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CASE REPORT

Pediatric/Craniofacial

Peripheral Neurectomy for Management of Trigeminal Neuralgia Refractory to Multiple Surgical Procedures

Francisco Ferri, MD*
Craig M. Forleiter, MD†
Lisandro Montorfano, MD*
Michael Konstantinidis, MD‡
Hamid Borghei-Razavi, MD§
Andres Mascaro-Pankova, MD†

Summary: Trigeminal Neuralgia (TN) is defined as a recurrent, unilateral, brief, electric shock-like pain and is associated with a significant deterioration in quality of life due to the debilitating nature of the pain. The first line treatment is medical therapy, and surgical treatment is reserved for patients with inadequate pain control or undesirable side effects. Surgical options for treatment may include microvascular decompression (MVD), stereotactic radiosurgery, percutaneous radiofrequency rhizotomy, and percutaneous balloon compression of trigeminal ganglion. MVD is considered the procedure of choice due to its high efficacy and safety profile; however, it carries a recurrence rate of 1%–5% annually and 15%–35% long term. Although re-operative MVD has been reported for recurrent cases, it carries a high risk of complications due to arachnoid adhesions and distorted anatomy. Peripheral neurectomy is a simple, expeditious, low-risk procedure that is well tolerated by patients and can be done even under local anesthesia. We report a case of a 69-year-old man who presented with a debilitating TN in the V1 and V2 territory refractory to MVD, stereotactic radiosurgery, and percutaneous balloon compression of the trigeminal ganglion, who had been treated with neurectomy of the left supraorbital, supratrochlear, and infraorbital nerves, with an excellent outcome at 6 months follow-up. Peripheral neurectomy is an effective alternative for patients with refractory TN who failed multiple surgical interventions. Previous publications have reported an elevated long-term recurrence rate after this procedure, perhaps due to peripheral nerve regeneration or neuroma formation. It is not yet studied whether using nerve conduits may lead to a decrease in recurrence.
(Plast Reconstr Surg Glob Open 2020;8:e3264; doi: 10.1097/GOX.0000000000003264; Published online 23 November 2020.)

Trigeminal neuralgia (TN) causes a severe, unilateral, lancinating, electric-like facial pain. It is the most common neuralgia, with a global incidence of 4–5 cases per 100,000 people and is associated with a tremendous loss of productivity due to the debilitating nature of the pain.[1] Diagnosis of this condition is primarily clinical, although additional workup may include MRI to exclude secondary causes of TN.[1] Medical therapy is the first-line treatment and, when inadequate, surgical treatment may include stereotactic radiosurgery (SRS), percutaneous radiofrequency rhizotomy, percutaneous balloon compression of trigeminal ganglion, and microvascular decompression (MVD).[2] Unfortunately, the recurrence rate of TN after MVD is 1%–5% annually and 15%–35% long term. Similarly, long-term recurrence rates are 5%–32% and 18%–80% after SRS and radiofrequency rhizotomy, respectively.[3]

Peripheral neurectomy is a simple, low-risk, outpatient procedure that can be done on all terminal branches of the trigeminal nerve. Patients with comorbidities that preclude invasive neurosurgical procedures may be prime candidates, as well as patients living in areas where facilities for advanced neurosurgical procedures are not available.[4] We report a case of a debilitating TN refractory to multiple surgical procedures who had been treated with

*From the *Department of General Surgery, Cleveland Clinic Florida, Weston, Fla.; †Department of Plastic and Reconstructive Surgery, Cleveland Clinic Florida, Weston, Fla.; ‡Saint George's University School of Medicine, Grenada, West Indies; and §Department of Neurosurgery, Cleveland Clinic Florida, Weston, Fla.*

Received for publication June 4, 2020; accepted September 29, 2020.

DOI: 10.1097/GOX.0000000000003264

Disclosure: *The authors have no financial interest to declare in relation to the content of this article.*

neurectomy of the left supraorbital, supratrochlear, and infraorbital nerves.

CASE REPORT

We herein report a 69-year-old man who presented with a 2-year history of progressive, debilitating left facial pain with an associated blurry vision. The pain was constant and burning in nature, localized in left V1–V3 territory. He also had superimposed episodes of shooting pain, 10/10 in intensity (numeric rating scale), 5–10 times daily, lasting few seconds, and exacerbated by eating, brushing, and talking. The overall clinical picture was causing him severe disruption to his everyday life. Neurological evaluation and MRI of the brain were normal.

