Analysis of the efficacy of external treatment of traditional Chinese medicine to assist in the treatment of headache in patients after manifest microvascular decompression for facial muscle spasm

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Introduction. To observe the effect of mesotherapy on postoperative pain in patients with anterior myasthenic microvascular decompression.

Methods. Forty-three patients with facial myasthenia gravis admitted to our functional neurosurgery department from May to August 2019 were selected for the study, and were divided into a Chinese medicine group (23 cases) and a Western medicine group (20 cases) using the random number method. In the sufentanil group, 0.2 μg/kg of sufentanil, 0.2 mg/kg of etomidate and 0. 15 mg/kg of atracurium cisbenzosulfonate were injected intravenously for induction of anesthesia; in the oxycodone group, 0.2 mg/kg of oxycodone, 0.2 mg/kg of etomidate and 0. 15 mg/kg of atracurium cisbenzosulfonate were injected intravenously for induction of anesthesia. Continuous pumping was used in both groups. At the time of dural closure, sufentanil 0.05 μg/kg was injected intravenously in the sufentanil group and oxycodone 0.05 mg/kg was injected intravenously in the oxycodone group. The visual analogue score (VAS) of pain at 0.5, 1, 2, 4, 6, 24 and 48 h postoperatively was recorded in both groups, as well as the number of pressures and the incidence of adverse reactions
in the patients with PCA.

Results. The oxycodone group had significantly lower postoperative VAS scores at 0.5, 1, 2, 4, and 6 h than the sufentanil group [1.0(0.0,3.0) score versus 3.0(1.5,3.6) score, 1.0(0.0, 1.8) score versus 2.0(1.0,3.8) score, 1.0(0.0, 1.0) score versus 2.0(1.0,2.5) score, 0.5(0.0, 1.0) score compared with 1.5(1.0,2.5) score, 0.0(0.0,0.8) score compared with 1.0(0.0,2.0) score] ($P<0.05$); there was no statistically significant difference between VAS scores at 24h and 48h postoperatively in the two groups ($P>0.05$). There was no statistically significant difference between the two groups in the number of postoperative PCA compressions at 6, 24 and 48h ($P>0.05$). There was no statistically significant difference in the incidence of postoperative nausea and vomiting, dizziness, and skin pruritus between the two groups ($P>0.05$), and no respiratory depression or excessive sedation
occurred in any of the patients.

Conclusion. Compared with Western analgesia, Chinese external treatment significantly improved pain scores in patients with facial muscle spasm microvascular decompression within 6 h after surgery, with no significant increase in adverse effects.

Keywords. Microvascular, Decompression, external treatment of traditional Chinese medicine, postoperative pain

INTRODUCTION

Hemifacial spasm (HFS) is a clinically common functional disorder of the nervous system, often starting from one side of the orbicularis oculi muscle and extending downward to the same side of the facial muscles (expression muscles, orbicularis oris) over time. HFS occurs in middle-aged and elderly people, with more women than men [4], is more common on the left side, and symptoms are mostly located on one side of the face; bilateral facial muscle spasms are rare [5-6]. A large-scale epidemiological survey in the United States showed that the prevalence of lateral myasthenia gravis was 7.4/100,000 in men and 14.5/100,000 in women [7], which is basically consistent with the epidemiological findings of Liu Xiaoxiao et al [8] in terms of the proportion of men and women and the age of onset, and the patients were mainly distributed in the 40.79-year-old group, and the incidence of HFS showed an increasing trend with age [9]. There is no large-scale epidemiological survey of HFS in China, but the literature indicates that HFS is more common in Asian populations than in other populations [10]. Subsequent cases were reported [11]. It was not until 1970 that Jannetta first systematically described the "vascular compression theory" and suggested that compression of the Root exit zone (REZ) was the cause of HFS, and then histological examination confirmed that vascular compression led to demyelination of nerve roots [12-13].

As research progressed, two hypotheses for the pathogenesis of HFS were developed: the "short-circuit" theory and the "nuclear" theory [14], of which the "nuclear" theory is being increasingly accepted. The "nuclear" theory is becoming more and more accepted. However, the pathogenesis of lateral facioscapulohumeral spasm is not yet fully understood, and the existing theories are mostly hypotheses based on a large number of clinical phenomena, but lack objective scientific basis. Most of the lateral spasms can be diagnosed by the characteristic clinical manifestations, and the auxiliary examinations are mainly used for patients who lack the characteristic clinical manifestations, and the commonly used clinical examination methods include

MRI and carbamazepine treatment test. Imaging examinations such as MRI are used to clarify the presence of secondary intracranial lesions that cause facial spasm, such as occupying lesions, skull base malformations, and cerebrovascular disease [15], and three-dimensional time-of-flight method magnetic resonance angiography (3D. TOF. MRA) can understand the distribution of blood vessels around the facial nerve [16- 17].

