



ORIGINAL ARTICLE

Methods improvement for diagnostics and treatment of inflammatory diseases in the temporomandibular joint



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Maxillofacial region injuries;
Osteoarthritis

Abstract *Purpose:* The article subject relevance is conditioned by poor knowledge of the aetiology and pathogenesis of inflammatory diseases in this area. The purpose of this study was to identify the most rational approach to solving the issues of improving methods for treating arthritis and arthrosis.

Methods: The leading approach was the combination of the analysis results concerning the clinical examination of dental patients of various age groups with the logical construction of conclusions drawn from the research results. The paper presented the clinical examination data of patients with TMJ pathologies of various age groups and described the methods of their treatment.

Results: The results include the main effective methods identification for the diagnostics and treatment of inflammatory diseases in the temporomandibular joint and the main prospects for improving these methods in the future, with the aim of a general expansion of ideas regarding the possibilities of diagnostics and treatment of such diseases.

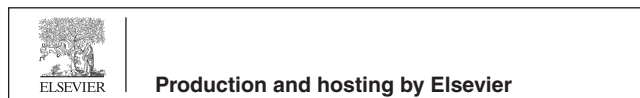
Conclusion: The study value lies in the possibility of using its results in practical dentistry to bring practical improvements to the currently available methods for diagnostics and treatment of inflammatory TMJ diseases.

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1. Introduction

In the practice of a dentist, temporomandibular joint diseases are quite common, difficult to treat and, with long-term arthralgia, are painful for patients (Ulmner et al., 2020; Ruggiero, 2015; Mupparapu, 2015). Despite the fact that patients with temporomandibular joint (TMJ) diseases mostly require a multilevel examination and treatment, they are rarely hospitalised in specialised departments of maxillofacial surgery and dentistry of multidisciplinary medical institutions. More often, such patients undergo diagnostic measures on an outpatient basis (Iordanishvili and Serikov, 2016; Stoustrup et al., 2020). The diagnostics of patients with maxillary joint pathology is made after clinical, radiological and laboratory examinations.

In this context, the prevalence of the disease increases with age. Thus, in the population of older people, it can reach 36%. Etiological factors of TMJ osteoarthritis can be age and genetic predisposition, abnormalities or disorders of the joint and surrounding muscles, previous injuries of the joint or mandible, systemic factors (Tarasov et al., 2016). The clinical symptoms of TMJ diseases, namely osteoarthritis, are joint pain, limitation of its mobility and specific joint sounds. Dentistry specialists distinguish three stages of this disease (Fonseca, 2017; Wu et al., 2020). The initial stage, lasting up to 4 years, is manifested by the presence of a squeak and crunch when the temporomandibular joint is active. The intermediate stage lasts from 6 months to a year and is associated with joint destruction. In this case, there is pain in the joint at rest or during exertion, restriction of mouth opening, grinding sounds in the joint. On average, 5.5 years pass from the initial to the final stage (Tarasov et al., 2016; Ulmner et al., 2021; Haack et al., 2020). In general, the clinical picture of muscle and joint dysfunction is described by the presence of various pathological temporomandibular joint and masticatory muscles symptoms.

The purpose of this study was to identify the most rational approach to solving the issues of improving methods for treating arthritis and arthrosis.

2. Materials and methods

The objects of this study were dental patients of various age groups with TMJ diseases. In the course of the study, a clinical examination of 35 dental patients aged 15–19, 20–29, and more than 60 years old with an inflammatory disease of the temporomandibular joint was carried out, who were on outpatient treatment from 2014 to 2015. Table 1 presents the data on the distribution of patients by sex and age.

Patients of the study group complained of a shooting headache of varying intensity in one half of the face and head radiating to the neck; ear pain – 50% of patients complain of ear pain, non-infectious pathology; sounds similar to grinding, crunching and clicks are characteristic of patients with inflammatory diseases of the temporomandibular joint, these sounds are accompanied by increased pain, dizziness; 1/3 of patients report ear fullness; 40% of patients have ringing in the ears, restriction of opening the mouth, noise in the joint in the form of rustling or friction (crunching), crepitus or clicking. The control group consisted of 10 examined patients aged 15–19 and over 60. No pathological changes in the temporomandibular joint were revealed in all the patients of the control group.

