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# Clinical and Immunologic Evaluation of Pulpitis Patients with Painful Symptoms

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**Abstract:** The pathology of the pulp, which is most often manifested by chronic pulpitis, can lead to the occurrence of atypical facial pain. It is known that the pain of pulpitis is one of the most severe and causes suffering to the patient. The study would allow the dentist to consider pulpitis pain not only as a symptom of a dental disease, but also as a systemic syndrome in which the nervous system, the patient's psyche, his ability to work and quality of life suffer. As a result of clinical and immunological studies, the clinical and pathophysiological features of atypical facial pain in pulpitis have been clarified. Treatment of pulpitis cannot be limited only to endodontic and restoration measures, it must include a set of diagnostic and rehabilitation measures aimed at restoring the neuropsychiatric and immunological health of the patient.

**Keywords:** pulpitis with pain symptom; nervous system; facial pain; pain syndrome.

**Introduction.** The relevance of studying the mechanisms of pain and pain relief is determined by its general medical and socio-economic significance for society [2,5,6,12]. In recent decades, intensive research has been conducted on the mechanisms of pain, the search for effective means of its suppression and pathogenetic treatment. Facial pain is a symptom complex characterized by sensitive, vegetative and motor disorders in the face or oral organs [1, 3,8,9].

Unlike physiological pain, which plays the role of a trigger mechanism for the body's protective reactions, pathological pain has a maladaptive, pathogenic significance and differs significantly in its characteristics and mechanisms. With persistent chronic pain syndromes, prolonged use of medications very often leads to drug intoxication, allergies, and immunodeficiency. It is clear that the further search for ways to prevent and treat severe syndromes should be associated with fundamental research that reveals the essence of pathological pain.

Currently, according to the International Classification of Diseases (ICD-10), pain symptoms in the face and oral organs are classified as follows:

- ✓ typical neuralgia of the fifth pair of cranial nerves;
- ✓ atypical facial neuralgia;
- ✓ craniofacial pain that occurs secondarily in the presence of other extra- and intracranial pathologies.

Thus, atypical facial pains include pain syndromes in the face-and oral organs- associated with pathology of the teeth, temporomandibular joint, masticatory muscles, bone tissue, and mucous membrane. According to the literature, atypical facial pain occurs more often in women after 40 years of age [7,11,13,15].

Among neurostomatological diseases, atypical facial pain averages 6.4% [19]. The pathology of the pulp, which is most often manifested by chronic pulpitis, can also lead to the occurrence of atypical facial pain. It is known that the pain of pulpitis is one of the most severe and causes suffering to the

patient. Often it does not allow you to sleep, fully chew food, makes a person irritable and short-tempered. However, the fear of dental treatment or other reasons make you endure this pain for a long time, use all possible means of self-control against it, which most often turn out to be temporary and ineffective [14,15].

Despite a long-term study of the problem of odontogenic facial pain, the clinical and pathophysiological features of atypical facial pain in pulpitis have not yet been clarified. Such a study would allow a dentist to consider pulpitis pain not only as a symptom of a dental disease, but also as a systemic syndrome in which the nervous system, the patient's psyche, his ability to work and quality of life suffer [17].

The aim of the study was to study the complex of clinical and immunological parameters in patients with pulpitis.

**Materials and methods of research.**

107 patients aged 18 to 64 years with facial pain caused by inflammation of the dental pulp were examined. The average age was 36±1.2 years. The majority of the examined (87.9%) were patients aged 20 to 49 years, fewer patients aged under 20 (3.7%) and after 50 (8.4%). The ratio of men to women was 48 (44.9%) to 59 (55.1%).

Persons with typical facial pain characteristic of trigeminal neuralgia, as well as persons with a history of demyelinating and rheumatic diseases, were excluded from the analysis of the results of this study.

Facial pain was often detected on the right side - in 60.7% of cases. Bilateral pain was detected only in 1 observation

When conducting immunological studies, "we compared the obtained results with similar ones obtained from practically healthy volunteers. This comparison group consisted of 20 people with a sanitized oral cavity who do not have acute and chronic somatic and neuropsychiatric pathology. There were 8 men and 12 women among them. Their age, almost like in the main group, ranged from 18 to 62 years. The average age was 34.2±3.1 years

Methods of immunological research

They included the determination of serum levels of antibodies to myeloperoxidase (MPO) and antibodies to the main protein of myelin (MBM) using immunoassay (ELISA) [11,13]. For this purpose, test systems from Navina (Russia) were used.

