preserve the vascular supply to the anterior segment of the globe.[5]

As the disease stabilizes spontaneously, clinicians usually reserve surgeries until the disease burns out. Initiating treatment before disease burn-out might increase the total number of surgeries. However, early intervention can improve patient satisfaction with their appearance and reduce psychosocial harms caused by the disease.[6]

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Unilateral Approach to Primary Bilateral Trigeminal Neuralgia Via Bilateral Microvascular Decompression

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Background: Primary bilateral trigeminal neuralgia is a rare disease characterized by paroxysmal bilateral facial pain confined to the somatosensory distribution of the trigeminal nerve. Nonetheless, while treatment of bilateral trigeminal neuralgia with microvascular decompression (MVD) has been reported, there have been no trials of a unilateral approach for bilateral MVD.

Methods: The authors retrospectively analyzed the outcomes and complications of 2 cases of bilateral trigeminal neuralgia treated with MVD by unilateral craniotomy. The 2 patients were followed up for 27 and 32 months, with satisfactory results. One patient developed facial numbness on 1 side postoperatively, which disappeared 3 months later.

Conclusions: Microvascular decompression is an effective and safe opinion for primary bilateral trigeminal neuralgia that fails to respond adequately to medical therapy. The authors suggest that the initial surgery be performed on the more seriously affected side. Unilateral craniotomy for bilateral MVD represents a new therapeutic approach in patients with an enlarged superior trigeminal nerve space.

Key Words: Microvascular decompression, primary bilateral trigeminal neuralgia, unilateral approach

While primary bilateral trigeminal neuralgia (PBTN) is a quite rare disease, that reported to have an incidence ranging between 0.6% to 5.9%, accounting for trigeminal neuralgia (TN).[1,2] Vascular compression theory has been widely accepted in unilateral trigeminal neuralgia, and microvascular decompression (MVD) is satisfactory for its low recurrence rate and few complications, by resolving the neurovascular conflict between an abnormal vessel and the trigeminal nerve.[3-5] Some neurosurgeons have performed multiple craniotomies on PBTN patients with satisfactory results.[6,7] In this article, we present 2 cases of PBTN patients who underwent bilateral MVD through unilateral craniotomy creatively. The results, complications, and feasibility of the surgery will be analyzed separately.

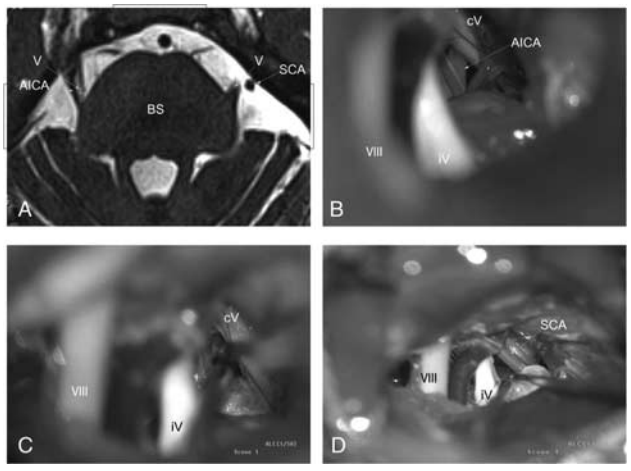

FIGURE 1. Patient 1: (A) Three-dimensional time-of-flight magnetic resonance angiography findings. Anterior inferior cerebellar artery compresses the right trigeminal nerve, left side was compressed by superior cerebellar artery. (B) Contralateral trigeminal never was compressed by anterior inferior cerebellar artery. (C) Contralateral Trigeminal nerve was separated with the artery and a small Telflon pad was inserted between them. (D) The superior cerebellar artery was moved away from ipsilateral trigeminal nerve and small pieces of Teflon felts were placed between the artery and the nerve. AICA, anterior inferior cerebellar arterysuperior cerebellar artery; BS, brainstem; cV, contralateral trigeminal nerve; iV, ipsilateral trigeminal nerve; SCA, superior cerebellar artery; V, trigeminal never; VIII, vestibular nerve.

