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FEATURES OF THE USE OF PLATELET AUTOPLASM IN THE TREATMENT OF DYSFUNCTION OF THE TEMPOROMANDIBULAR JOINT

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Abstract: The aim was to study the effect of autoplasma enriched with platelets in the treatment of patients with dysfunction of the temporomandibular joint. Patients with signs of TMJ dysfunction were subjected to a comprehensive examination, including a clinical analysis of TMJ and TMJ magnetic resonance imaging. Patients were randomized in the two groups. In the first group, patients underwent complex treatment of temporomandibular joint dysfunction according to indications. Patients of the second group additionally underwent arthrocentesis using autoplasma enriched with platelets. In patients underwent arthrocentesis, meniscus was restored, clicks and pain in the joint decreased or disappeared. After 6 months, there was a decrease in the severity of degeneration of the meniscus and the heads of the lower jaw, which can be explained by the ability of autoplasma containing platelets to repair tissues.

Key words: temporomandibular joint dysfunction, magnetic resonance imaging, joint aligners, autoplasm enriched with platelets.

Pain dysfunction of the temporomandibular joint (TMJ) is a disease that has recently become common among patients of different age groups.

The increase in the prevalence of painful PDTMJ is noted by domestic specialists and dentists from around the world [1,3]. Disorders of the temporomandibular joint (TMJ), according to various domestic and foreign sources, are detected in 65-95% of patients examined at a dental appointment [4,8]. Along with the well-known traditional methods of treating PDTMJ, the use of platelet-enriched autoplasm of patients is of interest. A number of researchers have proved the prospects of this method in medicine and dentistry in particular, explaining the effectiveness of the method by the presence of growth factors in plasma [1, 3, 5].

The method is considered minimally invasive, safe, and eliminates the risk of allergic reactions, since the fraction injected into the TMJ capsule is isolated from the venous blood of the patient himself. Methods of arthrocentesis, arthroplavage, and hydraulic meniscus reposition are also widely used in the treatment of patients with PDTMJ [5, 8].

The aim of the study was to study the effectiveness of the use of platelet–enriched autoplasm in the complex treatment of patients with PDTMJ.

Material and methods. The study included 200 patients of both sexes aged 23 to 58 years who complained of pain and dysfunction of the TMJ, and patients whose TMJ dysfunction was detected at a dental appointment. In a clinical examination, the main criteria for assessing PDTMJ were the presence of pain in the joint area, amplitude limitations, or vice versa – hypermobility of the lower jaw when opening the mouth, deflection or deviation of the lower incisive point. After clinical

examination, all patients underwent magnetic resonance imaging (MRI) of the TMJ with open and closed mouth, in oblique, frontal, horizontal projections, in t-1 and t-2-weighted modes, which made it possible to determine or exclude morphological changes in the structural elements of the TMJ, to assess the severity of morphofunctional disorders, violations of the topography of the lower jaws relative to the skull in statics and dynamics, to identify violations of the shape and (or) structure, topography of the articular disc (meniscus), condition and shape of the articular heads. The analysis of the condition of the articular meniscus disk assessed its topography – dislocation, the presence of deformities and degenerative changes [1,2,4].

The criteria for exclusion from the study were age under 18 years, the presence of large dental defects, complete loss of teeth, exacerbations of chronic general somatic diseases, mental disorders, active orthodontic treatment, the presence of neoplasms, myocardial infarction, surgical interventions in the field of TMJ in the anamnesis, lack of informed consent to participate in the study. All patients were randomized into two equal groups of 100 people, regardless of the causes, stage, degree of PDTMJ (double-blind method). In the first group, treatment was carried out in accordance with the classical complex treatment scheme, including selective grinding of supercontacts of dentition, drug treatment, the use of occlusive splints, mouthguards, orthotics. Patients of the second group, in addition to the classical complex treatment regimen, underwent arthrocentesis and hydraulic meniscus reposition with platelet-enriched autoplasm of the patient. To do this, venous blood (12-18 ml) was taken from patients into vacuum containers using sterile disposable systems. Vacutainers were centrifuged for 5 minutes at a speed of 1000 revolutions per minute to separate platelet-enriched plasma. Under infiltration anesthesia with a solution of articaine hydrochloride – 40 mg per 1 ml, epinephrine hydrochloride – 0.0061 mg per 1 ml, in an amount of 1.7 ml, arthroplasty was performed with sterile saline solution (100 ml) of the upper and lower articular fissure using four arthroplasty needles. Two needles were used in the upper part and two in the lower part of the TMJ to wash the joint cracks with saline solution. Then one needle was removed from each floor of the TMJ, platelet–rich plasma (1.5-2 ml) was injected through the remaining needles into the upper and lower sections of the TMJ until hydraulic pressure was reached. After the manipulations, the patient was placed on the lower dentition with an orthotic made in advance according to the results of an MRI analysis, which allowed the articular surfaces of the TMJ to be separated by the amount necessary for meniscus reposition. This value was determined by analyzing the TMJ MRI. The procedure was completed by administration of platelet–rich plasma in a volume of 1.5-2 ml paracapsularly from the ventral side of the meniscus. A pressure bandage was applied to the injection sites. The Kolmogorov-Smirnov test was used to determine the normality of the data distribution. The Kruskal–Wallis, Mann–Whitney, and Wilcoxon W-test were used to compare abnormally distributed variables. The level of statistical significance was $p<0.05$, the confidence interval was 95%.