The content of myeloperoxidase was determined using monospecific polyclonal antibodies in a solid-phase enzyme immunoassay. The principle of the method consists in the interaction of myeloperoxidase with antibodies to it on a tablet, followed by the determination of optical density on a Multiscan spectrophotometer at a wavelength of 492 nm. The obtained indicators were compared with those of the comparison group.

If the analysis is carried out correctly, the average OP value in wells with positive control serum should be higher than in wells with negative control serum by at least 0.5 units of optical density.

As is known, myelin is one of the main components of the human nervous system, it is part of both nerve cells and nerve fibers. Studying the level of antibodies to its main component allowed us to judge the autoimmune processes directly affecting the human nervous system in pulpitis, accompanied by the destruction of myelin.

Antibodies to the common myelin protein were determined by the method of enzyme immunoassay using a set of reagents developed by N.E. Yasrebova and N.P. Vaneeva.

The determination was carried out due to the specific interaction of MBM sorbed on a tablet with antibodies to it contained in the blood serum. The registration was carried out on a Multiskan spectrophotometer at a wavelength of 492 nm. The ELISA was carried out using automatic micro pipettes. The kit includes the following components: immunosorbent polystyrene tablets, in the wells

of which the drug MBM from the brain of a rabbit, bull or human is sorbed; positive control is a drug from human blood serum containing antibodies to MBM above the diagnostic level; conjugate - diagnostic antibodies against human immunoglobulins labeled with peroxidase, OFD, FSB-D, CFB-P, "stop reagent" - 2M sulfuric acid solution.

The course of the analysis consists in washing the immunosorbent with a solution (FSB- D) in a volume of at least 0.2 ml and holding the tablet at room temperature for 2-6 minutes. Then the contents of the wells were removed by shaking. The washing was repeated twice. Then a serum sample was introduced and incubated at a temperature of 36.5 - 37.5 ° C for 60 minutes. The next step is to wash away the excess of antibodies. Then a conjugate was introduced — 0.1 ml of diagnostic antibodies against human immunoglobulins G, enriched with peroxidase. After that, the incubation was carried out for 60 minutes, removing the excess conjugate, and a substrate-indicator mixture was introduced. Then the reaction was reincubated and stopped by adding 0.05 ml of the "stop reagent" - 2M sulfuric acid solution to the wells of the tablet.

The immunological study was carried out in the Laboratory of Reproductive Immunology at the Institute of Human Immunology and Genomics of the Scientific Research Center.

The obtained data were subjected to statistical processing on a computer with a Pentium-IV processor using the Microsoft Office Excel-2003 software package, including the use of built-in statistical processing functions.

The results of the clinical trial

All 107 patients with pain symptoms examined by us needed oral sanitation.The hygienic condition of the oral cavity was assessed in all the examined patients using the Fedorov -Volodkina hygienic index.

Periodontal diseases were diagnosed in 59 (55.1%) patients, the failure of orthopedic structures with tooth loss was noted in 14 of 37 prosthetic patients (37.8%); malocclusion was detected in 28 (26.2%) of all examined. The prevalence of the carious process in the examined patients was 100%.

In all patients, the leading complaint was a painful symptom of varying duration, localization and intensity. With the progression of the inflammatory process in the dental pulp, the pain increased, became aching and painful, localized in the projection area of the affected dental plexus. The pain covered the tooth, gum and alveolar process. In most cases (53.7%), the upper dental plexus suffered. Against the background of aching pains, 19.6% of patients had an attack-like increase in pain lasting from several seconds to 1 minute.

Pain paroxysms occurred with varying frequency from 3-4 times a day to 5-7 attacks per hour. The localization of pain corresponded to the affected dental plexus. The pain was most often localized in molars (61.1%) and premolars (36.1%), less often in canines (0.9%) and incisors (1.9%).

During the attack, the pain radiated along the alveolar plexus, and also spread to the hard palate, cheek and temple area. When the lower plexus was affected, the pain covered the bottom of the oral cavity, buccal and parotid region. During the attack, the patients were passive, assumed a horizontal position and applied heat to the cheek. At the end of the attack, the pain was localized in the area of the corresponding tooth, where the affected dental plexus was located. The duration of the pain symptom in patients revealed during the examination ranged from 3 days to 7 months.

A detailed neurological examination of patients with pulpitis pain revealed the symptoms of damage to the nervous system. The most common symptoms were tinnitus and ringing in the ears, hearing loss, dizziness of a systemic and non-systemic nature, headache, unsteadiness when walking, nausea and vomiting.

The examined patients complained of general weakness, decreased performance, fatigue, sweating (especially at night), an increase in body temperature (37.1 °- 37.7 ° C), a decrease in body weight.

