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Efficacy and Safety of Root Compression of Trigeminal Nerve for Trigeminal Neuralgia without Evidence of Vascular Compression

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Key words
- Trigeminal neuralgia
- Trigeminal root compression

Abbreviations and Acronyms
MVD: Microvascular decompression
MRI: Magnetic resonance imaging
TN: Trigeminal neuralgia

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OBJECTIVE: **Trigeminal neuralgia (TN) surgical treatment with microvascular decompression is highly effective and safe, but for a percentage of patients who undergo this procedure, no vascular compression is found. The purpose of this study was to evaluate the long-term efficacy with trigeminal root compression of the trigeminal nerve in patients with TN refractory to medical treatment who underwent neurosurgical management by a retrosigmoid approach of the cerebellopontine angle and were found to be negative for vascular compression.**

METHODS: **A prospective collection of clinical data on all patients with a diagnosis of idiopathic TN was conducted at our institution. A total of 277 patients with TN were treated by a keyhole retrosigmoid approach for exploration of the cerebellopontine angle between January of 2000 and August of 2010. A total of 44 patients were found to be negative for vascular compression of the trigeminal nerve; all of these patients underwent trigeminal root compression.**

RESULTS: **We found that all patients were pain free after the procedure. There was a 27% relapse in a mean time of 10 months, but 83% of these patients were adequately controlled by medical treatment, and only 17% needed a complementary procedure for pain relief. We also found that 63% of the patients complained of a partial loss of facial sensitivity, but only 1 patient presented with a corneal ulcer. There was a 6.7% rate of significant complications.**

CONCLUSIONS: **We concluded that trigeminal root compression is a safe and effective option for patients with primary TN without vascular compression.**

INTRODUCTION

Numerous studies have demonstrated the effectiveness and durability of microvascular decompression (MVD) for patients with idiopathic trigeminal neuralgia (TN) (3, 4). Barker et al. (3) reviewed the records of 1185 patients who underwent procedures performed by Dr. Peter J. Jannetta between 1972 and 1991 for typical TN. Ten years after the procedure, 64% of the patients were pain free without medications after a single intervention. The annual rate of pain recurrence was reported at 2% at 5 years and 1% at 10 years. Other studies have reported a rate of 63%–86% of patients who were pain and drug free after MVD for TN (5, 18).

Various surgical procedures have been used to treat patients with medically refractory TN including MVD, glycerol rhizotomy, balloon microcompression of the trigeminal ganglion, radiofrequency rhizotomy, and stereotactic radiosurgery (5, 6, 12). Unlike less invasive surgical methods, MVD is the only procedure in which a destructive lesioning of the nerve is not purposefully performed. Consequently, postoperative pain relief after an MVD is independent of the degree of trigeminal nerve injury. This result, combined with the durability of pain relief after MVD when compared with other surgeries, makes it the procedure of choice for patients with medically unresponsive TN who are younger or for older patients in good medical health (1, 12, 25).

The MVD procedure for TN was first reported by Gardner (10) in 1962 and subse-

quently popularized by Jannetta since 1967 (15). It is now clear that a vessel causing vascular compression of trigeminal nerve at the root entry zone is responsible for most of the cases named as idiopathic trigeminal neuralgia (21). However, it is reported that in 3.1%–17% of patients there is no vessel found to cause compression on the nerve, and there is no well-designed surgical treatment for these patients (23, 24).

The purpose of this article is to describe the results of a series of patients with the diagnosis of trigeminal neuralgia refractory to medical treatment. These patients underwent a trigeminal nerve root compression procedure of the affected fifth cranial nerve because of an absence of vascular compression. Compression of trigeminal nerve causes a neuropraxia process in the nerve with a class I neuropathy, according to Sunderland classification, which could explain the therapeutic and side effects of the procedure (11, 16).

METHODS

Between January 2000 and August 2010, a prospective collection of clinical data on all patients with diagnosis of idiopathic TN was conducted at our institution (National Institute of Neurology and Neurosurgery of Mexico).

During this period, 301 patients were found to have TN. Of these patients, 30 where treated with linear accelerator-based radiosurgery; 227 patients had MVD of TN by a typical keyhole retrosigmoid approach; and 44 patients had exploration of cerebellopontine angle root compression of TN, because lack of evidence of vascular compression.

