

Repeat LINAC-based Stereotactic Radiosurgery for Recurrent Trigeminal Neuralgia

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Abstract

Objective: Trigeminal neuralgia (TGN), also called Tic Douloureux, is a facial neuropathic condition characterized by sharp and debilitating facial pain. Stereotactic radiosurgery (SRS) is a non-invasive treatment option for TGN that uses a single dose of radiation aimed at the root entry zone (REZ) of the trigeminal nerve. SRS treatment for TGN can be done using Gamma Knife frame-based stereotactic radiosurgery (GKSR) or linear accelerator (LINAC) based stereotactic radiosurgery (SRS). Unfortunately, there is a high rate of recurrence following SRS with either form of radiosurgery. Multiple studies have explored the retreatment of TGN using GKSR, but few have examined LINAC-based retreatment safety, efficacy, and outcomes.

Methods: In this retrospective review of patients treated between January 2004 and April 2021 there were 29 cases of repeat SRS for 28 patients (one patient had bilateral TGN SRS re-irradiation). The treatment regimen for these patients was standardized to 90 Gy point max as initial treatment and 60 Gy for re-treatment, and all patients were treated with frameless LINAC-based SRS. Outcomes were scored on the Barrow Neurological Institute (BNI) pain intensity scores and patients were categorized as having an excellent (minimal to no pain; BNI 1-3A) or good responders (pain controlled with medical management; BNI 3B) or refractory (BNI 4-5). Other variables examined include time between SRS sessions, and toxicity after re-irradiation. The time of follow up after repeat SRS ranged from 1-109 months with the median and mean being 13 months and 24.3 months, respectively.

Results: An excellent outcome was achieved in 14 out of 29 cases (48%) and a good outcome in 7 of 29 cases (24%) while 8 out of 29 (28%) cases experienced a refractory outcome. The time between SRS sessions ranged from 5 - 76 months with a mean of 33.3 months and a median of 18 months. Two out of the 14 patients (14%) who had an excellent outcome after repeat SRS had recurrence at 10 and 18 months. Two out of the 7 patients (29%) who had a good outcome had recurrence at 10 and 17 months. Toxicity following re-irradiation included one case of grade 1 dysesthesia and one case of mild grade 1 facial numbness unilaterally.

Conclusion: In this small cohort of patient treated at a single institution, treatment of recurrent TGN with re-irradiation using LINAC-based SRS provided an effective treatment option with 21 out of 29 cases (72%) experiencing positive outcomes. The procedure also appears to be safe with only 2 cases of mild grade 1 toxicity following treatment. The results obtained with LINAC-based SRS for recurrent TGN pain appear to be similar to those with GKSR.