

# Acupuncture for rehabilitation after surgery for cerebellopontine angle meningioma

## A case report

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### Abstract

**Rationale:** In some cases, surgery of cerebellopontine angle meningioma (CPAM) might result in multiple cranial nerve injury, which could bring serious impact on the patients, especially when it affects the function of facial muscles and eyeballs. This report describes a successful application of acupuncture for rehabilitation in a patient after surgery for CPAM.

**Patient concerns:** A 27-year-old patient presented with limitation of left eye abduction, accompanied with frontal and facial sensory disturbance on the left after resection of the pontocerebellar angle tumor. The patient also suffered from significant anxiety and depression as concomitant symptoms.

**Diagnoses:** Based on medical history, clinical symptoms, and magnetic resonance imaging results, the patient was diagnosed with the fourth, fifth, sixth, and seventh cranial nerve injury after surgery for CPAM.

**Interventions:** Acupuncture treatment was applied for this patient. One acupuncture session was given every 2 days in 35 days, and the needles were retained for 30 minutes per session.

**Outcomes:** After acupuncture treatment, the limitation of left eye abduction had totally recovered. The superficial sensory disturbance in the frontal and facial region was significantly relieved. Besides, the scores of Hamilton Anxiety and Depression Scale showed a significant reduction. However, the superficial sensory of the alar and nasolabial groove on the left side still decreased mildly when compared with the right side.

**Conclusion:** Acupuncture might be an option for rehabilitation after surgery for CPAM.

**Abbreviations:** CPAM = cerebellopontine angle meningioma, HAMA = Hamilton Anxiety Rating Scale, HAMD = Hamilton Depression Rating Scale, MRI = magnetic resonance imaging, PFT = posterior fossa tumors, TCM = traditional Chinese medicine.

**Keywords:** acupuncture, cerebellopontine angle meningioma, multiple cranial nerve injury

## 1. Introduction

Cerebellopontine angle meningioma (CPAM) is the most common posterior fossa tumor (PFT)<sup>[1]</sup> and accounts for a high percentage in PFT.<sup>[2]</sup> Till date, surgical treatment has been

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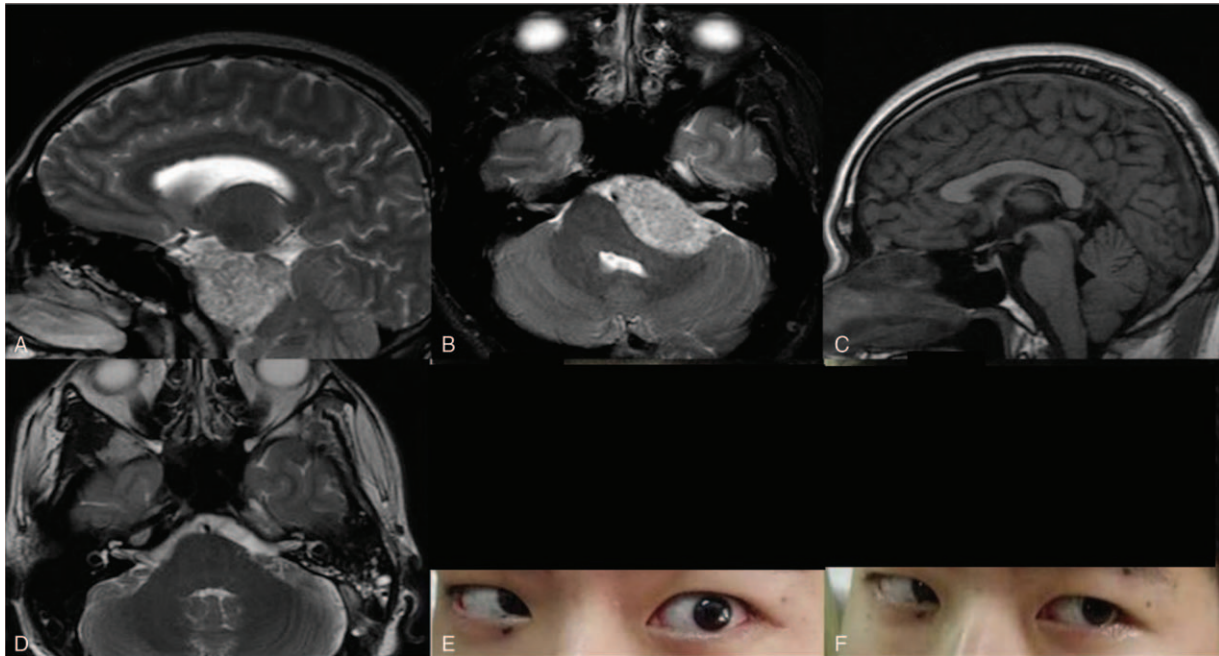
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acknowledged as the best therapy, which includes various approaches in terms of different locations and different sizes of tumors. Among them, the retrosigmoid approach<sup>[3]</sup> is one of the most commonly used surgical methods, but it may also pose a risk of injury to multiple cranial nerve and bring serious impact on patients. As a physical therapy that could be adopted as a treatment option for promoting rehabilitation of neural function, acupuncture has been proved effective by increasing clinical studies<sup>[4,5]</sup> in recent years, although the underlying mechanism remains unclear and further investigation is needed. This case report describes a successful application of acupuncture for rehabilitation in a patient after surgery for CPAM.