In some patients with long-term pain symptoms, we noted (both subjectively and objectively) violations of salivation. In some cases, hyposalivation was detected, in which patients complained of

dry mouth. However, on the contrary, most of these patients noted increased salivation, especially during a pain attack.

Pain in the movement of the eyeballs was observed in 11.2% of patients. Violation of the innervation of the facial nerve was manifested in 45.8% of patients with unilateral flattening of the nasolabial fold, which indicates the central nature of the lesion. Language deviation was observed in 17.8% of patients.

The syndrome of multiple cerebral microsymptomatics was detected in 37.4% of patients, and 28.0% of patients were diagnosed with grade I dental neuralgia, and 34.6% of patients with grade II dental neuralgia. This syndrome is characterized by the presence of subjective neurological symptoms and focal microsymptoms in the form of insufficient convergence of the eyeballs, decreased corneal reflexes, smoothness of the nasolabial fold, deviation of the tongue, reflexes of oral automatism.

Focal brain lesion syndrome was observed in 24.3% of patients, with grade I dental neuralgia detected in 4.7% of patients, and grade I in 19.6% of patients. This syndrome is characterized by the presence of focal neurological symptoms associated with circulatory disorders in a certain vascular basin. The focal symptoms were mostly mild and had a transient or persistent character; manifested most often in the form of an alternating syndrome, systemic dizziness, hemihypesthesia, hemiparesis, aphasia.

**The results of the immunological study**

We have determined the content of antibodies to myeloperoxidase in the blood serum of patients with subjective and objective signs of dental neuralgia (main group). The results obtained were compared with those in the comparison group

Immunological studies have revealed a significant increase in indicators in patients with atypical facial pain, compared with the data of the comparison group, the highest levels of antibodies to mycoperoxidase were observed in lesions of the dental plexus of the molars. The lesion of the dental plexus is accompanied by a high titer of antibodies to myeloperoxidase, which indicates inflammation of the microvessels.

The presence of exudative and productive vasculitis during histological examination of the pulp in patients is evidenced by microscopic examination data.

An established increase in the titers of antibodies to myeloperoxidase in patients with dental neuralgia indicates the presence of systemic vasculitis, since these antibodies are one of the markers of inflammatory damage to small vessels.

Thus, dental neuralgia was the result of a systemic vascular process occurring according to the type of vasculitis caused by allergization to infectious and allergic factors.

We also studied antibodies to the total myelin b protein in the blood serum of patients with dental neuropathy in comparison with the analogous indicator of the comparison group

Determination of the level of antibodies to the common myelin protein also revealed a significant increase in its level in the group of patients with dental neuropathy compared with similar indicators in the comparison group.

As can be seen from the table above, the highest content of the studied antibodies was determined during exacerbation of chronic pulpitis, which, in our opinion, indicates a higher degree of autoimmune process at this stage of dental plexopathy. This is due to the connection of chronic inflammatory and autoimmune processes in atypical facial pain with pathology of the terminal branches of the trigeminal nerve.

In the venous blood of patients with pulpitis with a painful symptom, the number of antibodies to myeloperoxidase is 6.2 times higher than in healthy patients, which indicates a direct connection between inflammatory and autoimmune processes in atypical facial pain with pathology of the terminal branches of the trigeminal nerve. The studied immunological parameters have a direct statistically significant dependence on the duration and phase of the disease, the size of the dental plexus. Patients with pulpitis and severe pain symptoms should be classified as at risk of dental

diseases, and therefore, in 100% of cases, they require oral sanitation. The obtained research results are recommended to be used in the activities of dental therapists to prevent the development of pain symptoms and prevent the development of a neurological picture of the process.

**Conclusions**

1. Inflammation in the dental pulp in the examined patients is accompanied not only by a painful symptom, the features of which are due to a number of pathophysiological processes, but also by disorders of the immune and nervous systems, manifested in 42.1% of patients with vegetative-vascular dystonia syndrome, 24.3% - focal brain lesions combined with dental plexopathy.
2. In the venous blood of patients with pulpitis with a painful symptom, the number of antibodies to myeloperoxidase is 6.2 times higher, and to the total myelin protein is 3 times higher than in healthy patients, which indicates a direct connection between inflammatory and autoimmune processes in atypical facial pain with pathology of the terminal branches of the trigeminal nerve.
3. The studied immunological parameters have a direct statistically significant dependence on the duration and phase of the disease, the size of the dental plexus.
4. Treatment of pulpitis cannot be limited only to endodontic and restoration measures, it must include a set of diagnostic and rehabilitation measures aimed at restoring the neuropsychiatric and immunological health of the patient.

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