The leading approach in this study was the combination of the analysis results concerning the clinical examination of dental patients of various age groups with the logical construction of conclusions drawn from the results of this examination. All examined patients underwent clinical and laboratory studies. The X-ray method was carried out to assess the condition of the articular head, articular disc and their relative position. In a specific case under consideration, the following treatment method is often used, which gives good results. The point of this method is that osteotropic antibiotics are injected into the articular cavity with the addition of pain relievers and thus pain is relieved, temporomandibular joint trophicity and movement are improved, solid food intake is facilitated, and additional activity is introduced. The course of treatment is 10 days, followed by enzyme electrophoresis. This method will be improved and implemented among dental practitioners.

3. Results and discussion

Various pain sensations in the temporomandibular joint can be caused both by damage to the joint itself and by the pathology of the surrounding tissues. They are manifested by trophicity disruption of the cartilaginous surfaces of the joint, its bone component and surrounding formations. In 70–80% of cases, radiography of the temporomandibular joint indicates that pathological processes in the joint are associated with the pathology of its soft tissue components of the articular disc, intra-articular ligaments and capsule. The risk of developing arthritis and arthrosis increases with age. However, due to the disproportionate development of the skeleton in adolescence, TMJ osteoarthritis can also occur, often called juvenile or adolescent (Tsai et al., 2021; Leissner et al., 2021) (Figs. 1 and 2).

Medicinal treatment involves the use of sedatives, antidepressants, and muscle relaxants. Prescribing these medications according to the indications allows relieving feelings of emo-

Table 1 Distribution by sex and age of patients who took part in experimental studies.

Group	Number of patients	Sex		Age		
		Male	Female	Up to 19	20–29	Over 60
Study	35	15	20	17	7	11
Control	10	5	5	5	2	3
Total	45	20	25	22	9	14

Source: Chazal et al. (2018) and Petsos et al. (2021).

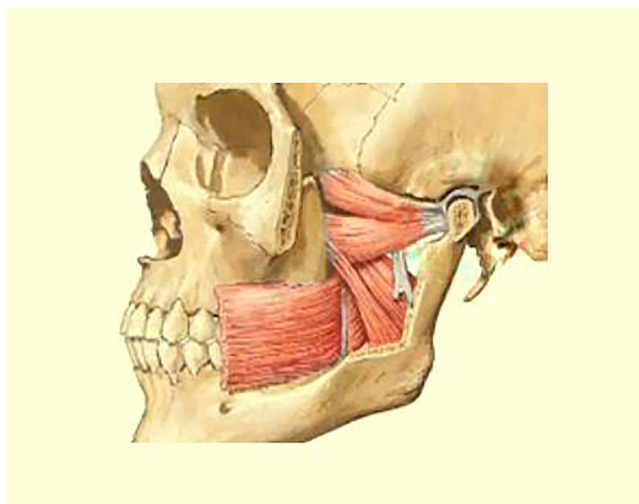


Fig. 1 Normal position of the temporomandibular joint.

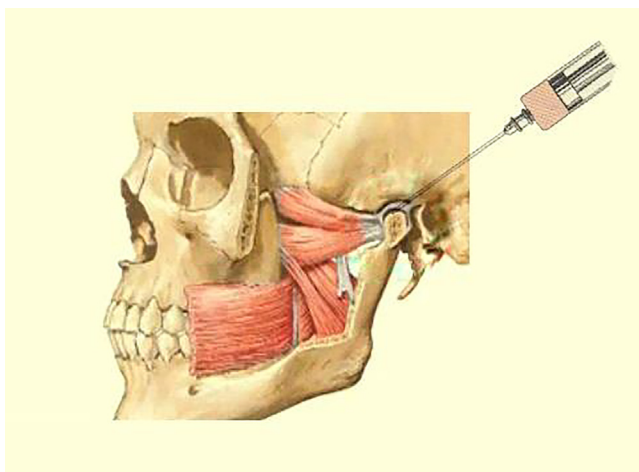


Fig. 2 Pathological processes of the joint.

tional stress, fear, as well as reducing the spasm of the chewing muscles and pain. In addition, upon treating inflammatory TMJ diseases, one should consider the aetiology of the course of the disease, its pathogenesis, stage, individual characteristics of the patient and his or her current mental state. Since the development of a specific inflammatory disease is associated with the formation of a kind of vicious cycle “spasm – pain – spasm – pain”, it is possible to break this pathological chain if due attention is paid to the external causes of its occurrence (Regezi et al., 2016; Bagheri et al., 2017).

