

## Treatment Outcomes for Typical and Atypical Trigeminal Neuralgia following Stereotactic Radiosurgery

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## Abstract

**Objectives:** Stereotactic radiosurgery (SRS) is a local treatment option for patients with trigeminal neuralgia (TN). The purposes of this study are to summarize pre-treatment characteristics of TN patients, assess the effectiveness of SRS in providing initial pain relief, and examine the side-effect profiles stemming from treatment from a multi-institutional SRS patient registry.

**Methods:** The RSSearch Patient Registry was screened for both typical and atypical TN cases from July 2007 to June 2015. A descriptive analysis of patient demographics, initial Visual Analog Scores (VAS) for facial pain, and treatment planning was performed. We then examined initial pain relief achieved by analyzing changes in VAS for facial pain following SRS. Potential prognostic factors (such as prescription dose, age, and initial Karnofsky and VAS scores) for initial pain relief were evaluated via univariate logistic regressions as well as the relationship of prescription dose to the likelihood of side effects. Potential prognostic factors relating to sustained pain relief after treatment were evaluated using the Kaplan-Meier method and continuous log-rank analysis.

**Results:** Our analysis included 163 patients; 125 patients with typical TN and 38 patients with atypical TN treated at 16 academic and community-based radiotherapy centers. For typical and atypical cases, the median prescribed doses were 60 Gy (range: 49.00 Gy - 75.00 Gy) and 73.5 Gy (range: 17.78 Gy - 75.00 Gy), respectively. Pre-treatment mean VAS pain scores were 7.47 (95% CI: 7.00 - 7.94) for typical cases and 6.89 (95% CI: 5.93 - 7.86) for atypical cases. Following SRS, mean VAS scores were found to be significantly lower for both typical TN (1.86; 95% CI: 1.33 - 2.38) and atypical TN (1.84; 95% CI: 0.82 - 2.87) following paired t-tests ( $p$ -value < 0.001 for both typical and atypical cases). The vast majority of both typical TN patients (87.2%) and atypical TN patients (86.8%) experienced initial pain relief following SRS. Of prognostic factors examined via logistic regression for initial pain relief, higher initial VAS ( $p$ -value = 0.015) and prescription dose > 60 Gy ( $p$ -value = 0.026) were correlated with a higher likelihood of treatment success for typical and atypical TN patients, respectively. Twenty-three of 28 typical TN patients (82%) reported VAS scores of 1 or fewer at 1-year follow-up, and 8 of 11 patients (72%) also had VAS scores of 1 or less at 2-year follow-up. No potential prognostic factors for long-term pain relief were identified via continuous log-rank analysis. The percentage of typical and atypical patients experiencing side effects after SRS were 18.4% and 10.5%,

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respectively, with the most common being neuropathy (particularly numbness), generalized pain, and nausea. Prescription dose > 75 Gy was not found to be a predictor of side-effect incidence in typical cases following logistic regression (p-value = 0.287). However, all atypical TN patients receiving a dose > 75 Gy reported treatment-related side-effects whereas none were noted in those receiving dose < 75 Gy.

Conclusions: SRS is a feasible and effective treatment option for typical and atypical TN patients for whom previous medications have proven ineffective at pain control. Initial pain relief following SRS was achieved in a vast majority of both typical and atypical TN patients with associated side effects observed in less than 20% of all patients examined.