

Original Article

The treatment of chronic incisional pain and headache after retromastoid craniectomy

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Abstract

Background: A seldom emphasized complication of retromastoid craniectomy is chronic postcraniectomy incisional pain or headache. Although hypotheses have been proposed to explain this problem, there have been few attempts to treat patients in a delayed fashion. The results of postoperative treatments for chronic postretromastoid craniectomy pain and their rationales are discussed in a preliminary number of patients.

Methods: Eight patients with chronic postretromastoid craniectomy pain who did not have placement of a cranioplasty at their initial operation underwent placement of a methylmethacrylate cranioplasty as a separate procedure. Three additional patients who did have a cranioplasty, but who had chronic pain underwent selective blocking of the ipsilateral second cervical nerve. If blocks resulted in relief of pain they then underwent a dorsal rhizotomy or ganglionectomy.

Results: Two of the eight patients undergoing a cranioplasty had excellent results and one partial improvement while five failed at last follow-up. The three patients with a cranioplasty representing four symptomatic sides underwent a dorsal rhizotomy or ganglionectomy after a positive selective cervical nerve blocking. All four operations resulted in excellent relief with one side failing 3 months postop after a motor vehicle accident.

Conclusion: Chronic headache or incisional pain after retromastoid craniectomy remains a significant complication of the operation. The patients presented here support the contention that multiple etiologies may play a role. Pain caused by scalp to dura adhesions can be treated effectively with a simple cranioplasty while occipital nerve injury can be identified using selective second cervical nerve blocking, and long-term relief obtained with a dorsal rhizotomy or ganglionectomy.

Key Words: Cerebellopontine angle, Cranioplasty, Dorsal rhizotomy, Neurolysis, Pain, Retromastoid craniectomy

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INTRODUCTION

The retromastoid craniectomy approach to the

cerebellopontine angle is a preferred operation by many surgeons for the treatment of cerebellopontine angle tumors, such as acoustic neuromas and for microvascular

decompression of the cranial nerves. A criticism of this operation, however, has been the potential complication of persistent postoperative incisional discomfort or “headache.” The incidence of this potentially disabling incisional pain or headache has been reported between 9% and 64%.^[1,4,5,7,11,14,15,17-19,24,26]

The etiology of this discomfort has been blamed on scalp to dura adhesions, occipital nerve injury, neck muscle spasms, leakage of cerebrospinal fluid, and aseptic meningitis from bone dust.^[1,3-5,7-10,14,16-20,22-25] The author attempted to treat chronic postretromastoid craniectomy incisional pain and headache refractory to conservative care with treatments designed to address potential causes.

MATERIALS AND METHODS

Eleven patients presented to the author with complaints of chronic postretromastoid craniectomy pain. Persistent pain was noted in the suboccipital region in the area of the linear postauricular incision. Occasional radiation into the ipsilateral frontal and/or temporal regions was described by some patients suggestive of occipital neuralgia. The term “headache” was often used by the patients when asked to qualify their discomfort. The pain duration ranged from 9 months to 12 years. All patients had failed aggressive conservative measures, such as medications and physical therapy and all felt that their pain interfered significantly with their quality of life.

Eight of the 11 patients had undergone retromastoid craniectomy with no formal cranioplasty at the time of initial operation. Five patients had excision of an acoustic neuroma, and 3 underwent microvascular decompression. Two of the microvascular decompression patients had a reoperation on the affected side and one acoustic patient had an additional ipsilateral translabyrinthine vestibular nerve section. The microvascular decompression patients did have some bone chips replaced in the defect in the hope that there would be some new bone formation. All of the patients, however, had significant craniectomy bony defects as documented by preoperative skull films and computed tomography.

These 8 patients were offered and agreed to undergo placement of a methylmethacrylate cranioplasty filling in completely the bony defect in the hope of relieving pain produced by scalp to dura adhesions. The duration of symptoms in this group ranged between 12 months and 12 years (mean 6 years).