Carbamazepine treatment trials: generally HFS patients are effective on carbamazepine treatment in the early stages of the disease, which can help to diagnose the disease. There are various methods of treatment for lateral facial myospasm [18], such as acupuncture, physiotherapy, radiofrequency ablation, and nerve block, but although these treatments can temporarily relieve the symptoms to some extent, long-term follow-up results show that none of them can completely cure facial myospasm and are prone to different degrees of complications. At present, the main clinical treatment modalities are the following three: ① drug therapy: commonly used drugs are carbamazepine, oxcarbazepine, and phenytoin surgical treatment is a common clinical treatment with good efficacy and sodium cure [19]. It is mainly used for patients with incipient facial spasm or mild symptoms, and the biggest problem is that spasticity symptoms can only be temporarily relieved and cannot be completely cured, and drug complications (such as headache, allergic reactions, hematopoietic and hepatic and renal impairment) also limit its wide application. Botulinum toxin A (Botulinum toxinA) local injection treatment: Botulinum toxin A can block the conduction of signals between the neuromuscular junction, and is mainly used for patients who are ineffective in drug treatment and lack surgical conditions, and can also be used as a supplementary treatment when surgical treatment is ineffective. However, botulinum toxin injections need to be repeated regularly and cannot be cured, and the effect and maintenance time of botulinum toxin gradually decrease as treatment advances. (iii) Microvascular decompression of the facial nerve (MVD): the high efficiency of MVD surgery (>90%) makes MVD the preferred treatment option for HFS, and several clinical studies have confirmed that MVD is an effective and safe method for the treatment of HFS [20], but the risks of MVD surgery, postoperative ineffectiveness, recurrence and surgery-related complications are aspects of this procedure that need further development and improvement. Advantages such as fast treatment, but at the same time most of the surgical treatments cause some postoperative adverse reactions and complications, for example, patients who undergo microvascular decompression may have complications such as head pain after surgery, which has a greater impact on patients' postoperative recovery and quality of life [21].

The Nei Jing says: "If you do not pass, you will have pain" and "If you do not glory, you will have pain". Therefore, HP is mostly caused by the attack of poisonous evil, which enters the surface and paralyzes the veins and channels, stagnates blood and Qi and causes pain; or it is caused by the prolonged illness, which depletes qi, blood, yin and yang, and cannot moisten the meridians and causes pain [22]. The main treatment is to open the channels and stop the pain, invigorate the blood and benefit the qi [23]. Current treatment methods are not satisfactory for patients, who often suffer from postherpetic neuralgia for months or even years, which not only physically but also mentally torments patients and greatly affects their quality of life. Although western medicine has narcotic analgesics, antidepressants, anticonvulsants, etc. to relieve patients' pain by increasing their pain threshold, these drugs can cause great damage to the cardiovascular system and liver and kidney functions, especially for long-term medication users and elderly patients, which also limit the application of western medicine in the treatment of HP, so the treatment is still a world-class problem. As the name implies, the internal treatment method is to give patients oral medicine through the diagnosis and treatment of Chinese medicine, but the treatment effect is not very obvious. The external treatment of HP is easy to operate and has no side effects, which is safe, hygienic, efficient and green, and has remarkable clinical effects. The clinical results are better when multiple methods are usually applied simultaneously according to the diagnosis and treatment [24]. These treatments dissipate the stagnant blood stasis in the blocked meridians, resulting in smooth flow of qi and blood in the meridians, so that the meridians can be nourished and moistened,
and the pain can be relieved by passing through without pain[25].

