Are peripheral neurectomies of value in the treatment of trigeminal neuralgia? An analysis of new cases and cases involving previous radiofrequency gasserian thermocoagulation

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The indications, advantages, complications, and benefits of peripheral neurectomy in patients with trigeminal neuralgia were studied in detail in 40 patients treated between 1982 and 1991. Twenty-eight patients had previously received radiofrequency thermocoagulation; peripheral neurectomy was performed for pain recurrence. These patients had excellent or good pain relief for at least 5 years postsurgery. Of the 12 patients who had peripheral neurectomy as their only procedure, seven had an excellent result and five had a good result. Five of the patients had recurrence of pain after 2 years but responded well to a second neurectomy. Elderly patients who experienced pain in the first and second divisions of the trigeminal distributions were the best candidates. Peripheral neurectomy is an effective, safe procedure for elderly patients who suffer from trigeminal neuralgia and have a limited life span.

KEY WORDS • trigeminal neuralgia • supra- and infraorbital neurectomy • indications • radiofrequency thermocoagulation

Destructive procedures on the various peripheral branches of the trigeminal nerve, such as supraorbital and infraorbital neurectomy, have long been known to play a beneficial role in the management of trigeminal neuralgia. These peripheral procedures are not commonly used presently primarily because of a high incidence of pain recurrence. Also, they have been superseded by more complex procedures such as microvascular decompression and radiofrequency thermocoagulation. However, we believe that there is a subgroup of patients with trigeminal neuralgia who benefit from peripheral neurectomies. We have reviewed our experience with 40 patients treated in this manner; their cases form the basis of this report.

Clinical Material and Methods

On our service between 1982 and 1991, 330 patients with trigeminal neuralgia were treated by various surgical procedures. Radiofrequency thermocoagulation was our preferred method of treatment for the majority of these patients. Fifty-seven patients (17%) underwent peripheral neurectomy. In this group 47 patients had typical trigeminal neuralgia and 10 had atypical trigeminal neuralgia.

We define "typical trigeminal neuralgia" as including the following features: 1) lancinating pain; 2) pain limited to one or two distributions of the trigeminal nerve on one side; 3) the presence of a trigger point; and 4) pain relieved by a course of carbamazepine, at least initially. We use the term "atypical trigeminal neuralgia" to describe patients with unilateral facial pain localized in one or more divisions of the trigeminal nerve without a clearcut lancinating feature and often without definite relief of the pain in response to carbamazepine treatment. This entity is occasionally present in a small group of patients with demyelinating disease or a mass or vascular anomaly in the cerebellopontine angle. In the present series, those conditions were eliminated by history, examination, and imaging studies. Atypical trigeminal neuralgia must be differentiated from the more common atypical facial pain syndromes for which no surgical treatment is recommended.

Detailed information and follow-up review were available in 40 of the 47 patients with typical trigeminal neuralgia. This group forms the basis of this report. A retrospective analysis of the patients’ charts was performed by the authors. Follow-up information was gathered from both charts and direct patient interviews.

Before being considered for surgical treatment, all patients had been placed on maximum pharmacological therapy, especially a course of carbamazepine. All the patients had become refractory to carbamazepine or had clinical and/or laboratory side effects sufficient to mandate drug cessation. All patients were investigated pre-
operatively with computerized tomography scanning or magnetic resonance imaging, which revealed no underlying structural abnormalities such as tumors. No patient in this series had previously undergone microvascular decompression. However, 28 (70%) of the 40 patients had undergone previous radiofrequency thermocoagulation 2 or more years prior to the neurectomy. These 28 patients had recurrence of pain in the same distribution, which again was unresponsive to carbamazepine treatment. They were offered peripheral neurectomy because they were reluctant to undergo an additional radiofrequency procedure, or because we thought that they were unable to cooperate sufficiently under disassociative anesthesia for a precise radiofrequency lesion to be constructed. The follow-up period covered by this study ranged from a minimum of 2 to more than 10 years.