## 2. Case description

In early August in 2016, a 27-year-old male was admitted to our outpatient acupuncture department, who presented as limitation of left eye abduction accompanied with frontal and facial sensory disturbance on the left side for more than 2 months. According to his medical history, the patient received a magnetic resonance imaging (MRI) examination in a hospital in late May because he experienced chronic headache previously. The MRI report revealed neoplasia in clival area, which mainly indicated meningioma (Fig. 1A and B). Four days later, a brain computed tomography angiogram scan further confirmed neoplasia in the left cerebellopontine angle territory and shifting basilar artery under compression. Some parts of the left posterior cerebral



**Figure 1.** (A and B) MRI revealed neoplasia in clival area, which mainly indicated meningioma. (C and D) After operation, MRI showed pathologic change of left cerebellopontine angle meningioma postoperation and abnormal enhancement of the left trigeminal nerve, and the prepontine cistern enlarged with signal-intensity abnormalities. (E) Abduction of the left eye had partly regained. (F) Abduction of eye on the affected side had totally recovered. MRI = magnetic resonance imaging.

artery and its branches were embedded in tumors. The next day, the patient underwent the surgery of pontocerebellar angle tumor resection via the retrosigmoid approach, and no significant hemorrhage was found according to his postoperative cerebral computed tomography. Postoperative pathological findings also verified meningioma of left cerebellopontine angle (World Health Organization grade 1).

However, after the surgery he began to suffer from limitation of left eye abduction, accompanied with shallower left nasolabial groove and numbness in the forehead and face. The re-examination of cerebral MRI showed postoperative pathologic change of left CPAM, abnormal enhancement of the left trigeminal nerve, and expansion of the prepontine cistern with signal-intensity abnormalities. Additionally, there was inflammation in the left mastoid (Fig. 1C and D). The patient's symptoms and complaints were not improved after taking mecobalamin. Thus, he sought for acupuncture treatments.

### 3. Examination

Physical examination was performed before acupuncture. The patient's both pupils were in equal size with a diameter of about 3 mm. He had sensitive pupillary light reflex, symmetric wrinkles on both sides, and satisfying closeness of eyelid. Some positive physical findings were observed. His left eye had movement disorder including abduction, oblique abduction. In addition, Hirschberg test showed an inward deviation at an angle of 45°. The tongue was in the middle and the left nasolabial groove became a little shallower. Superficial sensibility in the periauricular region, forehead, and left face diminished significantly. Superficial sensibility in the left alar and left nasolabial groove disappeared. Limb muscular strength, muscular tension, and tendon reflex were all normal. Both the Hoffmann sign and Babinski sign were negative. The Hamilton Anxiety Scale

(HAMA) indicated significant anxiety (18 scores) and the Hamilton Depression Scale (HAMD) suggested moderate depression (17 scores). In addition, according to traditional Chinese medicine (TCM), tongue diagnosis showed a light red tongue with thin white coating and pulse diagnosis demonstrated a taut pulse.

### 4. Intervention

Based on medical history, clinical symptoms and MRI results, the patient was diagnosed with the fourth, fifth, sixth, and seventh cranial nerve injury after surgery for CPAM. Acupuncture treatment was planned for this patient. Before the intervention, the acupuncture procedures were explained to the patient and informed consent was obtained. On the basis of TCM syndrome differentiation and the definite diagnosis, the following acupoints were selected: left Fengchi (GB20), left Taiyang (EX-HN5), Suliao (DU25), left Yingxiang (LI20), left Dicang (ST4), bilateral Hegu (LI4), bilateral Zusanli (ST36), and left Zhiyin (BL67). Intervention procedures were displayed in details in Table 1. One acupuncture session was given every 2 days for 35 days and the needles were retained for 30 minutes per session.

### 5. Outcome

Primary outcome was ocular movement, which was assessed based on Hirschberg test. Secondary outcome was the mental status measured by HAMA and HAMD. All outcomes were evaluated before intervention, every 4 sessions throughout the study and at the end of the treatment course.

