A Treatment Planning Technique Combining Stereotactic Radiosurgery (SRS) and Fractioned Stereotactic Radiosurgery (FSRS) Treatment Plans, to Minimize Undesirable Dose Contributions when Treating Multiple Brain Metastases(MBM) using Brainlab Elements

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INTRODUCTION

Challenges may arise when treating multiple brain metastases (MBM) with a range of volumes, such that a subset of lesions require multi-fraction treatment. contributions.

AIM

We demonstrate a new planning technique using Brainlab Elements combining single fraction and fractionated radiosurgery plans, to deliver the intended dose while minimizing undesirable dose

METHOD

Four tumors were identified on MRI with volumes as follows: Tumor1 (7.261cc), Tumor2 (0.284cc), Tumor3 (0.348cc), and Tumor4 (1.227cc). Tumor1 was prescribed a five-fraction treatment (Plan1). The remaining lesions were prescribed a single-fraction treatment (Plan2). Both plans were generated with Brainlab Elements MBM (v2.0) for treatment on a Varian Truebeam STX Linear Accelerator.

RESULTS

The summation plan was evaluated in Dose Review mode. The final dose to Tumor1 and Tumor3 exceeded the intended prescription dose, due to the close proximity of these lesions to one another. To mitigate this, Tumor3 was designated an organ at risk (OAR) in Plan1, and Tumor1 was designated an OAR in Plan2. The summation plan was again reviewed, and if needed, provided the basis for further changes to achieve the desired prescription.

The prescription is as the followings: Tumor1 (01_Right Cerebellar,7.261cc) was prescribed a five-fractions treatment (Plan1), and the other 3 smaller tumors, tumor2(02_Left Superior parietal, 0.284cc), tumor3 (03_right cerebellar vermis, 0.348cc), tumor4 (04_right posterior periventricular, 1.227cc) were prescribed as a single fraction treatment (Plan2). By creating the OAR Help1 and Help2, In plan1, we can lower the maximum dose to Tumor3 from 8.87Gy to 1.93Gy as showed in Figure1 a and b; similarly in Plan2, the dose to Tumor1 is lowered from 3.55Gy to 1.51Gy as showed in Figure2 a and b. Figure3 is the combined total dose from Plan1 and Plan2 in Dose Review mode.

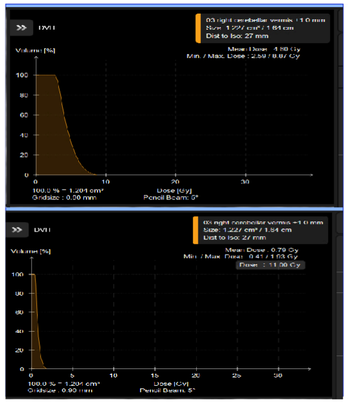


Figure1 a&b DVH for Tumor3, before and after creating OAR in Paln1 and Plan2

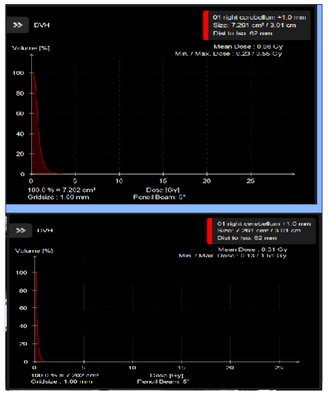
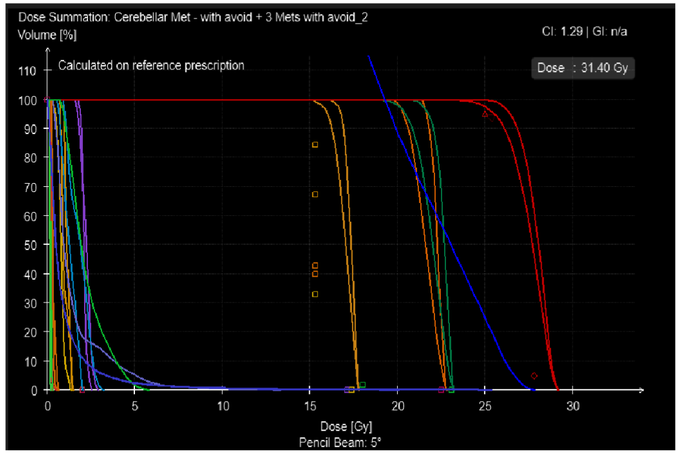


Figure2 a&b DVH forTumor1, before and after creating OAR in Paln1 and Pan2



CONCLUSIONS

Evaluation of the summation plan dose distribution using Dose Review mode revealed unintended dose contributions from adjacent lesions. This was mitigated by designating tumors as OARs and implementing dose constraints to reduce dose contributions. Combining SRS and FSRS is a feasible technique to achieve the prescription dose with the increased efficiency of MBM planning and delivery.

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REFERENCES

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