Surgical Technique

The techniques of peripheral neurectomies of trigeminal nerve branches are described in detail elsewhere. Briefly, supraorbital neurectomy is performed through an incision in the eyebrow. All branches of the supraorbital and supratrochlear nerves are divided and avulsed under magnification. It is important to trace the parent trunk of these nerves proximally into the periorbital fat and avulse them deep in the orbit to reduce the incidence of recurrence. Infraorbital neurectomy is performed via an intraoral incision in the labiogingival sulcus. The infraorbital nerve is avulsed well into the infraorbital foramen; after cauterizing the remnant of the nerve deep in the foramen, the foramen itself is packed with bone wax. Sectioning of the inferior alveolar nerve is accomplished within the inferior alveolar canal just proximal to the juncture of the horizontal and vertical rami of the mandible. The canal is exposed under magnification through a curvilinear incision just posterior to the angle of the mandible. Masseter muscle fibers are divided and retracted with care to avoid the parotid gland. A small burr hole in the mandibular ramus is made directly over the inferior dental canal, and the nerve is identified, coagulated, and cut.

Results

Patient Characteristics

There were 22 men and 18 women in the study group of 40 patients. The age distribution was as follows: 80 to 94 years, 16 patients; 70 to 79 years, 10 patients; 60 to 69 years, four patients; 50 to 59 years, five patients; and less than 50 years of age, five patients. Trigeminal neuralgia involved the right side in 22 patients and the left side in 16 patients. Two patients developed bilateral trigeminal neuralgia during the period between the first and second operation. Pain was distributed in the ophthalmic division (first division) in five patients, maxillary division (second division) in 14 patients, mandibular division (third division) in one patient, divisions one and two in 17 patients, and divisions two and three in three patients. The duration of the condition was less than 1 year in 10 patients, less than 2 years in four patients, less than 5 years in 14 patients, and less than 10 years in 12 patients. The procedures performed included 40 infraorbital neurectomies (including repeated neurectomies), 28 supraorbital and supratrochlear neurectomies, and one inferior alveolar neurectomy.

Twenty-eight patients had undergone radiofrequency thermocoagulation performed by the authors previously; in those cases the peripheral neurectomy was performed for pain recurrence.

The results of the treatment were classified into three groups as excellent, good, and poor pain relief. Excellent pain relief is defined as total loss of pain without requiring a course of carbamazepine; good pain relief as loss of pain requiring modest amounts of carbamazepine; and poor pain relief as no significant relief even with carbamazepine treatment. Twelve of the 40 patients underwent peripheral neurectomy as an initial procedure for treatment of trigeminal neuralgia. Of these, seven patients had excellent pain relief until their deaths, which resulted from other causes. Five patients had good pain relief. The subgroup of 28 patients who had undergone a prior radiofrequency gangliolysis followed later by peripheral neurectomy for recurrence of pain had the best outcome. Twenty-two patients (79%) in this group had excellent pain relief lasting 5 years or more. The remaining six had a good result. Six patients of 40 experienced a recurrence of pain after a mean follow-up period of 24 months and required an additional neurectomy. All these patients had an excellent result with no further recurrences after a mean follow-up period of 24 months. No patient has required peripheral neurectomy more than twice. The time interval between the initial thermocoagulation and the subsequent peripheral neurectomy was 6 months to 5 years.

Discussion

Almost any procedure for the treatment of trigeminal neuralgia is associated with a certain incidence of pain recurrence, side effects, or complications. Even drug treatment, especially a course of carbamazepine, results in decreased alertness, psychomotor retardation, bone marrow depression, and ataxia in many elderly patients. Our own preference for the initial treatment of drug-resistant trigeminal neuralgia is radiofrequency thermocoagulation. The 12 patients in this group who underwent peripheral neurectomy as their initial procedure were either very elderly, debilitated patients; individuals with severe language problems or cognitive dysfunction; or those who elected to have peripheral neurectomy after a thorough discussion of different treatment options. Prior to the procedure, all patients and their families were informed that peripheral neurectomy is usually associated with a high incidence of pain recurrence consequent to nerve regeneration in approximately 18 months to 3 years.

