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Clinical Efficacy of Combined Microvascular Decompression (Mvd) and Partial Sensory Rhizotomy (Psr) for Trigeminal Neuralgia

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Abstract: *Objective — To analyze the effect of microvascular decompression combined with partial sensory root resection in the clinical treatment of trigeminal neuralgia. Methods — A total of 54 patients with trigeminal neuralgia admitted to our hospital from June 2018 to June 2021 were selected as the research samples, and they were divided into the reference group (n=27) and the observation group (n=27) according to the random number table method. The reference group received microvascular decompression, while the observation group received partial sensory root resection and microvascular decompression. The treatment effect and complications of the two groups were observed, and the sleep quality and pain degree of the two groups before and after treatment were compared. Results — After treatment, the effective rate of the observation group was approximately the same as that of the reference group (P > 0.05), and the complication rate of the observation group was higher than that of the reference group, but there was no statistical difference (P > 0.05). In addition, there were no significant differences in VAS and PSQI scores between the two groups before and after treatment, and the data were similar (P > 0.05). Conclusion — For the treatment of trigeminal neuralgia, microvascular decompression has a good effect, and the effect of partial sensory root resection is also good, which can be selected as appropriate.*

Keywords: *Trigeminal neuralgia; Microvascular decompression; Efficacy; Complications; Sensory root*

1. Introduction

Among neurosurgical patients, patients with trigeminal neuralgia are commonly seen. After the disease, such patients will suffer from relatively intense pain in the trigeminal nerve region of the head and face, and the pain will occur repeatedly[1]. Most patients with trigeminal neuralgia are middle-aged and elderly people. Due to the intense pain, patients are unable to live and work normally, and their quality of life is seriously degraded, which threatens their physical health[2]. Clinical treatment of patients with trigeminal neuralgia will mostly choose drug treatment options. Although the symptoms of patients can be properly controlled, it is easy to have adverse reactions, which is detrimental to the treatment safety of patients[3]. In the surgical treatment, microvascular decompression is a standard procedure, and partial sensory root resection is also a common procedure, but most of the two procedures are used separately. In this study, two treatment options were selected for patients with trigeminal neuralgia, and the following analysis was conducted.

2. Data and Methods

2.1. Patient information

From June 2018 to June 2021, 54 patients diagnosed with trigeminal neuralgia in our department were selected as research samples. The content of this experiment was reviewed and approved by relevant departments, and the patients were fully aware of it. The subjects were randomly divided into the reference group (n=27) and the observation group (n=27). In the reference group, there were 14 males and 13 females, aged from 31 to 64 years, with a disease course of 1-7 years, 12 cases of left lesions and 15 cases of right lesions. There were 15 males and 12 females in the observation group, with the youngest age of 33 years and the largest age of 63 years. The shortest course of disease lasted 1 year and the longest was 8 years. There were 11 cases on the left side and 16 cases on the right side,

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and there was no statistical difference in the basic data between the two groups ($P > 0.05$),they were comparable.

The inclusion criteria of patients were: (1) Consistent with clinical diagnostic criteria; (2) Poor response to drug treatment; (3) Complete personal information.

The exclusion conditions were as follows: (1) Patients with mental dysfunction; (2) Subjects with contraindications for surgery; (3) Patients with malignant tumors; (4) Complicated with cardiopulmonary diseases; (5) Vascular malformation; (6) Persons in pregnancy or lactation period; (7) Patients with systemic infection.

2.2. Treatment methods

The patients in the reference group were treated with microvascular decompression after admission. The patients were treated with general anesthesia, and the operation position was lateral decubitus, ensuring that the affected side of the patient was upward, and the upper body was appropriately elevated, and the head was fixed. A 5-6-cm longitudinal incision was made in the occipital part of the mastoid process behind the patient's ear, and the incision was made layer by layer to ensure that the mastoid process and occipital bone were fully exposed.

A bone window of 1.5cm×2.5cm was made behind the mastoid process from above to the transverse sinus and forward to the sigmoid sinus to ensure the full exposure of the surgical site. After that, the patient's dura was cut open, cerebrospinal fluid was sucked out, and intracranial decompression was done. After the patient's cerebellar hemisphere collapsed, the pontine Angle area was observed.

The patient's CSF was completely aspirated and the subarachnoid space was opened to identify the location of the patient's trigeminal nerve and to identify the vascular tissue compressed by the trigeminal nerve. Then the compression of the blood vessel is conducted for free treatment, and a spacer between the trigeminal nerve and the compressed blood vessel should be placed, do a good job of fixing to avoid the spacer falling off. Finally, hemostasis was done, and the dura was sutured to the skin tissue. Finally, the incision was closed.

