

Ronald Tasker Award: Retreatment of Medically Refractory Trigeminal Neuralgia

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INTRODUCTION

Multiple modalities have been adapted to treat medically refractory trigeminal neuralgia (TN). Until recently, the preferred treatment modality was microvascular decompression (MVD),⁹ especially if a vessel was thought to be abutting the trigeminal nerve entry zone. Less-invasive techniques have since been developed. Percutaneous ablation is one technique that uses radiofrequency (RF), pressure, or chemolysis to provide instantaneous relief by lesioning the nerve. Even less invasive is radiosurgery (RS), which uses stereotaxy to lesion the nerve.

The degree of invasiveness is important, as is the treatment efficacy. MVD was the first treatment to be rigorously tested. The results showed a significant reduction of pain in four of five patients.^{2,7} Conversely, 20 to 30% of patients have persistent TN pain and require retreatment.^{1,2,4} Recurrent symptoms typically surface after 1.9 years,² thus, the length of follow-up in published studies is very important. Refractory or recurrent TN is also seen with other treatment modalities.^{3,6,11,13,14}

At this time, there have been no prospective randomized controlled studies comparing the different treatment modalities for TN with respect to effectiveness. In this chapter, we evaluated patients with idiopathic TN who were prospectively entered into our University of California, San Francisco (UCSF) TN Database and required retreatment after MVD, RS, or RF. We compare the effectiveness of each treatment modality.

PATIENTS AND METHODS

Our prospective database of 209 patients who underwent neurosurgical treatment of TN was retrospectively analyzed after permission was granted by the Committee on Human Research at UCSF. Phone surveys were conducted for patients not seen in our clinic within 3 months of our survey. Since 1997, we identified 32 patients who underwent retreatment for TN. All patients were treated by one neuro-

surgeon (N Barbaro). Patients were excluded if they had undergone previous treatment at another institution. Patients were also excluded if they were found to have a concomitant diagnosis of multiple sclerosis, because these patients are thought to have a different underlying pathophysiology.⁵

The database was reviewed for demographic information, clinical presentation, treatment modalities, time of treatments, and need for retreatment. Outcomes were assessed first by the need for retreatment; second, by the pain relief after retreatment; and third, by the need for medication after retreatment.

Comparisons of preoperative patient characteristics between patients who did or did not require retreatment were performed using analysis of variance and Fisher's Exact Test. Similarly, comparisons were carried out between the three treatment modalities. A *P* value less than 0.05 was considered significant.

RESULTS

Thirty-two of 209 patients were retreated for TN. The retreated and non-retreated patients did not differ significantly. The average duration of preoperative symptoms was similar for retreated and non-retreated patients (*P* = 0.278). There was not a difference in age at treatment (*P* = 0.868) or sex (*P* = 0.376). However, the duration of follow-up was significantly greater for patients requiring retreatment versus those who did not, 111.9 and 51.9 months, respectively (*P* < 0.0001) (*Table 36.1*).

The initial treatment for the 209 patients in our database was MVD with or without rhizotomy in 93 patients, RF in 12 patients, and RS in 104 patients. Although there was no significant difference between patients who did or did not require retreatment, there was a significant difference in age at initial treatment between the three treatment modalities (MVD, 58.0 ± 13.8 yr; RF, 72.8 ± 10.2 yr; and RS, 71.7 ± 12.9 yr; *P* < 0.0001). This reflects the effect of age and, more importantly, medical comorbidities in the choice of a treatment modality. Yet there was no difference with respect to the duration of preoperative symptoms (*P* = 0.401) or sex (*P* = 0.586). Importantly, the duration of follow-up between

TABLE 36.1. Comparison of preoperative variables for patients who did or did not require retreatment

	Retreatment		P value
	No	Yes	
Age at treatment (yr)	65.2	69.1	0.868
Duration of symptoms (mo)	93.9	104.1	0.278
Female (%)	67.5	59.4	0.376
Duration of follow-up (mo)	51.9	111.9	0.0001

treatment modalities was not different ($P = 0.233$) (Table 36.2).

Fewer retreatments were needed in patients treated with RS compared with MVD or RF ($P = 0.001$) (Table 36.3). Eighteen (19.4%) out of 93 patients who had undergone previous MVD required retreatment. Five (41.6%) of 12 patients who initially underwent treatment with RF were retreated. Nine (8.7%) of 104 patients initially treated with RS required retreatment (Table 36.3).

Kaplan-Meier curves comparing rates of retreatment for each initial surgical treatment (MVD with or without partial rhizotomy, RF, and RS) were plotted over time from initial treatment (Fig. 36.1). RS required the fewest retreatments overall. The Kaplan-Meier curve also shows that the patients initially treated with RS and requiring retreatment mostly recur within 40 months or less. In the MVD patients requiring retreatment, there was a group of patients who presented with recurrent symptoms after 60 months.

