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Stereotactic radiosurgery in single brain metastases using Novalis Tx system: plan comparison of intensity modulated radiation therapy (IMRT) and volumetric modulated arc therapy (VMAT).

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Abstract:

INTRODUCTION: Volumetric modulated arc therapy has dosimetric advantage in treatment of whole brain with simultaneous boost of brain metastases. In this study VMAT is compared with IMRT in radiosurgery of single brain metastases. **METHODS:** Five patients with single brain metastases (3 in parietal lobes and 2 in occipital lobes) treated with stereotactic radiosurgery were the study population. Contrasts enhancing computerized tomography (CECT) scans were obtained at 1mm slice thickness after immobilizing patients using BrainLab stereotactic thermoplastic masks. Volumetric magnetic resonance imaging (MRI) with T1, T2 and FLAIR sequences were performed for all patients and the axial images were reconstructed at 1mm thickness. MRI images were registered with CT images using BrainLab iPlan RT Image software and tumor volumes were delineated. Critical structures like normal brain, optic pathways, brainstem, etc. were drawn. All patients were planned for treatment with 16 to 18Gy in single fraction and treated on Novalis Tx system using ExacTrac image guidance. Initial planning was performed on BrainLab iPlan RT dose version 4.1.2 with static IMRT beams. Images and contours were then transferred to Eclipse planning system version 8.6 and planned for volumetric intensity modulated arc therapy. Dose parameters of planning target volume (PTV) and normal brain were compared. **RESULTS:** Mean planning target volume was 2.76 cc (range 0.9-6.1cc). Mean value of conformity index was 1.6 ± 0.28 and 1.4 ± 0.17 with IMRT and VMAT plans, respectively. Mean 12Gy volume of normal brain was 10.13cc and 9.13cc with IMRT and VMAT plans, respectively. Mean of monitor units required to deliver IMRT and VMAT plans were 3025 and 5243 respectively. **CONCLUSION:** In stereotactic radiosurgery of single brain metastases, volume of normal brain receiving 12 Gy was slightly less with VMAT compared to IMRT planning. Treatment delivery with VMAT would be faster compared to IMRT.

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: 7. Use advances in pharmacology, experimental therapeutics, biologic therapies, and radiobiology to improve future therapies for patients with CNS tumors

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