
Results: The D10/V90 value was 45±4% versus 48±4% for posterior versus all-direction 9-beam setups. The posterior setup was significantly better. The D10/V90 value was 48±4%, 47±4%, 45±4%, 45±4% and 45±4% for 5, 6, 7, 8, and 9 beams respectively. Both the D10/V90 and EUDc/EUDt values tended to improve with increasing number of beams. However, the improvement was minimal when the beam number was more than 7. These values also improved with decreasing grid and beamlet sizes. D10/V90 was 40±4% versus 58±10% for 2mm versus 4mm grid/beamlets.
Conclusion: The 7-9 beam plans with posterior setup and smallest grid/beamlet size are associated with the optimal plan for spinal radiosurgery.