At the first visit, it is necessary to give the patient the main information about the disease; draw his or her attention to the need to completely eliminate stressful situations from his or her life; limit the movement of the lower jaw, exclude liquid food. It is important to perform dental debridement, rational prosthetics, and selective grinding of teeth. Acupuncture is indicated. Therapeutic exercises, autogenic training will help (effective in the initial signs of the disease). Therapeutic exercises should be preceded by thermal procedures. The best practical results in improving the methods for diagnostics and treatment of inflammatory TMJ diseases can be obtained if

the optimal combination of these methods is selected in each specific case, considering the individual characteristics of the patient.

The issues of improving the methods for diagnostics and treatment of inflammatory diseases in the temporomandibular joint are widely discussed in the scientific literature, which emphasises the importance of such issues and the need to find ways of their practical solution. Thus, researchers [Iordanishvili and Serikov \(2016\)](#), upon working on methodology for the diagnostics of TMJ diseases, noted that to arrive at an accurate diagnosis and refer the patient for further examination, it is important to know not only the clinical manifestations of various TMJ pathologies, but also the classification of its diseases, which are very diverse. Among the TMJ pathologies, the most common in clinical practice are dysfunctions, arthrosis, dislocation of the mandible, less often – arthritis, ankylosis, and tumours of this joint ([Yessimov et al., 2019](#)).

For its part, in their joint study, the team of authors represented by [Tarasov et al. \(2016\)](#) addressed the fact that upon diagnosing TMJ diseases, apart from anamnestic data and physical examination, it is advisable to use instrumental methods of diagnostics: Schuller’s view, Mayer’s view; it is also recommended to use zonography, ultrasonography, X-ray computed tomography (CT), magnetic resonance imaging (MRI). Morphological changes in TMJ detected by instrumental methods include erosion of the articular surface (up to 31% of cases), flattening of the condylar process surfaces of the mandible and glenoid fossa (up to 77% of cases), subchondral cysts and osteophytes (up to 77% of cases) ([Zhumalina et al., 2020](#)).

In turn, [Waldman \(2018\)](#), in the study of syndromes of diseases of the oral cavity in general and the temporomandibular joint in particular, noted that the clinical picture of acute arthritis of this joint has the following symptoms: joint pain, aggravated by movement of the lower jaw, radiating to various parts of the maxillofacial area, and at rest there is less pain. Opening of mouth – 0.5–1 cm. When opening the mouth, the jaw shifts to the sore side. There may be swelling. In arthrempyesis, there is tissue infiltration in the tragus area, the skin is strained into a fold, it does not gather. A quick and accurate choice of a treatment method in this case largely determines the final result. Thus, the discussion of the stated subject reveals a variety of researchers’ opinions on the improvement of methods for the diagnostics and treatment of inflammatory TMJ diseases, which largely determines the prospects for further research in this area.

4. Conclusions

The diagnostics of inflammatory TMJ diseases is rather difficult since it is associated with the need to objectively evaluate the various clinical manifestations of this pathology. Practical improvement of methods for the diagnostics and treatment of inflammatory TMJ diseases becomes possible due to the development of modern methods of computer diagnostics, which allow identifying the onset of the disease at its early stage, as well as the introduction of a series of measures to prevent the development of an already identified pathology. Ultimately, the decisive factor influencing the effectiveness of diagnostics and treatment of inflammatory TMJ diseases is the individual characteristics of the patient, including their age,

as well as the degree of neglect of this pathology. Such factors should be considered decisive in the choice of methods for treating these diseases, since the final results depend on the correct choice of methods for treating patients.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. A study was approved by National Ethics Commission of the Ministry of Health of the Republic of Kazakhstan, No. 865-3.

CRediT authorship contribution statement

Fazladin T. Temurov: Conceptualization, Software, Supervision. **Elmira A. Kozhambekova:** Data curation, Writing – original draft, Supervision. **Meirambek O. Syzdykov:** Visualization, Investigation, Writing – review & editing. **Gamal K. Ashirbekov:** Supervision, Software, Validation, Writing – review & editing. **Sardor U. Safarbaev:** Methodology, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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