MATERIALS AND METHODS

General Information

Forty-three patients with facial muscle spasm admitted to our functional neurosurgery department from May to August 2019 were selected for the study, and microscopic microvascular decompression was performed electively under general anesthesia. Inclusion criteria: ①Age 18-65 years old; ②American Society of Anesthesiologists (ASA) classification I-II; ③ Patients all signed the informed consent form. Exclusion criteria: (i) severe systemic disease; (ii) chronic pain disease; (iii) alcohol or opioid dependence; (iv) allergy to the drugs used; (v) preoperative cognitive insufficiency or psychiatric disorders; (vi) patient refusal to join the study. The patients were divided into sufentanil group (23 patients) and oxycodone group (20 patients) by random number method, and the differences in general data such as gender and age between the two groups were
not statistically significant (P>0.05), as shown in Table 1

Anesthesia method

After admission, ECG, noninvasive blood pressure, transcutaneous noninvasive pulse oximetry and EEG dual frequency index were monitored. Upper limb venous access was opened, and radial artery puncture was performed under local anesthesia with 2% lidocaine, and invasive arterial blood pressure was monitored continuously. Before induction of anesthesia, 0.1 mg/kg of dexamethasone and 0.2 mg of pentoxifylline hydrochloride injection were given. For induction of anesthesia, sufentanil (produced by Yichang Renfu Pharmaceutical Co., Ltd., Lot No. 91A05211) was injected intravenously at 0.2 μg/kg in the sufentanil group, and oxycodone (produced by Hamol Limited (UK), Lot No. BX378) was injected intravenously at 0.2 mg/kg in the oxycodone group; after 2 min, etomidate 0.2 mg/kg and cis After induction of anesthesia, a reinforced tracheal tube was inserted under the GlideScope visual video laryngoscope (GVLReusableSystem, Verathon, USA), and the breath sounds of both lungs were symmetrical on auscultation, and mechanical ventilation was performed after connecting the tracheal tube to the Y-connector of the anesthesia ventilator. The respiratory parameters were adjusted to maintain 30~40 mmHg (1 mmHg=0.133 kPa). Anesthesia maintenance: 3~6mg/(kg-h) propofol and 0.3~0.4μg/(kg-min) remifentanil were continuously pumped. The intraoperative pumping rate of propofol was titrated and the EEG dual frequency index was maintained at 40~60. When the dura was

closed, 4 mg of ondansetron was injected intravenously in both groups, 0.05 μg/kg of sufentanil was injected intravenously in the sufentanil

group, and 0.05 mg/kg of oxycodone was injected intravenously in the oxycodone group. After removal of the tracheal tube, the patients were taken to the functional neurosurgical care unit.

Treatment method TCM group: given Tongluo external treatment method (local herbal hot aman pack applied externally, local patting, pricking and bleeding) treatment.

Chinese herbal medicine hot amenity pack for external application: 15g each of Boswellia serrata, Turbinicarpus, Qingfeng vine, 30g each of Niu Knee, Chuanxiong, 25g of Mugwort, 15g of Trigon, etc., beaten into coarse powder, mixed with big green salt in the ratio of 1:1, put into a 20×40cm cloth bag. Microwave heating for 3 min before use, cool to 45 ℃ and then put on the affected knee joint, about 20 min to take off, 6 times a week for 6 weeks. Pay attention to prevent burns and suspend use if there is skin itching and other allergic symptoms.

Stabbing and bleeding method: Patients were instructed to take a standing position, select 4 bleeding points, take a range of 10× 15 cm of skin at the purple and superficial vein of the affected knee, sterilize and then puncture the vein with a conventional disposable blood collection needle to make blood flow out 2- 10 mL. Treatment was performed twice a week for 6 weeks. The patients were observed in real time during the intervention period, and if dizziness, weakness, panic and other reactions occurred, the intervention needed to be stopped and the patients were told to develop good living habits.

Local patting: Patients take a sitting position with both knees straight, help patients adjust their mindset. Vertical patting of the front and back of the knee joint and both sides inside and outside, the frequency of patting is 60 times per minute, one time for 20 min is appropriate, the intensity of patting is as strong as can be tolerated, and the skin is slightly flushed. The treatment was performed twice daily for 6 weeks.

Western medical group: Patients were all anesthetized with subcutaneous infiltration of 0.5% ropivacaine by the surgeon before skin incision. At the end of surgery, a Smith 6300 electronic analgesic pump (Smith, USA) was connected for intravenous self-administered analgesia. The infusion rate was adjusted to 1 mL/h, and the additional dose was 0.05 mL/kg

for a single press, with a locking time of 30 min and a continuous infusion time of 48 h. The patients in both groups were given sufentanil 1 μg/mL + ondansetron 80 μg/mL.