The patient was treated medically for 14 months without improvement and underwent MVD, SRS, and 2 attempts at percutaneous balloon compression of the trigeminal ganglion with partial amelioration of the symptoms in the V2 dermatome and symptomatic resolution in the V3 dermatome. However, the symptoms in the V1 distribution never improved, requiring the intake of oxycodone daily. A V1 nerve block was performed with transient improvement, which suggested that a surgical neurectomy could provide a lasting relief.

In the operating room, an interdisciplinary team of neurosurgery and plastic surgery approached the nerves via a supraorbital incision. The supraorbital and supratrochlear nerves were identified (Fig. 1), freed from their attachments and transected sharply, approximately 4 mm from where they exited their respective foramina. The proximal ends of both nerves were coapted to a nerve conduit to prevent neuroma formation (Fig. 2). The distal portion of both nerves were clamped with a hemostat and avulsed in a steady rotational motion (Figs. 3 and 4).

At the 1-month follow-up, his debilitating pain in the V1 distribution had completely resolved and he stopped taking oxycodone. He reported expected numbness in the left forehead with complete resolution of the ipsilateral blurry vision. His left eyebrow incision healed appropriately without an obvious scar. At the 3-month follow-up, the patient requested to undergo a neurectomy of the infraorbital nerve, which had recently recurred once again in the V2 distribution. It was performed in a similar fashion using a transbuccal approach and coapting the proximal end of the nerve to a nerve conduit. At the 6-month follow-up from the V1 neurectomy and 3-month follow-up from the V2 neurectomy, the patient reported complete resolution of his supraorbital and infraorbital shooting pain. He described expected numbness in the V1–V2 territory, but this does not interfere with shaving. He is currently off pain medications and overall, he is extremely satisfied with the outcome.

DISCUSSION

TN is a clinical neurological syndrome characterized by severe paroxysmal attacks of intense facial pain, which has a tremendous impact on quality of life.[5] The incredible psychological stress causes many of these patients to contemplate suicide.[6] MVD has been described as the

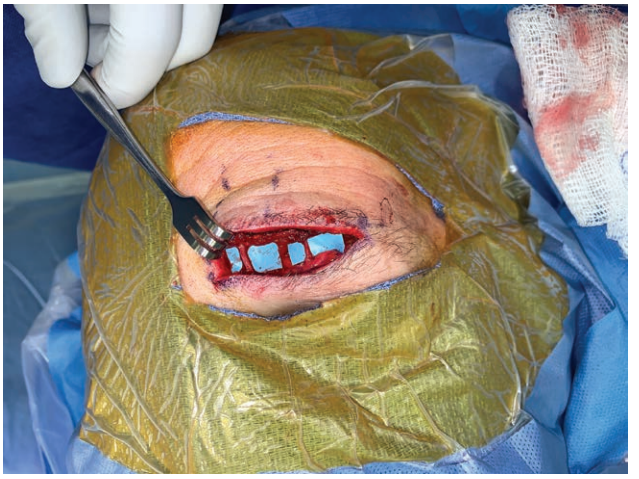

Fig. 1. Identification of supraorbital and supratrochlear nerves.

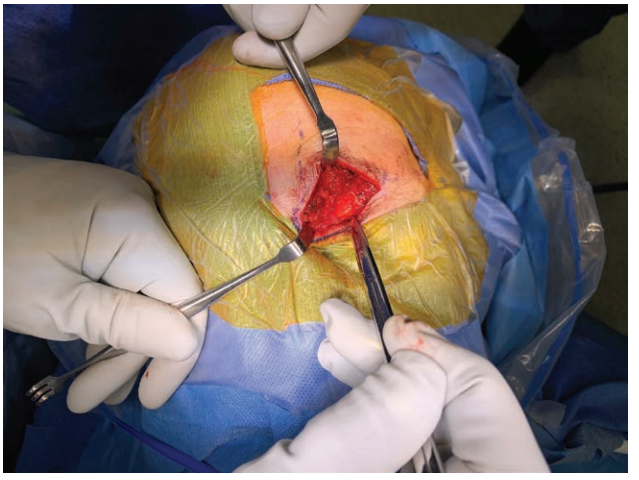

Fig. 2. The proximal ends of the nerves were coapted to a nerve conduit to prevent neuroma formation.