After 4 treatment sessions, the abduction amplitude of the left eye increased obviously, but still could not return to the primary position. Hirschberg test showed an inward deviation at an angle of 30°. Meanwhile, the numbness in the left periauricular region

**Table 1****The location/channel distribution/operation of these points, and their relationship with the case.**

Acupoint	Location	Channel distribution	Relationship with eyes	Procedure
Fengchi (GB20)	In the depression between the upper portion of sternocleidomastoideus and trapezius	Gallbladder channel of Foot-Shaoyang	Originates from the outer canthus and one branch starts from the outer canthus	Perpendicular insertion for 1.2cun
Taiyang (EX-HN5)	In the depression about 1 finger-breadth posterior to the midpoint between the lateral end of the eyebrow and the outer canthus	Extra point	Near the outer canthus	Perpendicular insertion for 1.0cun
Suliao (GV25)	At the tip of the nose	Governor vessel	A branch to the lower central part of the eye. Also used for superficial paresthesia here	Upward oblique insertion for 0.3cun
Yingxiang (LI20)	In the nasolabial groove, at the center of the lateral border of the ala nasi	Large intestine channel of Hand-Yangming	Mainly used for the treatment of local functional rehabilitation and superficial paresthesia of left nasolabial groove	Upward oblique insertion for 0.5cun
Dicang (ST4)	With the eye looking straight forward, the point is vertically below the pupil, at the level of the angle of the mouth	Stomach channel of Foot-Yangming	The divergent channel connect with eye	Backward horizontal insertion for 0.5cun
Zusanli (ST36)	3cun below Dubi (ST35), 1 finger width lateral to the anterior crest of the tibia	Stomach channel of Foot-Yangming	Its muscle regions manage the underpart of eye	Perpendicular insertion for 1.2cun
Hegu (LI4)	On the dorsum of the hand, between the 1st and 2nd metacarpal bones, approximately in the middle of the 2nd metacarpal bone on the radial side	Large intestine channel of Hand-Yangming	Illness of the face and mouth can be cleared by needling Hegu	Perpendicular insertion for 1.0cun
Zhiyin (BL67)	On the lateral side of the little toe, approximately 0.1 cun lateral from the corner of the nail	Bladder channel of Foot-Taiyang	Originates from the inner canthus of the eye. Its muscle regions manage the upper part of eye. And the root of bladder channel of Foot-Taiyang is BL67, the tip is eye	Perpendicular insertion for 0.1 cun

was relieved. The scores of HAMA and HAMD also showed a reduction (12 points and 14 points, respectively). At the end of 7 treatment sessions, the patient could look at a target front horizontally. After 12 treatments, limitation of left eye abduction had partly improved (Fig. 1E), and superficial sensory disturbance in the periauricular region, forehead, and left face had improved. At the end of all 16 treatment sessions, limitation of left eye abduction had totally recovered (Fig. 1F). In addition, superficial sensory disturbance in the frontal and facial region had significantly relived. The scores of HAMA and HAMD were all reduced to 4 points. However, the superficial sensory of the alar and nasolabial groove on the left side still decreased mildly when compared with the right side. Lastly, at the 3-month follow-up by telephone, the patient reported that his symptoms had not recurred.

## 6. Discussion

The incidence rate of meningioma accounts for about 6% to 15% of cerebellopontine angle tumor,<sup>[6,7]</sup> ranking only second to acoustic neuroma. Its histological morphology is complicated and it is generally classified into 7 categories, which includes epithelia type, fibroblast type, transitional cell type, psammoma body type, hemangioblastoma, papillary type, and variant

type.<sup>[8]</sup> Though most tumor cells are well-differentiated and grow benignly, meningioma is located in the irregular gap between cerebellum, pons, and petrous part of temporal bone, and the gap forms an inverted 3 pyramid. To be specific, meningioma is close to the fifth, sixth, seventh, eighth, ninth, tenth, eleventh pairs of cranial nerves and the brainstem as well as some vital blood vessels, which consists of superior cerebellar artery, anterior inferior cerebellar artery, posterior inferior cerebellar artery, super petrosal vein, inferior petrosal vein and their branches. Therefore, choosing an appropriate operative method is of great significance to protect the important tissue, reduce sequelae, and improve life quality for patients.

The most commonly used surgical method is the retrosigmoid approach, which features a simple operation approach and a clear operative field, making it easy to control the size of an incision. In addition, this approach also makes it easily operative to deal with lesions of trigeminal nerve, auditory nerve, tongue pharynx, vagus nerve, and their peripheral regions.<sup>[3]</sup> Despite these advantages, surgical procedures such as traction, cutting and suction may put tissues, surrounding blood vessels, nerves, and brain stem at high risk of injury, especially the cranial nerves such as facial nerve, abducens nerve, vestibulocochlear nerve, and oculomotor nerve.