Observation indexes and scoring criteria

(i) Intraoperative conditions, including operative time, anesthesia time, total fluid intake, bleeding and intraoperative urine volume, remifentanil dosage and propofol dosage, were recorded in the two groups. ②Compare the visualanaloguescale (VAS) of pain in the two groups at 0.5, 1, 2, 4, 6, 24 and 48 h postoperatively, with VAS scores ranging from 0 to 10, with 0 being no pain and 10 being severe pain. The number of patient-controlled analgesia (PCA) compressions was recorded at 6, 24 and 48 h after surgery. Patients were instructed to apply the VAS score to evaluate the pain level and the use of PCA pump during the preoperative visit. Adverse events such as nausea and vomiting, dizziness, skin pruritus, respiratory depression, and excessive sedation (Ramsay score ≥5) were recorded. The Ramsay sedation score was applied to assess the degree of sedation: 1 as the patient was awake, restless or irritable; 2 as the patient was awake, well-oriented, quiet and cooperative; 3 as the patient was awake but could only follow instructions; 4 as the patient was drowsy and could be quickly awakened by tapping between the eyebrows or shouting; 5 as the patient was drowsy and could be aroused by tapping between the eyebrows or shouting, but the response was delayed; 6 as the patient was deeply asleep, The patient can not be aroused by tapping between the eyebrows or shouting.

Chinese medicine symptom efficacy criteria

Clinical control: disappearance of clinical symptoms, or significant improvement of symptoms, reduction of patients' physical discomfort and ≥95% reduction of TCM evidence points.

Significant effect: symptoms are effectively controlled, and the TCM evidence points are reduced by 70% to 94%.

Effective: the patient's symptoms did not continue to worsen, physical discomfort was reduced, and the TCM evidence points were reduced by 60% to 69%.

Ineffective: the symptoms continued to deteriorate or failed to be controlled, and the reduction of TCM symptom score was <30%. The number of ineffective was excluded, and the total effective rate was calculated by dividing the remaining number by the percentage of the total number.

Statistical Methods

SPSS23.0 statistical software was used for data analysis, and measurement data conforming to normal distribution were expressed as mean±standard deviation (x2±s) and compared between two groups by independent samples t-test; measurement data with non-normal distribution were expressed as median (interquartile range) [M(P25, P75)] and compared between two groups by Mann-Whitney U test. Statistical data were compared by the $\chi 2$ test or Fisher's exact probability method. $p<0.05$ was considered a statistically significant difference.

RESULTS

Comparison of intraoperative conditions between the two groups of patients

There was no statistically significant difference between the two groups in terms of operative time, anesthesia time, total fluid intake, bleeding and intraoperative urine volume (P>0.05), see Table2.

Comparison of VAS score and number of PCA compressions between two groups of patients

The VAS scores at 0.5, 1, 2, 4 and 6h postoperatively were significantly lower in the oxycodone group than in the sufentanil group (P<0.05), and there was no statistically significant difference between the two groups at 24h and 48h postoperatively (P>0.05), see Table 3; there was no statistically significant difference between the two groups in the number of PCA compressions at 6, 24 and 48h postoperatively (P>0.05), See Table 4.

Comparison of the occurrence of adverse reactions between the two groups

There was no statistically significant difference in the incidence of nausea and vomiting, dizziness, and skin pruritus between the two groups within 48 h after surgery (P>0.05), and no respiratory depression and excessive sedation were observed in both groups, as shown in Table 5.

Comparison of efficiency between the two groups

The total effective rate was 91.30% in the TCM group and 75.00% in the Western medicine group, with a significant difference between the TCM group and the combined group (P< 0.05) (Table 6).

DISCUSSION

Facial muscle spasm is mainly caused by compression of the facial nerve at the root exitzone (REZ) by tortuous vessels [27]. There are two mainstream hypotheses about the pathogenesis of HFS: 1) the "short circuit" theory suggests that the REZ of the facial nerve is located at the junction of the central and peripheral ends of the facial nerve and has a weak myelin sheath. impulses [27]; 2) the "nuclear" theory suggests that the facial nerve exiting the brainstem area is compressed by the vasculature and generates reverse impulses, and that with increased excitability the facial nuclei are "activated", causing involuntary muscle movements 128]. Regardless of the hypothesis, "vascular compression of the nerve" is the anatomical basis, and most cases are single-vessel compression, with the anterior inferior cerebellar artery being the most common, followed by the posterior inferior cerebellar artery, and then the vertebral artery [29]. vessels simultaneously, and in rare cases, venous compression, which is consistent with the literature. One of the reasons for the 120 cases (53.6%) of left-sided facial spasm in this study, more than the 104 cases (46.4%) of right-sided, may be that the left vertebral artery is larger in diameter than the right in most people and is prone to secondary hemodynamic changes. The current ideal surgical method is facial nerve microvascular decompression, the principle of which is to reduce the compression of the nerve by separating the vascular nerve, and then the responsible vessel is separated from the root of the facial nerve by biomaterials such as polytetrafluoroethylene cotton, thus relieving symptoms [30].The outcome of MVD surgery depends largely on the accurate identification of the responsible vessel. Sometimes, we often mistake the vessels close to or parallel to the facial nerve as the responsible vessels, thus overlooking the real responsible vessels hidden in the deep surface of the cerebral sulcus. Therefore, careful intraoperative discrimination of the responsible vessel and ensuring that no other vessels are compressed in the REZ area of the facial nerve are crucial for successful surgery [3l]. The literature reports that the efficiency of MVD surgery is about 92.9.98%, including complete disappearance of spasticity symptoms, significant relief and partial relief. And with further refinement and improvement of surgical methods, the surgical efficiency rate of MVD has gradually increased. Yuan Yue et al [32] followed up 1200 patients with HFS treated surgically for MVD for 2. 10 years, and 94.3% of them had disappearance or significant relief of symptoms. Yin Gangfeng et al [33] retrospectively analyzed 833 HFS cases, and the total effective rate was 92.9%. Jin Wenyi et al [34] adjusted the evaluation

