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A Study of the Quality of Life of Patients with Trigeminal Neuralgia Before and After Modern Differentiated Surgical Treatment

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Abstract The article on the occurrence of trigeminal neuralgia, its surgical treatment, and the history of the development of other methods. Modern diagnostic methods, treatment tactics, determination of the effectiveness of treatment methods. Methods of assessing the quality of life the impact of a particular treatment method on the quality of life of patients. The analysis of the effectiveness of treatment methods is given. Application of questionnaires and comparative analysis of the results to determine the quality of life before and after the treatment of trigeminal neuralgia.

Keywords Neuralgia, Trigeminal nerve, Neurosurgery, Surgical treatment, Quality of life, Questionnaires

1. Introduction

Trigeminal neuralgia (TN), a serious condition long known among scientists, does not pose a direct threat to life due to its severe attacks of pain. However, it is accompanied by such physical and emotional suffering that it dramatically complicates the patient's normal existence, making life unbearable, and can sometimes lead to suicidal attempts [2,3,5,11,12].

Pain associated with neuralgia occurs in short-term attacks of varying severity, including stabbing, cutting, and pressing, lasting from a few seconds to sometimes more than half an hour. Diagnostic criteria for TN, designed to accurately determine the condition, have been approved by the International Headache Association [2,3,5,11,12]. The etiology of trigeminal neuralgia (TN) has been the subject of ongoing debate and discussion since ancient times, but there remains no consensus. This is due to the development of diagnostic capabilities and a more precise determination of the causes of the disease [1,3,6].

Trigeminal neuralgia is a fairly common condition. According to statistics from the World Health Organization (WHO), the incidence currently ranges from thirty to fifty patients per hundred thousand inhabitants, with an incidence rate of two to four per hundred thousand inhabitants [1,3,6].

A more modern and effective method of surgical treatment for TN is microvascular decompression of the trigeminal nerve (MVD) at the brainstem to eliminate vascular-nerve conflict. Destructive methods also exist. Currently, destructive methods are rarely used due to the low effectiveness of their destructive effect on the nerve roots [8,9,10,15,17]. Currently, studying the literature, the authors note that MVD remains the method of choice if the patient is selected correctly, i.e. the established diagnosis is substantiated and confirmed by instrumental studies. The analysis concluded that the MVD provides the highest long-term patient satisfaction rate with the lowest pain recurrence rate in surgical treatment of trigeminal neuralgia [8,9,10,17].

Quality of life reflects the impact of the disease and treatment on the patient's well-being and characterizes their physical, emotional, and social well-being, which is affected by the disease or its treatment. Therefore, scientists around the world have begun to increasingly study it [4,7,13,14,16].

2. Purpose of the Research

Our research aim is to improve treatment outcomes for patients with trigeminal neuralgia through a differentiated approach, taking into account the severity of the disease and assessing quality of life.

3. Materials and Methods

This study is based on observations of 168 patients with trigeminal neuralgia treated at the Tashkent Medical Academy inpatient department, a multidisciplinary clinic, and the Department of Neurosurgery from 2019 to 2023.

We used magnetic resonance imaging (MRI) data from 1.5 to 3.0 Tesla, T2 (3D-FIESTA, DRIVE, or CISS), time-of-flight magnetic resonance angiography (MRA)

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(3D-TOF), and contrast-enhanced T1-weighted imaging to determine neurovascular dysfunction, all of which played a key role in establishing a diagnosis and determining further treatment strategies.

Our studies utilized electroneuromyography (ENMG), which determines the level of nerve branch damage, i.e., central or peripheral type irritation with 75% reliability, which gives us the opportunity, taking into account the level of damage, to choose the tactics of surgical or conservative treatment of trigeminal neuralgia.

Patients' quality of life was assessed using the "Quality of Life Assessment for Trigeminal Neuralgia" and "Pain Assessment for Trigeminal Neuralgia" questionnaires developed by the Republican Specialized Scientific and Practical Medical Center for Neurosurgery.

4. Results and Discussion

The study examined the observational data of 168 patients with trigeminal neuralgia treated in the inpatient department of the Tashkent Medical Academy, a multidisciplinary clinic, and the neurosurgery department from 2019 to 2024.

To establish a diagnosis and select a treatment method, all patients underwent a comprehensive examination, including clinical, neurological, and instrumental examinations. All patients were divided into three groups based on treatment method, severity of trigeminal neuralgia, and somatic status. The first group included 54 patients (32.2%) who underwent Gasser ganglion blocks and trigeminal nerve branch exeresis. The second group consisted of 56 patients (33.3%) who underwent microvascular decompression surgery using a modified approach proposed by the Republican Specialized Scientific and Practical Medical Center for Neurosurgery for Trigeminal Neuralgia (TN). The third group consisted of 58 patients (34.5%) who underwent microvascular decompression of the trigeminal nerve root using the existing method.