**Table 2****The location and channel distributions of special points of oculopathy.**

Acupoint	Location	Channel distribution
Yanglao (SI6)	On the dorsal ulnar aspect of the forearm, in the depression on the radial side of the proximal end of the capitulum the ulna	Small intestine channel of Hand-Taiyang
Guangming (GB37)	5 cun superior of the tip of the external malleolus, slightly anterior to the anterior border of the fibula	Gallbladder channel of Foot-Shaoyang
Taichong (LR3)	In the depression distal to the junction of the 1st and 2nd metatarsal bones	Liver channel of Foot-Jueyin
Sanyinjiao (SP6)	3 cun above the meridian malleolus, on the posterior border of the meridian aspect of the tibia	Spleen channel of Foot-Taiyin
Ganshu (BL18)	Level with the lower border of the spinous process of the 9th thoracic vertebra, 1.5 cun lateral to the posterior midline	Bladder channel of Foot-Taiyang

**Table 3****General classification of syndrome and corresponding symptoms and points.**

Type of syndrome	Symptoms	Common acupoints
Liver and kidney deficiency type	Sore eyes, soreness and weakness of waist and knees, red tongue with less coating, deep and thin pulse	Ganshu (BL18), Shenshu (BL23), Taixi (KI3), Zhaohai (KI6)
Damp-heat in liver and gallbladder type	Gum in the eyes, excessive tearing, sticky slimy sensation in the mouth, red tongue with yellow and greasy coating, slippery and rapid pulse	Yinlingquan (SP9), Yanglingquan (GB34), Zusanli (ST36), Zulinqi (GB41)
Liver qi stagnation type	Dilated eyes, becoming sentimental, pale tongue with thin coating, wiry pulse	Taichong (LR3), Zhigou (SJ6), Guangming (GB37)
Qi stagnation and blood stasis type	Enduring disease acute trauma, postoperative or enduring disease, accompanied with depression, purple tongue, dusky or with stasis maculae, rough or wiry pulse	Geshu (BL17), Taichong (LR3), Hegu (LI4), Sanyinjiao (SP6)

Acupuncture belongs to complementary and alternative medicine and could effectively promote rehabilitation of neural function.<sup>[9]</sup> Previous studies have confirmed that acupuncture plays a positive role in the treatment of various ocular diseases, including xeroma,<sup>[10,11]</sup> abducent paralysis,<sup>[12]</sup> glaucoma,<sup>[13]</sup> anisometropic amblyopia,<sup>[14]</sup> and keratoconjunctivitis sicca.<sup>[15]</sup> The mechanisms may be explained by decreasing intraocular pressure,<sup>[16]</sup> improving the central visual field,<sup>[17]</sup> increasing ophthalmic blood flow,<sup>[18]</sup> and promoting retinal nerve growth factor and brain-derived neurotrophic factor.<sup>[19]</sup> Meanwhile, some studies also have proved that acupuncture can effectively protect the nerve, accelerate microcirculation and metabolism, and promote the recovery of neural function.<sup>[20,21]</sup>

In this case, Fengchi (GB20), Taiyang (EX-HN5), Suliao (GV25), Yingxiang (LI20), and Dicang (ST4) are local acupoints, which could stimulate the local region and promote rehabilitation of the cranial nerve injury. And acupoints of Hegu (LI4), Zusanli (ST36), and Zhiyin (BL67) are also selected as distant points according to the distribution of relevant meridians. The locations and meridian distributions of these points, as well as their relationships with the patient's clinical symptoms, are displayed in Table 1. When treating ocular diseases with acupuncture, local points, such as Jingming (BL1), Chengqi (ST1), Cuanzhu (ST2), Sibai (ST2), Taiyang (EX-HN5), Sizhukong (SJ23), Tongziliao (GB1), and Fengchi (GB20), are generally selected. Supplementary distant acupoints vary according to different fundamental theories. For examples, when considering special therapeutic effect, acupoints like Yanglao (SI6), Guangming (GB37), Taichong (LR3), Sanyinjiao (SP6), Ganshu (BL18) are commonly used, and their locations and meridian distributions are presented in Table 2. Acupoints can also be selected based on different TCM syndromes, their common type of syndromes, and the selected points are shown in Table 3.

Although the definitive mechanisms are not fully understood and further investigation is needed, acupuncture might be an option for rehabilitation after surgery for CPAM.

**Author contributions**

**Investigation:** Ying Zhang.

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**Resources:** Lianqiang Fang.

**Supervision:** Xingling Li.

**Writing – original draft:** Dexiong Han, Hantong Hu.

**Writing – review & editing:** Dexiong Han, Hantong Hu.

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