Long-Term Efficacy of Nerve Combing for Patients with Trigeminal Neuralgia and Failed Prior Microvascular Decompression

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BACKGROUND: **Microvascular decompression (MVD) of the trigeminal nerve is the most effective treatment for trigeminal neuralgia (TN). However, many patients respond poorly to initial MVD. For these patients, redo MVD is commonly done. There has been no research regarding the effectiveness of nerve combing (NC) plus MVD in patients with TN and failed prior MVD. We compared the clinical outcome of NC plus MVD and simple redo MVD in patients with TN and failed prior MVD.**

METHODS: **We performed a retrospective analysis of 148 patients with recurrent or persistent TN symptoms who underwent surgery between January 2007 and December 2015. Simple MVD was performed in 62 patients, and NC plus MVD was performed in 86 patients.**

RESULTS: **For simple MVD, success rates at 1 day, 7 days, 1 month, 3 months, and 1 year after surgery all were approximately 80%. Success rates of NC plus MVD were significantly ($P < 0.05$) higher than success rates of simple MVD, by 17.02%, 18.64%, 16.47%, 17.21%, and 14.80% at 1 day, 7 days, 1 month, 3 months, and 1 year. The incidence rates of facial numbness in the simple MVD group were 48.39%, 45.16%, 36.67%, 16.95%, and 1.75% at 1 day, 7 days, 1 month, 3 months, and 1 year; the incidence rates in the NC plus MVD group were 60.47%, 55.81%, 48.24%, 21.69%, and 3.75% ($P > 0.05$).**

CONCLUSIONS: **In patients with TN who failed prior MVD, NC plus MVD significantly improved the success rate of the operation compared with simple redo MVD. We obtained good short-term and long-term surgical outcomes with NC combined with MVD.**

INTRODUCTION

Trigeminal neuralgia (TN) is a chronic pain syndrome characterized by paroxysmal shock-like, stabbing, recurrent episodes of pain localized in the distribution area of ≥1 branches of the trigeminal nerve.[1] Microvascular decompression (MVD) of the trigeminal nerve, popularized by Jannetta in 1967,[1] has been a highly accepted and effective surgical method for patients with TN.[2,3] The biggest advantage of MVD, which removes the vascular compression of the root entrance of the trigeminal nerve, is maintenance of the normal facial sensitivity with long-term effective pain relief while avoiding facial numbness and discomfort after the procedure. However, some patients obtain only partial pain remission or MVD fails, and the reported annual recurrence rate is 1%–5%.[3-6] How to cure these patients with recurrent or persistent TN symptoms after prior MVD is a challenge.[4]

In this situation, redo MVD is commonly performed; however, this approach has lower success rates and higher complication rates than primary MVD.[7-10] To date, there has been no research published to our knowledge about nerve combing (NC) performed with MVD for these patients. The aim of this study was to compare the effects of NC plus MVD with simple redo MVD in patients with TN and failed prior MVD, determining differences in both the

Key words
- MVD
- Nerve combing
- TN
- Trigeminal neuralgia

Abbreviations and Acronyms
BNI: Barrow Neurological Institute
MVD: Microvascular decompression
NC: Nerve combing
TN: Trigeminal neuralgia

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success rate and the occurrence of facial numbness, the primary side effect of the surgery.

MATERIALS AND METHODS

Patients

This study and the technique of NC were approved by the Xin Hua Hospital Ethics Institutional Committee. Each patient included in the study signed an informed consent. We analyzed the records of 148 patients with TN and failed prior MVD who underwent redo MVD surgery performed by a single surgeon (S.-T.L.) at Xinhua Hospital between January 2007 and December 2015. All patients underwent magnetic resonance imaging before surgery to exclude secondary lesions. Simple redo MVD was performed in 62 patients between January 2007 and December 2010; NC plus MVD was performed in 86 patients between January 2011 and December 2015.