By age, the patients were distributed according to the WHO classification, which provides for the identification of age groups: young age 14-19 years; younger middle age 20-44 years; older middle age 45-59 years; elderly age 60-74 years; old age 75-89 years.

The distribution of patients by age and gender showed that among the patients, women predominated - 101 (60.2%), while men accounted for 67 (39.8%), which is 1.5 times less than women. The majority of patients were older than 69 (41.5%).

The majority of patients were in the 60-74 age group (51 patients, 30.4%), which is consistent with data from international scientists.

A physical examination revealed that among the 168 patients, 68 (40.5%) had somatic pathology, manifested as arterial hypertension in 52 (31.0%) patients and ischemic heart disease in 13 (7.8%) patients. Diabetes mellitus was noted in 18 (11.2%) cases, liver disease in 4 (2.6%) patients, and renal failure in 1 (0.9%). It should be noted that a combination of two or more somatic diseases was observed in the same patient, especially cardiovascular diseases. An analysis of the provoking factors found in the study revealed that almost all patients experienced the following: chewing and talking were provoking factors in over 93% of cases, followed by touching (8%), and cold, brushing teeth, washing, shaving, and opening the mouth (less than 5%).

Before admission to the clinic, all patients received comprehensive conservative treatment. They were treated by dentists, neurologists, and maxillofacial surgeons. During examination of patients, the following symptoms were identified as the main criteria for trigeminal neuralgia: unilateral paroxysmal facial pain, the presence of a trigger zone in 168 patients examined. The localization of trigger zones gave the following results, with a total of 32 (19.3%) observations. Among 32 patients with the presence of trigger points, the nasolabial triangle ranks first in localization 15 (48.5), followed by the mental region 8 (24.3%), the frontal-zygomatic region 2 (9.1%), and the remaining zones are the oral cavity, cheek, parotid region, Vale points, and the neck in the area of the spinous processes of the III-IV cervical vertebrae, representing from 3% to 6% of cases.

We also checked for symptoms of hypertonicity of the masticatory muscles, autonomic dysfunction, and hypoesthesia in the innervation zones of individual branches or the entire side of the face. We also confirmed that trigeminal neuralgia is characterized by short attacks (2-15 minutes) that can recur frequently (up to 30 times per day). A study of sensory disturbances in the innervation zone of the trigeminal nerve branches yielded the following results.

In our study, out of 168 patients, 90 (54%) had sensory disturbances in the innervation zone of the trigeminal nerve branches: 52.2% of cases had hypoesthesia, 40.2% had paresthesia, 6.5% had hyperesthesia, and one case of anesthesia resulted from previous surgical interventions. This case was observed among patients in the third group. As a result of multiple exeresis surgeries, sensitivity in the innervation zone was completely lost, and trophic changes in the facial muscles on the side of the affected trigeminal nerve branches occurred. This patient did not experience pain in the trigeminal nerve innervation zone after MVD, but sensitivity did not recover after destructive surgical interventions.

Autonomic dysfunction was observed in 17 (10.5%) cases in our patients. Of these, hyperemia (50.1%) was the most common, lacrimation (33.3%), and salivation (16.6%). When analyzed by group, 55.6% were in Group 3, 27.7% in Group 2, and the least common was 16.7% in Group 1. Autonomic dysfunction recovered after treatment.

An analysis of the 168 patients examined, based on the location of the affected trigeminal nerve branches, revealed the following results. Trigeminal neuralgia was observed on the right side in 131 patients (78.4%), on the left in 33 (19.8%), and on both sides in 3 (1.8%) cases. In our study, the second (33.3%) and second and third branches (4.6%) were most frequently affected, and, as noted above, right-sided neuralgia was observed in most cases, demonstrating its typical nature.

Thus, in our observations, two branches were most frequently affected simultaneously (50.9%). Involvement of all three branches was observed in 31.9% of patients, and one branch in 17.2%. Pain was most often on the right side (78.4%), on the left (19.8%), and bilateral (1.8%). Our patient study data are consistent with published data from other authors worldwide.

Positive results among the 168 patients studied were observed in 164 (97.5%), with no changes observed in 4 (2.5%). The best results were seen in the second and third groups, with all patients in these groups achieving positive results.

This demonstrates the effectiveness of surgical intervention with a differentiated approach to the treatment of trigeminal neuralgia, taking into account the patient's somatic status. Analysis of the obtained data showed that 87.8% of patients in the second and third groups showed significant improvement, 12.2% showed improvement but no change. In the first group, 9.3% showed significant improvement, 83.4% showed improvement, and 4 (7.3%) patients showed no improvement.

In our studies, microvascular decompression of the trigeminal nerve root proved to be a more effective surgical method. Patients operated on using a modified microvascular decompression approach proposed by the Republican Specialized Scientific and Practical Medical Center for Neurosurgery for Trigeminal Neuralgia, compared to the existing microvascular decompression approach at the brainstem, since 87.8% of the total number of 168 patients treated in the second and third groups showed significant improvement.