The patients in the observation group were treated with microvascular decompression and partial sensory root resection. The surgical approach of the patient was consistent with the treatment of the reference group. The causes of trigeminal neuralgia were determined, and whether the trigeminal nerve roots of the patient had vascular compression was checked. The superior artery, basilar artery and other tissues of the cerebellar part of the patient were observed. If there was a compressed blood vessel, microvascular decompression was performed first to ensure that the compressed blood vessel tissue of the patient was effectively separated. After that, partial sensory root resection was performed at the posterolateral 1/3 to 1/5 of the trigeminal sensory root of the patient, and the excised stump was burned with an electrocoagulator. In the operation, we should ensure the standardization, the movement should be gentle to reduce the impact on the patient's vascular tissue, avoid complications, so as to ensure the safety of the treatment of patients.

2.3. Specific indicators

The clinical efficacy of the two groups of patients after receiving different modes of treatment was compared. According to the changes of symptoms and the degree of pain relief of the patients, the efficacy was divided into ineffective, improved and significant effect. The total effective rate was expressed as (improved + significant effect)/cases × 100%. In addition, the complications of the two groups after treatment, including nausea and vomiting, vertigo and peripheral facial paralysis, were observed and analyzed.

The pain degree of the two groups before and after treatment was observed, and the VAS scale was used for analysis, with 0 point indicating no pain, 1-3 points indicating mild pain, 4-7 points indicating moderate pain, and more than 7 points indicating severe pain and unbearable pain. Patients with trigeminal neuralgia usually have sleep disorders due to pain. The sleep quality was analyzed before and after treatment, and the PSQI scale was selected to evaluate. The total score was 21, and the higher the score of the patient, the worse the sleep quality.

2.4. Statistical calculation

All data in the study were substituted into SPSS21.0 software package for processing. The count

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data were expressed as N (%) and subjected to X2 test, while the measurement data were subjected to t test. P < 0.05 was considered to be statistically different.

3. Results

3.1. Treatment effect of patients

In the reference group, 25 out of 27 patients received curative effect, including 12 patients with improved curative effect, 13 patients with significant curative effect, and 2 patients with no obvious curative effect after treatment.In the observation group, a total of 26 out of 27 patients achieved curative effect, including 14 patients with significant curative effect, 12 patients with improved curative effect, and 1 patient with ineffective curative effect. In general, the clinical effective rate of patients in the observation group after treatment was roughly comparable to that in the reference group, and there was no statistical difference after data comparison (P>0.05), as shown in Table 1.

Table 1: Comparison of clinical efficacy between the two groups after receiving different treatment methods

Groups	Invalid	Improvement	Positive	Total effective rate
Reference group(n=27)	2(7.41)	12(44.44)	13(48.15)	25(92.59)
Observation group(n=27)	1(3.70)	12(44.44)	14(51.86)	26(96.30)
x^2	——	——	——	0.35
P	——	——	——	0.552>0.05

3.2. Patient complications

In the reference group, there were two patients who developed complications after treatment, one with nausea and vomiting and the other with vertigo. There were no patients with peripheral facial paralysis. In the observation group, a total of five people developed complications, one complication was nausea and vomiting, one was vertigo, and a total of three people developed peripheral facial paralysis.In general, the incidence of complications after treatment in the observation group was higher than that in the reference group, but there was no significant difference in the data (P > 0.05), as shown in Table 2 below.

Table 2: Comparison of the incidence of complications between the two groups after treatment

Groups	Nausea and Vomiting	Vertigo	Peripheral facial palsy	The total incidence
Reference group(n=27)	1(3.70)	1(3.70)	0(0)	2(7.50)
Observation group(n=27)	1(3.70)	1(3.70)	3(11.11)	5(18.51)
x^2	——	——	——	1.477
P	——	——	——	0.224＞0.05

3.3. Sleep quality and pain

Table 3: Comparison of PSQI and VAS scores between the two groups before and after treatment with different modes

Groups	PSQI scores		VAS scores	
	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
Reference group(n=27)	13.11±0.76	3.15±0.13	7.12±1.04	2.74±0.28
Observation group(n=27)	13.12±0.74	3.13±0.11	7.11±1.02	2.73±0.27
t	0.049	0.610	0.036	0.134
P	0.961＞0.05	0.544＞0.05	0.972＞0.05	0.894＞0.05

In the two groups, before and after treatment, the score difference of sleep quality was large, but the

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score difference between the two groups was not obvious and had no statistical significance. In the two groups, before and after treatment, the score difference of pain degree was large, and the score difference between the two groups was still not obvious and had no statistical significance, as shown in Table 3.

4. Discussion

Patients with trigeminal neuralgia experience brief and recurrent episodes of intense pain in the cranial and facial trigeminal nerves. The pathogenesis of these patients is mainly due to vascular compression, peripheral nerve lesions, etc., and is also related to the decline of the patient's central nervous system. [4] Modern medical research believes that the patient's vascular compression range is large, including the Michael's capsule of the trigeminal nerve to the brainstem nerve root. There are many tiny blood vessels in this area. In addition, this area is where the myelin exchange center of the human body is located, so the self-sensitivity of blood vessels will also be higher. Once the trigeminal nerve is compressed, it can cause extremely intense pain. [5-6]

For patients with trigeminal neuralgia, the vascular compression theory is a highly recognized view in clinical practice. This view believes that the main cause of the disease is the compression of the corresponding tissues by the microvessels at the root of the trigeminal nerve, leading to the symptoms of trigeminal neuralgia. With the continuous development of clinical medicine, the development of imaging technology is fast. After patients received imaging examination, the validity of the theory of vascular compression can be confirmed. According to relevant studies, for the trigeminal nerve of patients, there are many vascular tissue types that cause compression, including the superior and inferior anterior cerebellar arteries and inferior posterior arteries, and also related to the vertebrobasilar arteries of patients. At present, it is generally believed that the responsible vessels of trigeminal nerve compression in patients are arterial vessels. There is still some debate about whether venous vessels will produce compression.