All patients were treated by the senior author (R.R.-G.) with a standard keyhole retrosigmoid approach.

Epidemiologic data, clinical background, operative findings, and clinical outcome were analyzed. Outcome was updated with the analysis of postoperative pain relief, recurrence, medication requirements, and pain-free period. Failed treatment was considered when patient presented again with pain. Follow-up was every 3 months for the first year, every 6 months during the second year, and yearly thereafter. In patients found to have recurrence, the moment of recurrence detection was considered the follow-up end point. Pain control was classified into three grades: 1) pain free without medication requirements; 2) pain relief with medication; 3) painful with medication. Morbidity from surgical treatment was also recorded in the immediate postoperative period and follow-up consultations. We were able to follow-up all patients who underwent the compression procedure.

Results with MVD and trigeminal compression procedure were compared using Fisher's exact test for statistical analysis and a Kaplan-Meier survival curve was made for the first year of follow-up.

Surgical Technique of Trigeminal Root Compression for Trigeminal Neuralgia

The patient was in the park-bench position with the head fixed in a Mayfield-Kees headrest (Shaerer Medical USA, Cincinnati, Ohio, USA), with rotation of 60 degrees and contralateral flexion of 10 degrees. The skin incision was made 2.5 cm behind the retroauricular hairline, 2 cm over and 3 cm below the superior nuchal line. The nuchal fascia was incised in the same direction, and sternocleidomastoid, trapezius, splenius capitis, longissimus capitis, and superior oblique muscles were partially dissected from their attachments, and retracted laterally, exposing the asterion. A "keyhole" burr hole was placed in the projection of the transverse sigmoid sinus junction (i.e., inferior to the superior nuchal line, just behind the ridge delimiting the body of the mastoid bone) (8). Then a craniotomy of 2.5 cm in diameter was completed, and the dura was opened in a U shape, with the base at the angle between sigmoid and transverse sinuses. An intradural dissection leads to the superior cerebellopontine angle cistern. The trigeminal nerve was identified, and dissected from the surrounding arachnoid membranes, looking for an offending vessel.

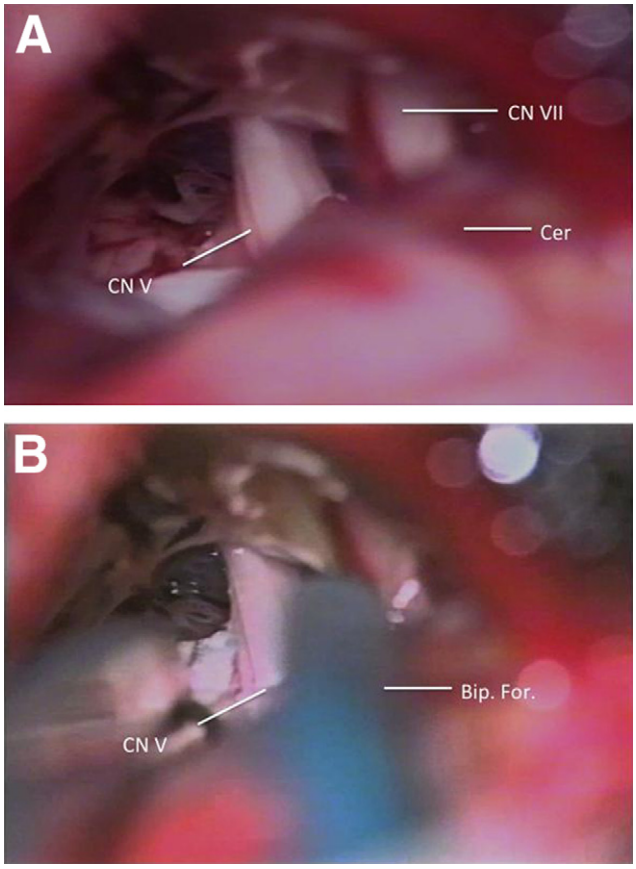

Figure 1. Surgical findings of patients who underwent neuropraxia procedure. (**A**) Absence of vascular compression on the root entry zone of the trigeminal nerve. (**B**) The neuropraxia procedure done by gentle compression of the trigeminal nerve root with bipolar forceps on its cisternal course. No coagulation on the nerve or rhizotomy is done. Cer, cerebellum; CN V, fifth cranial nerve; CN VII, seventh cranial nerve; Bip. For., bipolar forceps.