Three additional patients presented with complaints similar to those of the first 8 patients; however, these 3 patients did have an effective methylmethacrylate cranioplasty performed at the time of initial operation. One patient had excision of a small acoustic neuroma, one multiple ipsilateral microvascular decompressions, and the third patient underwent bilateral microvascular

decompression operations, developing chronic pain after each for a total of 4 symptomatic sides. The duration of symptoms in this group of 4 sides ranged from 9 to 52 months, (mean, 24 months).

As these patients should not have had dura to scalp adhesions because of the cranioplasty, it was postulated that their pain might have been caused by injury to one or more branches of the occipital nerves. Therefore, each patient (four sides), underwent selective percutaneous blocking of the ipsilateral second cervical nerve using fluoroscopic guidance. After appropriate preparation and local anesthetic skin injection, a 22-gauge spinal needle was inserted a centimeter caudal and lateral to the spinous process of C2. The needle was advanced under both AP and lateral fluoroscopic guidance to lie just caudal and anterior to the ring of C1 in the sagittal plane and in the lateral third of the C1–2 joint in the coronal plane. After negative aspiration, a combination of 1% xylocaine, 0.25% marcaine, and 20mg of depomedrol was injected.

A block was considered a success if the patient experienced the expected hypalgesia in a C2 dermatomal distribution and reported greater than 70% relief of their typical pain for at least 2–3 h. In order to be considered a surgical candidate, a patient had to have a good result in at least 2 out of 3 blocks to avoid false positives. All 4 sides tested positively to selective blocking.

These 3 patients with four sides underwent sensory nerve sectioning utilizing a technique described by others.^[2,6] Three C1–2 laminectomies with intradural dorsal sensory root rhizotomies of C1–3 were performed. The patient with bilateral pain had an initial right C2 extradural ganglionectomy. After an additional microvascular decompression on the opposite side again resulted in chronic pain, a subsequent intradural rhizotomy was performed on the left. When performing the intradural rhizotomy, sensory roots of C1 were sectioned if found, all of dorsal C2 and the upper half of C3. Cervical 3 was spared, however, only if C2 blocking preoperatively gave 100% relief. It was then anticipated that sensory loss could be limited with maintenance of a good outcome based on the preoperative blocking results.

Outcomes were determined by patient self-assessment and obtained by an independent observer not connected with their procedures.

RESULTS

Cranioplasty patients

For the 8 patients who underwent a cranioplasty duration of followup averaged 16–25 months (range, 1–36 months). At last follow-up 14 and 18 months after surgery, 2 acoustic patients reported excellent results with 80%–100% relief of their preoperative pain. One of these 2

patients had preoperative symptoms for 12 years. A third acoustic patient had partial relief of 50%–60% by self-assessment at 36 months postop. The other 5 patients, 2 acoustics and all 3 microvascular patients reported no significant improvement. There were no complications with any of the cranioplasty procedures.

Nerve section patients

Three operations, the ganglionectomy and 2 rhizotomy procedures gave excellent results with 90%–100% relief of pain at 33, 22, and 12 months postop, respectively. The patient with bilateral pain had as mentioned an excellent result with the ganglionectomy. The more recent rhizotomy procedure also produced an initial excellent result with almost 100% of pain relief for 3 months, but recurrence of symptoms developed after a motor vehicle accident, which still persisted at her last follow-up 9 months postop. There were no complications associated with either the blocks or the nerve-sectioning operations.

DISCUSSION

It is clear that persistent pain after retromastoid craniectomy does occur as a complication of this operation. The actual incidence of this is uncertain as postoperative headaches have been reported between 9% and 64% in a number of papers.^[1,4,5,7,11,14,15,17-19,24,26] It is not clear, however, if these papers are reporting short- or long-term headache. Some authors have addressed this specifically. Hamer *et al.*,^[5] in reporting the follow-up of 331 acoustic patients noted that 23% complained of headache at 3 months, dropping to 16% at 1 year and 9% at 2 years. Jackler^[7] has also reported persistence of pain for more than 6 months in 29% of patients.