In the group of 12 patients who had peripheral neurectomy alone, seven patients had excellent pain relief until death occurred 6 months to 3 years later from other causes. Another five patients were initially quite comfortable after the procedure, only to experience sufficient recurrence of pain within 2 years postsurgery to require a second neurectomy. When the neurectomy was repeated all these patients again had excellent or good pain relief.

The subgroup of 28 patients who initially underwent ra-
Peripheral neurectomy

diofrequency thermocoagulation and later peripheral neurectomy were all found to have excellent or good pain relief for 5 or more years. This was somewhat surprising and we cannot pinpoint the exact underlying mechanism. One possible hypothesis is that axonal regrowth after a neurectomy, which is usually the cause for pain recurrence, is impaired or delayed in these patients due to the presence of the radiofrequency lesion in the gasserian ganglion. Despite excellent results to date, it is probable that some of these patients will again experience pain recurrence if they live enough years.

There are several advantages of peripheral neurectomy procedures. They are easy to perform, well tolerated by elderly, debilitated, or cognitively impaired patients, and can often be performed while the patient is under local anesthesia. Corneal sensation is left intact in patients with first division trigeminal neuralgia, and the patient can be sent home either the day of the operation or 1 day later. Assuming the diagnosis is correct, pain relief is assured and occurs immediately following the operative procedure or very soon thereafter. There are no major complications of these procedures other than some facial swelling and bruising in the early postoperative period and the expected loss of sensation in the appropriate distribution of the trigeminal nerve. Two patients in this series complained of dysesthesias; they preferred this inconvenience to the pain they had previously experienced.

Elderly patients, patients with first and second division trigeminal neuralgia, and those with recurrence of pain following a radiofrequency procedure are the best candidates for a peripheral neurectomy procedure. Based on our findings, one-third of patients undergoing peripheral neurectomy alone will have recurrence of pain sometime after 2 years, but even these patients respond favorably to a repeat neurectomy if necessary.4 We always inform patients about the possibility of recurrence before the procedure and have not had problems with elderly patients choosing this option. We have not subjected our results to statistical analysis because of the small number of patients, especially in the subgroups. However, we still believe that the results are of interest in the management of this difficult disease.

It is fair to ask why it is necessary or desirable to perform open peripheral neurectomies when the supraorbital and infraorbital nerves can be destroyed in the same anatomical location using percutaneous injections of alcohol or a comparable neurotoxin. It is our contention that the risks of the open procedure are so slight that they are far outweighed by the advantages of visualizing all appropriate nerve branches under magnification and dividing them as far proximally as possible, thus greatly reducing the incidence of recurrence. For alcohol injection to produce excellent long-lasting anesthesia, it must be injected directly into the nerve bundle. Perineural injection of alcohol or similar agents may produce only partial sensory loss, leaving persistent pain as well as complications such as soft-tissue necrosis. In addition, the supraorbital and infraorbital foramina are not always easy to identify, even with radiographic control. This is especially true in instances in which a previous peripheral neurectomy has been performed followed by bone remodeling and foraminal atresia.

We are aware that for many of our patients who underwent peripheral neurectomy, other practitioners would recommend alternative procedures such as intracisternal glycerol administration and/or balloon compression of the trigeminal ganglion. We have no quarrel with these approaches; however, in our experience we found that although the glycerol procedure was occasionally successful, it proved to be so capricious that we are loathe to recommend it as a definitive therapeutic option.

Conclusions

Peripheral neurectomy provides excellent pain relief for many elderly patients with trigeminal neuralgia. Those with division one trigeminal neuralgia can be offered relief of pain without losing corneal sensation. Patients who have had a previous radiofrequency thermocoagulation that resulted in recurrence of pain in the same distribution are particularly good candidates for peripheral neurectomy as the second procedure. Peripheral neurectomy alone is associated with a 40% recurrence of pain over a 2-year period; however, even these patients respond well to a second neurectomy.

References


Manuscript received November 29, 1995.
Accepted in final form February 26, 1996.
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