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Comparison of the Improvement Effect of MVD and Gamma Knife on Pain, Anxiety and Depression of Patients after Treatment of Primary Trigeminal Neuralgia

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Abstract: ***Objective:*** To explore the effects of microsurgical vascular decompression (MVD) and gamma knife respectively on the treatment of pain, anxiety and depression in patients with primary trigeminal neuralgia. ***Methods:*** From February 2011 to June 2017, we treated 108 patients with primary trigeminal neuralgia. According to the treatment plan of the patients, they were divided into an observation group and a control group, 54 cases each. The observation group underwent microsurgical vascular decompression (MVD) for the treatment of primary trigeminal neuralgia, while the control group received gamma knife treatment. The effects of pain, improvement of anxiety and depression were compared between two groups at 1 week, 3 months, and 6 months after treatment. ***Results:*** The pain, anxiety and depression scores of the observation group was significantly lower than that of the control group (P<0.05). ***Conclusion:*** MVD can relieve patients' pain, anxiety and depression symptoms, as well as improve quality of life and restore self-confidence in life.

Keywords: Primary trigeminal neuralgia; Microsurgical vascular Decompression; Gamma knife; Pain; Anxiety; Depression; Effect

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Primary trigeminal neuralgia is a recurrent episodic, lightning-like pain in the trigeminal nerve distribution area. It is a common intracranial nerve disease[1-3]. Long-term pain can cause patients to have anxiety and depression, which seriously affects the quality of the patients' life. Therefore, it leads to a decline in patients' confidence in life. In addition to drug therapy, the main surgical treatment methods for primary trigeminal neuralgia include trigeminal nerve semi-lunar node radiofrequency therapy, balloon dilatation therapy, MVD, and gamma knife therapy[4, 5]. The purpose of this study was to investigate the effect of MVD and gamma knife on the treatment of pain, anxiety and depression after primary trigeminal neuralgia.

1 Materials and methods

1.1 Baseline data

From February 2011 to June 2017, we treated 108 patients with primary trigeminal neuralgia, all patients are in line with the diagnostic criteria on the primary trigeminal neuralgia in the 2004 International Headache Classification (Second Edition) of International Headache Society[6]. The secondary trigeminal neuralgia was scanned by craniocerebral MRI and so on. Through the assessment by VAS pain score, SDS self-rating depression scale, and SAS anxiety scale, all patients had varying degrees of pain, anxiety, depression before surgery, excluding pain, anxiety, depression and other adverse factors

caused by other diseases. After admission and effective communication, the patients were divided into an observation group and a control group, 54 cases each, according to different treatment methods. Among them, there were 24 males and 30 females in the observation group, aged 24-80 years, with an average age of (45±12) years, and a disease course of 1-40 years. In the control group, there were 27 males and 27 females, aged 27-75 years, with an average age of (44±10) years and a course ranging from 1-30 years. There was no statistically significant difference in gender, age, and underlying diseases among all patients. All patients met the diagnostic criteria for primary trigeminal neuralgia, without speech dysfunction. After effective communication, a treatment consent was signed. From February 2011 to June 2017, 108 patients with primary trigeminal neuralgia all met the diagnostic criteria for primary trigeminal neuralgia.

1.2 Method

1.2.1 Observation group

Observation group adopted the head frame after general anesthesia, and chose sigmoid sinus approach for craniotomy with an incision about 5cm long. A bone window was formed with a diameter of about 3cm with a microscope placed within. Intraoperative responsible blood vessels are found. Polyester sheet was used to cushion the responsible blood vessels. The patient woke up after anesthesia, and routinely infective prevention and other postoperative treatments were given. And the improvement of patients' pain, anxiety and depression were evaluated at 1 week, 3 months and 6 months after the operation.

1.2.2 Control group

The patient was treated with a gamma head holder after local anesthesia. After a cranial MRI scan and enhanced positioning, the gamma knife treatment for trigeminal nerve sensory root was given. It is usually 50% isodose curve, peripheral dose 43GY, and central dose 86GY. After treatment, mannitol and dexamethasone were given for infusion treatment. The treatment time was 5-7 days. During treatment, carbamazepine or gabapentin tablets were still required to be taken orally. The follow-up was at 1 week, 3 months, and 6 months after evaluation and treatment.

Both groups of patients were assisted by the same psychological guidance during the treatment process, mainly to establish a good doctor-patient relationship. We listened to the patient's voice, inspired the patient to fully understand that emotions are closely related to the change of the disease, and enabled the patient to establish a positive attitude.

