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# Long-term outcomes of Gamma Knife radiosurgery for classic trigeminal neuralgia: implications of treatment and critical review of the literature

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## Object

Few long-term studies of Gamma Knife surgery (GKS) for trigeminal neuralgia (TN) exist. The authors report their long-term experience with the use of GKS in a previously reported cohort of patients with TN that has now been followed since 1996.

## Methods

One hundred twelve patients with TN were treated with GKS at the University of Maryland between June 1996 and July 2001. Of these, 67% had no invasive operations for TN prior to GKS, 13% had 1, 4% had 2, and 16% had  $\geq 3$ . The right side was affected in 56% of cases, predominantly involving V2 (26%), V3 (24%), or a combination of both (18%) branches. The median age at diagnosis was 56 years, and median

age at GKS was 64 years. The median prescription dose of 75 Gy (range 70–80 Gy) was delivered to the involved trigeminal nerve root entry zone. The authors assessed the degree of pain before and after GKS by using the Barrow Neurological Institute (BNI) pain scale.

## Results

In total, 102 patients took the survey at least once, for a response rate of 91%. Although not found to alter the conclusions of this study, 7 cases of atypical TN were found and these patients were removed, for a total of 95 cases herein analyzed. The median follow-up was 5.6 years (range 13–115 months). Before GKS, 88% of patients categorized their pain as BNI IV or V (inadequate control or severe pain on medication), whereas the remainder described their pain as BNI III (some pain, but controlled on medication).

After GKS, 64% reported a BNI score of I (no pain, no medications), 5% had BNI II (no pain, still on medication), 12% had BNI III, and 19% reported a BNI score of IV or V. The median time to response was 2 weeks (range 0–12 weeks) and the median response duration was 32 months (range 0–112 months). Eighty-one percent reported initial pain relief, and actuarial rates of freedom from treatment failure at 1, 3, 5, and 7 years were 60, 41, 34, and 22%, respectively. Response duration was significantly better for those who had no prior invasive treatment versus those in whom a previous surgical intervention had failed (32 vs 21 months,  $p < 0.02$ ). New bothersome facial numbness was reported in 6% of cases.

## Conclusions

This study represents one of the longest reported median follow-up periods and actuarial results for a cohort of patients with classic TN treated with GKS. Although GKS achieves excellent rates of initial pain relief, these results suggest a steady rate of late failure, particularly among patients who had undergone prior invasive surgical treatment. Despite a higher than expected recurrence rate, GKS remains a viable treatment option, particularly for patients who have had no prior invasive procedures. Patients with recurrences can still be offered salvage therapy with either repeat GKS, microvascular decompression, or rhizotomy.

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