In addition, the theory of peripheral lesions is also common in the clinical analysis of trigeminal neuralgia patients. This theory is mainly believed that the cause of the patient's illness is the demyelination of the trigeminal nerve, and also related to the adjacent microvascular compression. If the trigeminal nerve demyelinates its axons, it will "short-circuit" the unsheathed fibers, which will generate smaller tactile stimuli and afferent stimuli through the "short-circuit" response, which will then produce a strong pain sensation. Patients with trigeminal neuralgia who do not receive effective treatment can be extremely severe and lead to other complications.

For patients with trigeminal neuralgia, microvascular decompression is a more commonly used treatment. This treatment scheme can eliminate the compression of the blood vessels of the patients, thereby relieving the pain of the patients, ensuring the integrity of the anatomical structure of the trigeminal nerve, and avoiding the influence of the normal function of the trigeminal nerve. Microvascular decompression can only deal with the diseased vessels of the patient, and will not bring damage to the normal tissue of the trigeminal nerve, so as to avoid the normal tissue of the patient being affected. However, many patients simply receive microvascular decompression treatment, the disease is still prone to recurrent attacks.In this study, patients with trigeminal neuralgia selected microvascular decompression and partial sensory root resection as the combined treatment.

In this way, the patient's pain can be significantly relieved. The diseased vessels can be treated first, the compression of the trigeminal nerve root can be relieved, and part of the sensory root can be removed, so as to eliminate the patient's sensory root lesions. The two treatment programs can complement each other. At the same time, partial sensory root resection can also better preserve the motor root and the first sensory root of patients, avoid the impact of chewing function of patients, and reduce the incidence of facial paralysis of patients, so as to better ensure the treatment safety of patients. For the choice of the two treatment methods, the recurrence rate of pain in some patients receiving sensory root amputation is low, but the incidence of facial numbness is high. For example, in the study, after a partial sensory root resection, three patients in the observation group developed peripheral facial palsy. Therefore, some elderly patients with no obvious requirements for facial numbness will choose to feel the partial root cut, in order to "increase the efficacy". However, some young patients may choose microvascular decompression only because of the demands of life and work.

Although the combination of simple microvascular decompression and partial sensory root resection has a good effect, there are still some problems that need to be paid attention to when the combined treatment is performed. For the treatment of MVD surgery, the key is to identify the

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responsible blood vessels of patients and reduce the nerve compression of patients as soon as possible. During the operation process, we should do a good job in the exploration and analysis of the trigeminal nerve roots of patients and find any tissue that may be the responsible blood vessels.

Generally speaking, the responsible blood vessels of patients are mainly responsible for blood supply. After separation and treatment, it should be observed whether there is any distortion, so as to avoid adverse effects on the normal blood supply of patients and lead to postoperative adverse reactions.

The REZ region of the trigeminal nerve of the patient is the key area of the responsible vessel exploration. If the blood vessel is in direct contact with the REZ region and leads to changes in the nerve, such as bending or deformation, and atrophy can occur when the lesion is serious, then this vessel is the responsible vessel of the patient. After determining the responsible vessel of the patient, the arachnoid of the responsible vessel should be dissected and dissociated to ensure that the vessel leaves the REZ area, but electrocoagulation should not be performed during the treatment. During the separation process, the Teflon spacer should be used, and ensure that the size and specification of the spacer meet the requirements of the operation, and do a good job of fixing the spacer, so as not to fall off and cause the recurrence of the patient's condition. If the patient's vein is compressed, the separation and decompression treatment is performed. If the separation is difficult, the operation can be performed by electrocoagulation cutoff. If the responsible vessel of the patient cannot be found, the trigeminal nerve root fibers can be observed under a microscope, and the surrounding adhesion tissues of the nerve root can be separated and processed, or electrocoagulation and burning can be selected according to the patient's condition.

Combined with the results of this study, it can be seen that the overall effective rate of the observation group patients who received the combined treatment of the two surgical methods reached 96.30%, which is roughly the same as the clinical effective rate of patients who received microvascular decompression alone. However, the case shows that the incidence of complications in the observation group is significantly higher than that in the reference group, but there is no significant difference in specific data. This also shows that both treatment methods can lead to complications in some patients. During treatment, relevant information can be introduced to patients in detail, so that patients can choose the surgical method based on their own needs.

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