time to one year after surgery, and 990 patients out of 1010 HFS patients treated with MVD surgery or had significant remission, with a total effective rate of 98.0%. 1841 (90.8%1 patients) out of 2027 patients seen by Lee et al [20] had disappearance or significant remission of symptoms, and 113 patients (5.6%) had improvement of symptoms, with a total effectiveness rate was 96.4%. In this study, the apparent remission rate and overall effective rate at 6 months after surgery were 92.7% and 97.6%, but this study took 6 months after surgery as the time cut-off point, which does not exclude the possibility of delayed symptom remission in some patients. During the course of neurological functional disorders, the disease not only brings about a decline in physiological functions, but also leads to psychosocial problems such as lowered self-esteem, social isolation, and anxiety and depressive states. Ren Shanling et al [35] evaluated HFS using anxiety and depression scales such as the Hamilton Anxiety Inventory (HAMA) and the Hamilton Depression Inventory (HAMD) and found that HFS patients were more sensitive in interpersonal relationships and had significantly higher anxiety and depression states than healthy people, and the scores were correlated with the degree of spasticity.Young et al [7] showed that social anxiety disorder (SAD) in HFS patients Young et al [7] showed that social anxiety disorder (SAD) was significantly higher in HFS patients than in the control group, and also found that there was a correlation between spasticity duration and Liebowitz Social Anxiety Scale (LSAS) scores, and after surgical intervention in HFS patients with SAD, not only their symptoms After surgical intervention for HFS patients with SAD, not only their symptoms were reduced or disappeared, but also the level of SAD was improved. Health-related quality of life (HRQoL) is an important outcome predictor in the treatment of neurological functional disorders, focusing on changes in the psychosocial aspects of patients, including physical function, mental ability, social adjustment and general general feeling [36]. The currently generalized HRQoL scale a health survey short form SF.36 addresses several aspects of quality of life, and Reimer et al [25] applied the SF.36 to evaluate the quality of life of HFS patients and showed that compared to the general outpatients in the control group, the overall health, vitality, physical functioning, and psychological well-being of HFS patients were significantly decreased compared to healthy controls, indicating that HFS patients may be accompanied by severely impaired HRQoL, and the study suggests that quality of life evaluation should be used as an indicator to judge the treatment prognosis of HFS. However, the targeting of HFS is limited, so a specific quality of life evaluation scale is crucial in the

diagnosis and treatment of HFS, targeting the symptoms and treatment reflections related to HFS disease progression, which not only can effectively quantify the treatment effect and prognosis, but also can improve the objectivity of clinical studies and the validity of clinical data collection. In the study, on postoperative day 15, the vascular pain score of the experimental group was 2.07±0.30 and that of the control group was 3. 14±0.83. Compared with the pre-treatment VAS pain scores of 6.72±1.38 and 6.68±2.41, the VAS pain scores of the experimental group decreased significantly, and the patients' pain was significantly reduced. However, there was no significant difference between the VAS pain scores of the two groups on the first day after treatment, which was not statistically significant. The results indicated that the combined effect of Chinese and Western medicine in treating postoperative pain was better than that of single Western medicine. In terms of long-term analgesia, the TCM approach was more durable and effective and provided longer analgesia compared with Western medicine. The combination of Chinese and Western medicine can rapidly bring into play the effects of Western medicine and the long-lasting combination of Chinese medicine, complementing each other for better pain relief after neurosurgery.

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