DISCUSSION

Multiple modalities are available for surgical treatment of medically refractory TN. The selection of a particular treatment is based on a variety of variables, including age, medical condition of the patient, suspicion of vascular compression of the trigeminal nerve root, and patient preference. Similar rates of efficacy have been reported for MVD, RS, and RF, yet there have been no randomized controlled studies to compare these treatments.

TABLE 36.2. Comparison of preoperative variables for each treatment modality

	Initial treatment			P value
	MVD	RF	RS	
Age at treatment (yr)	58.1	72.8	71.7	0.0001
Duration of symptoms (mo)	95.6	140.0	111.6	0.401
Female (%)	63.1	77.7	68.1	0.586
Duration of follow-up (mo)	70.1	86.1	50.6	0.233

TABLE 36.3. Comparison of retreatment rates

	Retreatment (%)	P value
		0.001
MVD	19.4	
RF	41.6	
RS	8.7	

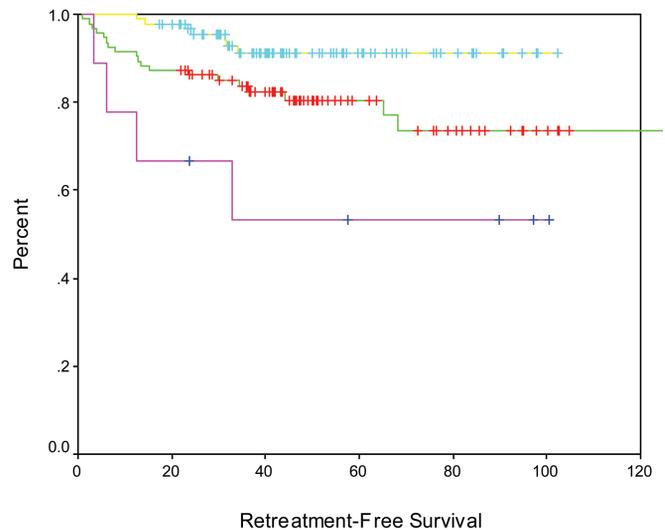


FIGURE 36.1 Kaplan-Meier curves for of retreatment-free survival for patients undergoing an initial treatment of RS (blue), MVD (green), and RF (purple).

The treatment of medically refractory TN is not always successful, and patients may require retreatment.^{2,10,12} Recurrent pain occurs in 10 to 30% of patients and occurs in the distribution of initial symptoms 90% of the time.¹² Recurrent symptoms after MVD have been associated with younger age at time of surgery,¹² longer preoperative symptom duration,^{2,8,12} venous compression of the trigeminal root entry zone, and female sex.¹² In our study, when looking at all treatment modalities, we found no significant difference between age at treatment, duration of symptoms, or sex between patients who did or did not require retreatment. This may suggest that these factors are less significant in non-MVD patients, but further analysis is necessary to confirm this.

Importantly, we found that duration of follow-up correlated strongly with need for retreatment. This signifies the importance of long-term follow-up in patient management and inclusion of sufficient follow-up time in studies is necessary to properly evaluate the efficacy of treatments. Others may have found younger age at time of MVD diagnosis to correlate with retreatment because younger patients have longer potential follow-up time.

The lowest rate of retreatment was seen after RS. Although patients receiving RS were significantly older than patients receiving MVD, they were not older than patients undergoing RF. Furthermore, when looking at all treatment modalities, there was no significant difference in age between patients who did or did not require retreatment. Therefore, it seems unlikely that age explains the increased efficacy of RS, but further study with age-matched controls is needed to exclude this. Duration of symptoms and sex did not differ between the three treatment modalities. Notably, there was no significant difference in follow-up time in the three treatment modalities.

The retreatment rate in our series after MVD (19.4%) is comparable to the 10 to 20% reported in the literature.^{1,2,4} RF had the highest rate of retreatment (41.6%). The small number of patients treated with this modality makes it difficult to compare with MVD or RS. Our rate of retreatment after RF was comparable to the 15 to 50% reported in the literature.^{11,13} Whether this is caused by differences in patient selection or number of treatments performed is unknown. We had the lowest rate of retreatment (8.7%) after RS. Others have reported that approximately 13 to 22% of patients require repeated treatment for recurrent symptoms after RS.^{3,6,14} Although randomized blinded studies with comparable patient selection would be necessary to statistically compare the three treatment modalities, our data suggest that RS may be more efficacious than MVD or RF as an initial treatment for idiopathic TN.

CONCLUSIONS

TN can recur after neurosurgical treatment. Our study demonstrates that the number of patients requiring retreatment is significant. Longer follow-up time correlated with increased incidence of recurrent TN requiring retreatment. RS was associated with decreased need for retreatment when compared with MVD or RF. This difference could not be

accounted for by duration of follow-up, sex, age at treatment, or duration of perioperative symptoms.

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