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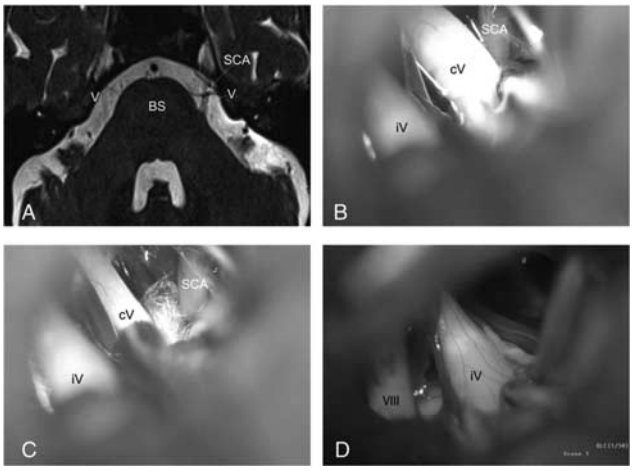

FIGURE 2. Patient 2: (A) Three-dimensional time-of-flight magnetic resonance angiography findings. Superior cerebellar artery compressed the left trigeminal nerve. (b) Contralateral trigeminal nerve was gradually revealed with the release of cerebrospinal fluid and the dissection of arachnoid membrane. Contralateral trigeminal never was compressed by superior cerebellar artery. (C) Contralateral Trigeminal nerve was separated with the artery and a small Telflon pad was inserted between them. (D) No typical vascular compression was found in the left side, and treated by nerve combing instead. BS, brainstem; cV, contralateral trigeminal nerve; iV, ipsilateral trigeminal nerve; SCA, superior cerebellar artery; V, trigeminal never; VIII, vestibular nerve.

METHODS

Between January 2017 and January 2021, there are 219 patients diagnosed as TN and who underwent MVD at the Department of Neurosurgery of Shengli Oilfield Centre Hospital. During this period, the number of PBTN cases was 5. According to the criteria, definedby the International Headache Society,[8] the patients can be diagnosis of classical TN conforming to the following characteristics: pain is distributed in 1 or more divisions of the trigeminal nerve, with no exceed the trigeminal nerve distribution; pain is characterized by electric shock-like, stabbing, unbearably, recurrent, paroxysimal attacks lasting from a few seconds to 2 minutes; pain can be typically triggered by speech, drinking, or teeth brushing, chewing, even light touch. Pain also can be relieved by carbamazepine or oxcarbazepine. Moreover, multiple sclerosis, tumors, odontogenic diseases, nasopharyngeal cancer, etc, other disease should be excluded; therefore, all patients were scheduled for a routine magnetic resonance imaging or computed tomography examination preoperatively.

After exclusion of contraindications by electrocardiogram and chest radiography, the 5 patients underwent operation on the side, which they considered to be heavier. It was occasionally found that contralateral trigeminal nerve could be detected during unilateral MVD in 2 of them. With the consent of the patient's families and the approval of the hospital ethics committee, contralateral MVD were performed at the simultaneous operation.

Patient 1

A 72-year-old elderly woman was admitted to our hospital complaining of episodic electric shock pain in the right cheek for 20 years and left facial similarly pain for 8 years. She relieved the pain with a daily gram of carbamazepine; however, owing to the unbearable side effects, the drugs had to be reduced. Radiofrequency thermocoagulation was performed on the right side and, unfortunately, it recurred very quickly after 1 year. Pain was observed involving of the second division in the right side and the V2-3 regions in the left side, while the left side was more serious. Three-dimensional time-of-flight magnetic resonance angiography showed bilateral trigeminal never was compressed by arteries (Fig. 1A). Left suboccipital retrosigmoid approach craniotomy was performed with the consent of the patient and her families, under general anesthesia. A surprise scene was explored in the operation that the contralateral trigeminal nerve was clearly visible and compressed by a branch of the superior cerebellar artery through the relatively uncrowded superior trigeminal space (Fig. 1B). The artery and nerve were gently separated, and a small Telflon pad was inserted between them securely (Fig. 1C). The ipsilateral responsible vessel was also effectively moved away from the trigeminal nerve (Fig. 1D). All procedures were approved by her families and authorized by the hospital ethics committee. The bilateral pain was immediately relieved and satisfactory for 32 months follow-up by telephone and questionnaire with no complications occurred.