Surgery

All patients underwent MVD of the trigeminal nerve in the lateral decubitus position via a standard retrosigmoid craniotomy and an infraflocculer approach. The trigeminal nerve was fully exposed to identify any new offending vasculature and achieve optimal decompression of the trigeminal nerve. If a new offending vessel could be clearly confirmed, the vessel was shifted off the trigeminal nerve by inserting small pieces of shredded polytetrafluoroethylene (Teflon) felt between the blood vessels and the brainstem or flocculus. If no new offending vessel was found during the operation, the Teflon pad placed in the last operation was replaced by a new Teflon pad. If the Teflon had severe adhesion with surrounding tissue, these Teflon pads were sharply separated. To prevent postoperative adhesion, small pieces of moist gelatin sponge were placed between the Teflon and neural tissue (Figure 1). For NC, the trigeminal nerve itself was longitudinally divided along its fibers, using a special NC knife with a cutting edge of 0.90 mm (Figure 2), into 6–8 bundles from the root entry zone to the petrous bone.

Outcome Assessment

Preoperative and postoperative pain measurements were obtained from the medical records or telephone inquiries based on the Barrow Neurological Institute (BNI) pain intensity scale (Table 1).[11] The categories of pain relief evaluated by this scale were excellent (BNI pain score I), good (BNI pain score I), and poor (BNI pain score III–V). The procedure was considered a success in patients with no or occasional pain, without medications (BNI pain score of I–II). Recurrence was defined as transition from pain-free to good response or from success to failure (BNI pain score ≥III). Patients were specifically asked to rate the effect that facial numbness had on their daily activities. A comprehensive analysis was performed of the surgical outcomes, including complications, at 1 day, 7 days, 1 month, 3 months, and 1 year after surgery.

Statistical Analysis

The analysis was performed by an independent assessor. To analyze the relationships between the patients' clinical features and long-term outcomes, we collected various descriptive

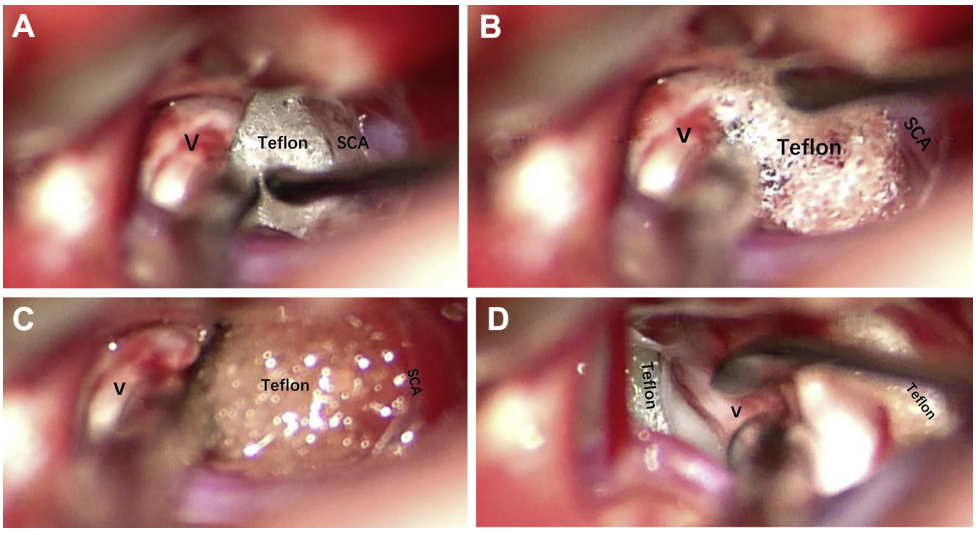

Figure 1. Redo simple microvascular decompression in a patient with trigeminal neuralgia whose first microvascular decompression failed. (**A**) The Teflon pad placed in the original operation was located between the trigeminal nerve and the superior cerebellar artery. (**B**) The Teflon pad placed in the original operation was loosened and removed. (**C** and **D**) A new Teflon pad was placed between the trigeminal nerve and the superior cerebellar artery. V, trigeminal nerve; SCA, superior cerebellar artery.