The proposed potential causes of persistent pain include scalp to dura adhesions, cerebrospinal fluid leak, bone dust causing aseptic meningitis, muscle spasms, and occipital nerve injury.^[1,3-5,7-10,14,16-20,22-25] Cerebrospinal fluid leaks would usually be obvious and aseptic meningitis often presents with fever and nuchal rigidity, improving with steroid treatment. Muscle spasms should also improve with time and conservative care. This leaves scalp to dura adhesions and occipital nerve injury as the likely causes of chronic pain. Therefore, treatments have been directed to address these problems. To alleviate pain caused by scalp to dura adhesions, cranioplasties have been placed in the bony defects. This procedure has been performed as a subsequent operation in a few patients initially by Malis^[13] and Schessel *et al.*,^[19] with excellent results. Subsequently, a number of studies have been published. They include placing cranioplasties and comparing them retrospectively with previous patients where a cranioplasty was not performed, or altering the procedure to a craniotomy, smaller cranial opening or split calvarial graft to cover the dura. Additionally, patients who did not have a cranioplasty and suffered

from chronic postop pain had placement of a cranioplasty as a separate procedure. Interestingly, these studies have opposing conclusions. Some clearly showed a decrease in postop headache or relief of chronic pain when a cranioplasty was used.^[3,9,16,20,22,23] Others did not find a significant difference.^[1,8,12,25] Some others felt that drilling in the posterior fossa creating bone dust was the most important factor,^[8] whereas others found the opposite, that drilling was not a contributing factor and scalp to dura adhesions were the main cause of persistent pain.^[23]

In this current study of 8 patients, 2 obtained excellent results and 1 partial improvement after the placement of a delayed cranioplasty. One of these patients obtained excellent results even after 12 years of chronic pain. These results are consistent with the existing literature suggesting that scalp to dura adhesions can certainly be a source of persistent discomfort, but clearly do not represent the sole cause of chronic pain. In spite of a lack of overwhelming success, delayed cranioplasty should be considered when a bony defect is present as it is a simple operation with low morbidity and may help up to 50% of patients. While there have been opposing conclusions as to the effectiveness of cranioplasty, at the time of initial retromastoid surgery it still seems advisable to separate the scalp and dura since the evidence points to adhesions as at least one potential cause of chronic postoperative pain.

Occipital nerve injury has been considered as a cause of pain by Levo *et al.*,^[10] but it does not appear that there have been definitive attempts to define, treat, and alleviate this pain until now. The second set of 3 patients demonstrated the role that occipital nerve injury may play in chronic pain. All 3 had effective cranioplasties placed at the initial operation, and yet had persistent discomfort indistinguishable from the noncranioplasty group based on symptomatology. Injury to the occipital nerves may occur from direct sectioning or from stretch injury secondary to retraction with neuroma formation. As these injuries may occur in smaller distal branches, it may be difficult to find a specific point of injury. Therefore, diagnostic selective blocking of the second cervical nerve as described is helpful in identifying pain mediated by peripheral nerve damage. The intradural dorsal rhizotomy may be more effective than C2 ganglionectomy in that C1 fibers can be sectioned if found and if necessary the upper sensory rootlets of C3 for more complete desensitization. There is also no need to violate the extensive venous plexus surrounding the C2 ganglion, which can result in significant blood loss. Nerve sectioning in appropriately selected patients can clearly give long-term relief of chronic postoperative incisional pain and headache as described in the 3 patients in this study.

A potential future treatment for chronic postoperative

pain may include occipital nerve stimulation. Neuromodulation has proved to be efficacious for the treatment of occipital neuralgia, craniofacial pain syndromes, such as herpetic neuralgia and trigeminal neuralgia and pain after peripheral nerve injury.^[21] While the author is unaware of any attempts to treat postcraniectomy pain with occipital nerve stimulation, neuromodulation may prove to be a viable less-invasive method of treating this pain without the destructive permanency of a neurolysis.

In summary, persistent incisional pain and/or headache after retromastoid craniectomy may be due to a number of etiologies while presenting clinically with similar characteristics. Treatment considerations should include placing a cranioplasty when a bony defect is present as it is a simple procedure with low morbidity, and may help upward of 50% of patients. Should a bony defect not be present, consideration should be given to selective C2 nerve blocking, which in these 3 presented patients accurately predicted pain due to peripheral nerve injury. This pain can be effectively addressed with a dorsal rhizotomy or ganglionectomy.

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