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## Abstract

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## A Case-Control Study of Gamma Knife Stereotactic Radiosurgery for Multiple Sclerosis Associated Trigeminal Neuralgia

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## Abstract

### Objectives:

The use of Gamma Knife radiosurgery (GKRS) in the management of trigeminal neuralgia (TN) is well established, but patients with multiple sclerosis associated trigeminal neuralgia (MS-TN) historically experience suboptimal outcomes. The objective of this study was to compare outcomes in patients who underwent GKRS for MS-TN to those who underwent GKRS for classical/idiopathic TN.

### Methods:

A retrospective, case-control study was performed of patients who underwent GKRS for MS-TN between 2001 and 2022. Cases were randomly matched 1:1 to controls of the same age. The final cohort included 56 patients (28 cases and 28 controls).

### Results:

Cranial nerve V diameters were measured, and the mean difference in size between the affected and unaffected side were not statistically different when comparing cases and controls (-10.3mm vs -9.8mm,  $t=0.1$ ,  $p=0.9$ ). There was a neurovascular conflict present in 84.6% of cases and 9.23% of controls. The target for GKRS was cranial nerve V in 89.2% of patients with MS-TN and 33.3% of control cases. Post-treatment BNI scores did not depend on the presence of conflict or not, or the location of the shot for treatment (conflict v nerve).

BNI scores were divided into categories, including “no pain, with or without medication,” “some pain, controlled with or without medication,” and “poorly controlled pain”. There was no statistically significant difference in final BNI score category when comparing patients with MS-TN and controls,  $\chi^2=2.8$ ,  $p=0.24$ .

Pain score categories were further dichotomized into “no pain / some pain (with or without medication)” and “poorly controlled pain”. After GKRS, there was “no pain / some pain (with or without medication)” in 78.57% of patients with MS-TN, and 66.67% of controls. When analyzing MS-TN cases alone, 10 patients (35.7%) required two Gamma Knife treatments for recurrent pain, and 2 patients (7%) required three treatments. There was no difference in pain control between groups receiving >1 or 1 GKRS (“no pain / some pain (with or without medication)” in 80% v 77.8%, respectively) (“poorly controlled pain” in 20% v 22.2%, respectively).

Pain change after GKRS was categorized as “pain reduced,” “no change,” or “worse than before treatment”. There was no difference in pain change category when comparing patients with MS-TN and controls,  $\chi^2=0.04$ ,  $p=0.36$ .

### Conclusion(s):

It is known that GKRS provides a durable benefit for patients with trigeminal neuralgia. This data shows that in the setting of multiple sclerosis associated trigeminal neuralgia, GKRS provides similar improvements in pain when compared to patients with classical trigeminal neuralgia. Further, when necessary, additional Gamma Knife radiosurgery treatments for trigeminal neuralgia in patients with multiple sclerosis can provide improvements in pain.

