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Linac Based Stereotactic Radiosurgery: Initial Experience from a Tertiary Care Hospital in Western India

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Introduction

over the last 2 decades fractionated stereotactic radiosurgery (FSRS) and single fraction radiosurgery have progressively replaced conventional radiotherapy and surgery for tumours located in hard to reach areas. This is because have a steeper dose gradient between the tumor and the surrounding normal tissue.

Materials and methods

retrospect review of 7 patients treated at HCG cancer centre vadodara were treated with single fraction SRS and FSRS between January 2021 and January 2022 are the subject of this retrospective case series.

Diagnosis was based on histological confirmation, or, on radiological appearance. Indications for treatment included post-operative residual tumor or symptoms in patients who were not candidates for surgery.

Double shell Frameless thermoplastic SRS mask were used for immobilisation. Simulation was done in neutral neck position with 1mm cuts. For majority of cases plain scan was taken, expect for AVM, where planning CT Angio was taken.

All patients were treated via RapidArc VMAT.

Gross target volume (GTV) was defined as the contrast enhancing tumor demonstrated on T1-weighted MRI fused with the simulation CT images with IV contrast. To reduce operator bias three different radiation oncologists contoured the GTV and the final volume was selected based on mutual agreement.

Clinical target volume (CTV) was considered the same as GTV. A 1 mm margin was added to define the planning target volume (PTV). The prescription dose to PTV ranged from 12Gy in 1 fraction to 30Gy/5#.

Choice between FSRT and Single fraction SRS was based on 1. Size of lesion and 2. Proximity to critical OARs.

During treatment delivery, CBCT was taken after every arc was delivered. Setup error within 1mm was accepted and not changed. Setup error over 1 mm required re-setup of patient.

SR. NO	SEX	AGE	DIAGNOSIS	DOSE
1	F	26	METASTATIC CA BREAST	16GY/1#
2	M	61	VESTIBULAR SCHWANNOMA	12GY/1#
3	F	26	ABDUCENT NERVE SCHWANNOMA	13GY/1#
4	M	29	RIGHT MCA FED IVM	18GY/1#
5	F	48	RECC. CA TONGUE WITH BRAIN METS	30GY/5#
6	F	35	CP ANGLE MENINGIOMA	25GY/5#
7	M	14	ORBITAL APEX SCHWANNOMA	12GY/1#
8	M	48	VESTIBULAR SCHWANNOMA	18GY/3#
9	M	50	NEUROCYTOMA	14GY/1#

Median age was 35 years (range 14–61). Of the 9 patients included in the study, there were 4 Female patients and 5 male patients. The age ranged from 14 to 61 years with a median age of 35 years.

The lesions treated included meningiomas, vestibular schwannomas, AVM, abducent nerve schwannomas and solitary metastasis. Prior to SRS, 2 patients underwent surgical intervention (surgical resection).

Median clinical target volume was 2.8cc (range 0.7–6.1) and median planning treatment volume was 4.7cc (range 1.3–10.2). Median total dose was 16 Gy (range 12–30). 6 patients received single fraction SRS, while 3 patients received FSRT.

4 patients on follow up demonstrated stable disease or reduction in tumour size. 2 patients died due to systemic metastasis and disease progression, and 2 patients are yet to undergo post treatment imaging. None of the 12 patients had any acute radiation induced toxicity on early follow up. One patient had progression of SNHL at 3 months.

95% ISODOSE

100% ISODOSE

50% ISODOSE

Discussion

Overall, based on the data in this study, the conclusion can be made that Intensity Modulated SRS can successfully be used to treat intracranial lesions that are difficult to reach surgically.

All patients completed treatment without any acute toxicities and without the need for indoor admission to hospital.

as a valuable option for the management of several intracranial benign tumors with 5 year tumor control rates of 88–98% for meningiomas, 86–97.9% for acoustic neuromas 93–99% for pituitary adenomas and 81.3–100% for craniopharyngiomas.

At our centre, a variety of fractionation regimens are utilized depending on the size and histology of tumour, location and relation to critical OARs.

12Gy/1#, 18Gy/3# and 25Gy/5# are the more commonly utilised fractionation schedules, since dose tolerance of critical OARs can easily be achieved with this fractionation.

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