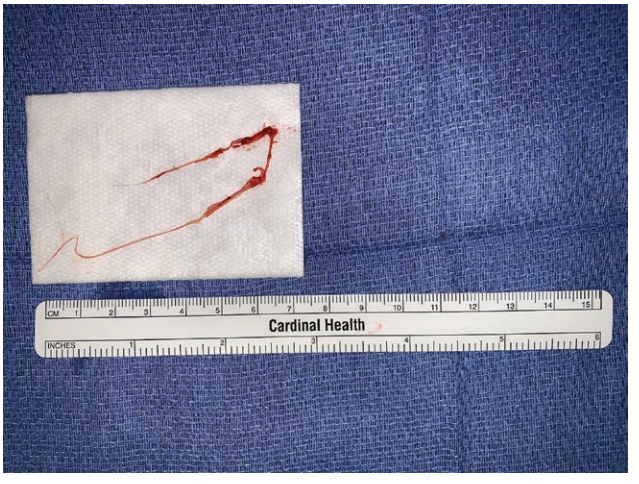

Fig. 3. Supraorbital nerve ex vivo.

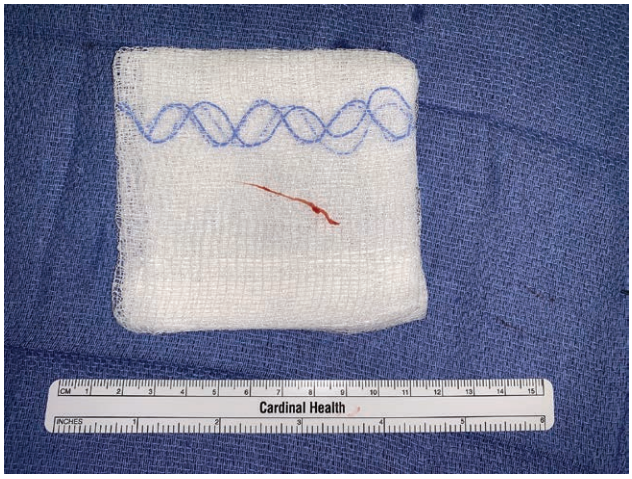

Fig. 4. Supratrochlear nerve ex vivo.

most effective surgical method for managing the symptoms of patients with TN. However, incomplete relief and recurrence remains a big problem, with an annual incidence ranging from 1% to 5%.[7] There have been reports of reoperation after MVD, but surgical re-interventions carry a high risk of complications due to arachnoid adhesions and distorted anatomy.[5]

Surgical neurectomy of the peripheral branches of the trigeminal nerve is the simplest, most economical, and safest surgical treatment for TN.[8] It is one of the oldest and least invasive surgical options, is well tolerated by patients, and can be done under local anesthesia, if necessary.[8] Most of the studies done for peripheral neurectomy were published 20–50 years ago, demonstrating an average pain relief period of 24–33 months after surgery, with follow-up periods up to 9 years.[9]

In a literature review performed by Yuvaraj et al,[10] the use of peripheral neurectomy alone in the management of classic TN was observed in 10 studies. Most of these studies lacked uniformity on many criteria, including diagnosis, pharmacologic therapy, and preoperative investigations. The immediate outcomes of peripheral neurectomies are usually excellent, but long-term efficacy in classic TN is variable.[10] Regarding the follow-up after peripheral neurectomy, Chandan et al.[9] suggest postoperative day 2, 7, 30, and then every 6 months for up to 3 years.

Although some central surgical procedures (ie, MVD and SRS) have been found to provide better results in patients with classic TN, re-operations carry a high risk of complications. A peripheral neurectomy should be considered a safe and effective therapeutic option in patients with TN refractory to previous surgical intervention, especially in patients with successful response to a peripheral nerve block. Historically, patients did report long-term recurrence after surgical neurectomy, perhaps due to peripheral nerve regeneration or neuroma formation. It is not yet studied whether using nerve conduits meant to decrease neuroma formation may lead to a decrease in recurrence. Although beyond the scope of this case report, that is certainly an interesting area of investigation.

Our study has several limitations, such as the report of a single case and the short follow-up period. Further studies with a larger sample size and a longer follow-up period are warranted.

CONCLUSIONS

Peripheral neurectomy is a simple, affordable, safe, and effective alternative in patients with TN refractory to multiple previous surgical procedures in the short term. There are no available data regarding the use of nerve conduits for recurrence rate reduction after peripheral neurectomy. A longer follow-up period and further clinical investigation are required to confirm its long-term efficacy.

Francisco Ferri, MD
Department of General Surgery
Cleveland Clinic Florida
2950 Cleveland Clinic Blvd
Weston, FL 33331
E-mail: ferriaf@ccf.org

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