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Stereotactic body radiotherapy of spinal metastases using Novalis Tx syatem: plan comparison of intensity modulated radiotherapy (IMRT) and volumetric modulated arc therapy (VMAT).

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Abstract:
INTRODUCTION: Intensity modulated radiotherapy is routinely used for stereotactic body radiotherapy of spinal metastases. Volumetric modulated arc therapy is the new technique that needs to be compared with IMRT. METHODS: Five patients of spinal metastases treated with stereotactic body radiotherapy were the study population. CT scans were obtained at 1mm slice thickness after immobilizing patients in thermoplastic masks. Volumetric MRI was performed and registered with CT images using BrainLab iPlan RT Image software. Vertebral bodies and pedicles were drawn as clinical target volume (CTV) and planning target volume (PTV) was generated after expanding CTV by 1mm. Spinal cord was drawn at the level of involved vertebra with cranial and caudal extension of 6mm. Three patients were planned for 30Gy and two for 35Gy divided in 5 daily fractions. Planning was performed on BrainLab iPlan RT dose version 4.1.2 workstation with static IMRT beams. Treatment was delivered on Novalis Tx system with ExacTrac image verification. For dosimetric comparison images with contours were transferred to Eclipse planning workstation version 8.6 and single arc VMAT plans were generated. RESULTS: Mean volume of the PTV was 33.1cc (21.5-49.5cc). Mean dose to PTV was 99.96 ±1.29 with IMRT and 100.4% ±0.89 with VMAT plans. Mean of conformity index was 1.31±0.12 in IMRT and 1.18 ±0.1 VMAT plans. Mean of maximum dose (0.035cc) to spinal cord with IMRT and VMAT plans was 27.33Gy and 26.43Gy, respectively. Ten percentage of spinal cord was receiving 26.36Gy in IMRT plans and 25.48Gy in VMAT plans. CONCLUSION: Conformity index was better with high-definition VMAT compared to IMRT plans. There was no significant dosimetric advantage of single arc VMAT over IMRT in sparing spinal cord. Treatment delivery time would be shorter with VMAT technique possibly reducing intrafraction variations.
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