1.3 Observation index

The VAS pain score, SDS self-rating depression scale, and SAS anxiety scale were used to assess the improvement of pain, anxiety, and depression at 1 week, 3 months, and 6 months after operation. The lower the score, the better the effect[7].

1.4 Statistical methods

The analysis was done by spss13.0 statistical software, and the measurement data was expressed as mean ± standard deviation ($\bar{x} \pm s$). It is t that used for test. It has statistically significant difference(P<0.05).

2 Results

The pain scores, anxiety scores and depression scores of the observation group were significantly lower than those of the control group (see the following table respectively) (P<0.05).

Table 1. Comparison of pain scores between two groups ($\bar{x} \pm s$, points)

	n	Before treatment	1 week after treatment	3 months after treatment	6 months after treatment
Observation group	54	8.35±1.52	0	0	0
Control group	54	8.21±1.07	7.05±1.16	4.82±1.25	3.22±1.08

Note: The two groups were compared, P<0.05

Table 2. Comparison of anxiety scores between two groups ($\bar{x} \pm s$, points)

	n	Before treatment	1 week after treatment	3 months after treatment	6 months after treatment
Observation group	54	45.34±6.34	39.42±5.43	21.25±3.25	15.25±2.28
Control group	54	46.31±7.33	44.36±6.57	39.02±5.72	30.25±3.35

Note: The two groups were compared, P<0.05

Table 3. Comparison of depression scores between two groups ($\bar{x} \pm s$, points)

	n	Before treatment	1 week after treatment	3 months after treatment	6 months after treatment
Observation group	54	49.78±3.46	44.33±3.47	27.38±4.08	18.23±2.57
Control group	54	49.86±4.57	48.69±6.21	40.23±5.89	30.57±3.52

Note: The two groups were compared, $P<0.05$

3 Discussion

The prevalence of chronic pain in adults in our country is gradually rising. Long-term chronic pain can cause patients to have varying degrees of psychological dysfunction, especially anxiety, depression and other negative emotions. Trigeminal neuralgia is the most common chronic pain which is called " the greatest pain in the world". This kind of pain attacks suddenly without warning. It comes and goes in such a sudden. Patients with trigeminal neuralgia have problems like pain, anxiety and depression, which seriously affects the quality of life. The average prevalence rates at home and abroad are 47.8/10 people and 62.6/10 people respectively[8]. The emotional response caused by anxiety and depression lost the control of the pain of patients[9,10]. The purpose of this study is to compare the improvement of patients' pain, anxiety and depression before and after MVD and gamma knife treatment. The index of pain, anxiety and depression improvement after gamma knife treatment are basically consistent with previous studies[11].

Trigeminal neuralgia currently has no specific drugs. The clinical drug treatments are mainly carbamazepine and gabapentin. However, as the treatment time is prolonged, the drug sensitivity gradually decreases and the effect also decreases significantly. The main method of previous surgery is to destroy the sensory root of trigeminal nerve to achieve the purpose of treatment, but its traumatic. Especially after treatment, patients may have decreased facial sensation and other complications, which can bring new psychological problems. With the development of clinical technology, currently the main treatment for primary trigeminal neuralgia is MVD and gamma knife treatment. MVD is used to separate the compressed blood vessels and isolate nerves. Trigeminal nerve sensory branches and local normal sensation are retained to achieve the purpose of treatment[12,13]. It is non-destructive to nerves. Pain can disappear immediately after surgery. And the condition of anxiety and depression are also greatly improved. And gamma knife treatment is to irradiate the sensory root of the trigeminal nerve with a single large dose of radiation. After a certain period of time, the nerve degenerates to achieve the purpose of reducing pain. It takes a long time to gradually reduce the pain. Therefore, it continues to rely on the control of drugs. At the same time, due to neurodegeneration, patients may suffer from decrease of facial sensation (patients often complain of facial numbness or loss of sensation). And such symptoms of facial sensation may bring new psychological problems to patients, which leads to the repetition or aggravation of anxiety and depression. Studies have shown that the long-term effectiveness of gamma knife treatment is not good, and the effective rate after 5 years of treatment has dropped to 40%[14], while the effective rate of patients remains above 90% 5 years after MVD treatment[15].

Comprehensive comparison: primary trigeminal neuralgia is treated with MVD, which is more effective in improving pain, anxiety and depression.

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