

Purpose: A single high radiation dose is effective to reduce pain caused by tumors adjacent to the spine. This study was to investigate optimal treatment angles and field numbers to create a standardized treatment for spine radiosurgery.

Methods: 20 patients with thoracic and lumbar lesions treated in the past two years were redesigned. IMRS treatment plans were performed using iPlan planning system and patients were treated with 18 Gy. Dose constraints were: less than 10% of spinal cord volume received 10 Gy; mean kidney dose less than 7 Gy, and <10 Gy for esophagus. Field number of 7, 9, and 11 were used for the comparisons. Gantry angle from various arrangements were studied.

Results: Excellent clinical outcomes were observed without any normal tissue complication.

With the same cord dose constraint (i.e., 10 Gy to less than 10% cord volume), the PTV received better dose coverage in 11-field's plans compared with the 9-field's, and PTV coverage was better in 9-field's plans than in the 7-field's. Using 11-field treatments, the effect of gantry angle is not significant. In our standardized 11-field IMRS plans, 18 Gy covers 85 to 95 % of the PTV volume, 16 Gy covers 96-100%, and 13 Gy covers 100% of PTV. The under dose regions were found at the interface between cord and lesions, which is necessary for safety margin. The range of total MU was around 10000 and the planning time was about 1.5 hours for the 11-field standardized plan.

Conclusions: Spinal lesions require urgent treatments; usually within 2-4 days including QA. With large field numbers (e.g., 11 fields), the selection of gantry angle is not important and plan can be designed in 1.5 hours. It may be relatively difficult to design a good plan if field number is less than 7 for the spine radiosurgery.