Patient 2

A 52-year-old man presented with typical left-side TN for 8 years, involving the third division. In the last 5 years he also suffered pain in the same distribution on the opposite side. Initially, the pain was controlled with carbamazepine and gabapentin; however, it became too severe to eat, even with moderate doses of carbamazepine. MRTA was positive on the left side (Fig. 2A). As he complained that pain was more intense and frequent on the left side than right, the left side was selected for craniotomy. Based on the previous experience, we informed preoperative that if contralateral vascular compression was found during the operation, the patient and his families clearly agreed to perform contralateral surgery simultaneously. Fortunately, the contralateral trigeminal nerve was gradually revealed with the release of cerebrospinal fluid and the dissection of arachnoid membrane, and typical arterial vessels were explored in contact with cranial nerve V in both upper and lower margins (Fig. 2D). Postoperative numbness on the left face was predictable, and the bilateral pain disappeared immediately. At 27 months follow-up he is still pain free, the numbness also relieved 3 months later. No other complications occurred.

DISCUSSION

Primary bilateral trigeminal neuralgia is characterized by electric shock-like paroxysmal pain in both sides of the innervated areas of the trigeminal nerve. The diagnosis of PBTN, like unilateral TN, is also primarily based on patient history, as no laboratory or diagnostic tests are definite.[3] The pain characteristics of each side of PBTN patients are consistent with that of unilateral TN. Neurophysiological test and imaging examination are important for the diagnosis of PBTN and help to eliminate secondary causes.[5] Di Stefano et al[9] noted the patients with multiple sclerosis had higher incidence suffering bilateral TN significantly. Neither of the 2 patients manifested evidences of multiple sclerosis during the therapeutic and follow-up period.

There is no single or standard method for the treatment of PBTN, and carmazepin is generally the initial choose for treatment.[4,10] When drug treatments fail or patients who are not intolerant of side effects, surgery is concerned. Various surgical approaches have been proposed for the treatment of TN as well as PBTN. The percutaneous treatments for TN, including balloon compression, glycerol rhizotomy, and radiofrequency thermocoagulation, show effective initial pain relief ($>90\%$).[11]

However, pain control rates of balloon compression are down to 54% at 3 years,[12] glycerol rhizotomy provides pain relief up to 85% of patients initially, and only 38% at 5 years.[13] Radiofrequency thermocoagulation offers similar pain-free outcomes of 80% initially and decreases to 75% at 3 years.[14] Moreover, the complications of dysesthesia, corneal numbness, masseter weakness, and herpes labialis are frequently reported with inevitable damage of nerve fibers.[11] Microvascular decompression is considered the first choice treatment for the medically refractory young adults and healthy elderly, with a neurovascular conflict.[15] Microvascular decompression also offers effective treatment for the bilateral TN patients, In Pollack's study,[2] comprising 35 bilateral TN patients, good or excellent symptom control was achieved in 89% of treated sides and was maintained 5 years after surgery in 78% of operative sides. Zhao et al[6] reported 13 cases of PBTN that were treated with MVD, good and excellent symptom control were achieved in 92.3% of treated sides, there into, 9 patients performed bilateral MVD successively. In this study, the 2 patients were both pain free at last follow-up.

However, not every patient with PBTN can be treated with unilateral craniotomy for bilateral MVD simultaneously, due to the limitation of anatomical space. The character of the cases is that, there is a relatively wide superior TN space, which is mostly dominated by superior petrosal veins. However, this feature can only be found intraoperative and cannot be evaluated by imaging examination preoperative so far.

According to the present cases, simultaneous contralateral trigeminal nerve exploration and decompression did not increase the complications of surgery, which of course requires larger series to confirm. On the other hand, due to the limitation of visual field, the trigeminal nerve cannot be explored comprehensively and responsible blood vessels may be undiscovered, which makes the operation invalid. The application of endoscope can offers wider visualization and illumination,[16] which may increase the effectiveness.

CONCLUSION

Microvascular decompression is an effective and safe opinion to PBTN patients, who are failed to respond adequately to medical therapy. We suggest the initial surgery prefer the more serious side. Unilateral craniotomy, performed bilateral MVD, provides new therapeutic approaches in several patients with an enlarger space superior trigeminal nerve.

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Drug Induced Sleep Endoscopy Versus Awake Endoscopy in Retrolingual Obstruction Assessment in Obstructive Sleep Apnea Patients: A Comparative Study

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