The use of the “Quality of Life Assessment in Trigeminal Neuralgia” questionnaire showed that the quality of life in all study groups was similar: that is, before surgery, quality of life indicators was low in all groups.

Following treatment, patients with trigeminal neuralgia immediately began to improve their quality of life, particularly significantly in the second and third groups. Positive results were also seen in patients in the first group.

The "Trigeminal Neuralgia Pain Assessment" questionnaire revealed that preoperative pain parameters varied significantly across all groups, with scores varying.

High scores were recorded in the first group before surgery, corresponding to severe pain intensity. After treatment, pain decreased to moderate levels in both groups, as indicated by questionnaire data.

Almost all patients underwent dental treatment, including tooth extraction. Further pain progression allowed for an accurate diagnosis and subsequent treatment of the underlying condition.

According to the "Trigeminal Neuralgia Pain Assessment" questionnaire, a score of up to 10 points indicates mild trigeminal neuralgia, 11-21 points indicates moderate trigeminal neuralgia, and 22-32 points indicates severe trigeminal neuralgia. Out of 168 patients with trigeminal neuralgia, the questionnaire revealed mild pain in 40 (24.4%), moderate pain in 119 (71.3%), and severe pain in 9 (5.2%). In the postoperative period, a complete absence of pain was noted in 164 (97.3%) patients, and mild pain in 5 (2.9%) patients. According to the questionnaire “Assessment of the quality of life in trigeminal neuralgia”: a sum of up to 10 points is a slight deterioration in the quality of life, 11-21 points is a moderate deterioration in the quality of life, 22-33 points – significant deterioration in quality of life. A questionnaire-based assessment of quality of life in 168 patients with trigeminal neuralgia revealed a significant deterioration in quality of life in the preoperative period in 128 (76.5%) patients, and a worsening of quality of life in 40 (24.4%) patients. Postoperatively, 17 patients (10.4%) experienced a significant improvement in quality of life, 143 (85.4%) experienced an improvement, and 7 (4.3%) patients experienced a slight improvement in quality of life.

5. Conclusions

1. The distribution of patients by age and gender showed that women predominated among the patients (101 (60.2%), while men accounted for 67 (39.8%), which is 1.5 times less than women. The majority of patients (69 patients, 41.5%) were middle-aged or elderly, with the largest number of patients (51 patients, 30.4%) aged 60-74 years, consistent with data from international scientists.
2. Chewing and talking were the precipitating factors in over 93% of cases, followed by touching (up to 8% of cases), and cold, brushing teeth, washing, shaving, and opening the mouth (less than 5%).
3. Examination of the somatic status revealed that among 168 patients, 68 (40.5%) had somatic pathology, manifested as arterial hypertension in 52 (31.0%) patients and ischemic heart disease in 13 (7.8%) patients. Diabetes mellitus was noted in 18 (11.2%) cases, liver pathology in 4 (2.6%) patients, and renal failure in 1 (0.9%).
4. The presence of a trigger zone in the 168 patients examined. The localization of trigger zones yielded the following results, with a total of 32 (19.3%) observations. Among the 32 patients with the presence of trigger points, the nasolabial triangle ranks first in localization (15 (48.5%)), the mental region ranks second (8 (24.3%), the frontal-zygomatic region ranks third (2 (9.1%)), and the remaining zones are the oral cavity, cheek, parotid region, Vale points, and the neck in the area of the spinous processes of the III-IV cervical vertebrae, representing from 3% to 6% of cases.
5. In our study, 90 (54%) of 168 patients had sensory disturbances in the innervation zone of the trigeminal nerve branches: hypesthesia (52.2%), paresthesia (40.2%), hyperesthesia (6.5%), and one case of anesthesia due to previous surgical interventions.
6. Autonomic disorders were observed in 17 (10.5%) cases

in our patients, with hyperemia (50.1%) being the most common, lacrimation (33.3%), and salivation (16.6%).

7. Positive results among the 168 patients studied were noted in 164 (97.5%), with no changes in 4 (2.5%). The best results were in the second and third groups, with positive results obtained in all patients in these groups.
8. Assessment of pain syndrome in trigeminal neuralgia using a questionnaire allowed us to identify mild pain in 40 (24.4%) patients, moderate pain in 119 (71.3%), and severe pain in 9 (5.2%). In the postoperative period, a complete absence of pain was noted in 164 (97.3%) patients and mild pain in 5 (2.9%) patients.
9. Assessment of quality of life using a questionnaire in 168 patients with trigeminal neuralgia showed a significant deterioration in quality of life in the preoperative period in 128 (76.5%) patients, and a deterioration in quality of life in 40 (24.4%) patients. In the postoperative period, patients with a significant improvement in quality of life amounted to 17 (10.4%) and with improvement – 143 (85.4%), a slight improvement in quality of life was noted in 7 (4.3%) patients.

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