Results and discussion. The results of treatment were analyzed 2 weeks, one month, and six months after the start of treatment in two groups of patients according to clinical criteria and based on the results of comparing TMJ MRI data. In the first two weeks after the start of complex treatment of PDTMJ, 85% of patients in the first group noted a decrease in pain by 70%, 54% of patients noted a decrease in crunching when opening their mouths. During clinical examination, 35% of patients in the first group showed no deviation and deflection, normalization of the volume of mouth opening was noted by 56% of patients. The average volume of mouth opening was 36.5 mm in men and 34.4 mm in women ($p<0.05$). Among patients of the second group, 94% of patients noted pain reduction within two weeks after complex treatment of PDTMJ, combined with the use of arthroplasty and with hydraulic meniscus reposition with platelet–enriched autoplasm, absence of crunch when opening the mouth - 89%, absence of deviation or deflection was observed in 84% of patients. The volume of mouth opening returned to normal in 85%. The average volume of mouth opening was 36.2 mm in

men and 36.5 mm in women ($p<0.05$).

In the first month after the complex treatment of acute respiratory syndrome in patients of the first group with mouth opening restrictions, the volume of opening increased by 10.1% ($p<0.05$); the possibility of lateral movements of the lower jaw to the right increased by 30.3%, to the left by 32.5% ($p>0.05$), pain was absent in 54% of patients. In patients of the second group, the amplitude of mouth opening and lateral movements remained close to physiological in 97% of cases, deviation and deflection were absent in 86% of patients, pain was absent in 87% of patients. The volume of mouth opening was normalized in 85% of cases ($p<0.05$). 6 months after treatment in patients of the first group, pain in the TMJ area was noted by 35% of patients, deviation and deflection were detected during clinical examination in 59% of patients; crunching, clicking, crepitation – in 39%.

Analysis of TMJ MRI results in the position of closed dentitions with interocclusal orthotics in patients of the first group six months after the start of treatment showed the prospects for meniscus reposition in 100% of patients due to interocclusal dissociation and, accordingly, dissociation of the articular surfaces of the TMJ. however, when removing the mouth guard in the position of habitual occlusion, ventral meniscus dislocation was detected in 46% of patients, meniscus deformity in 46%, which is 32.5% less than it was in this group before the start of treatment. Degenerative changes of the meniscus in patients of the first group were detected in 35% of cases. Signs of remodeling of the mandibular heads as a result of decompression of articular surfaces due to the use of an orthotic were revealed in 15% of cases.

In patients of the second group, according to TMJ MRI, signs of remodeling of the mandibular heads, a decrease in degenerative changes of the meniscus as a result of decompression of articular surfaces due to the use of orthotics and the action of growth factors of platelet-rich plasma were detected in 45% of cases. Deformation of the meniscus due to the introduction of platelet-rich plasma into the upper and lower sections of the TMJ was eliminated in 98% of cases, hydraulic reposition of the articular disc was achieved in 96% of cases.

Obviously, a decrease in the volume of degenerative processes after the introduction of platelet-enriched autoplasm into the articular cracks of the TMJ is associated with the effect of lubrication of cartilaginous surfaces with a "synovial fluid implant", and the meniscus repair effect occurs due to the growth factors contained in plasma, synoviocytes, platelets, which generally has a positive effect on the restoration of cartilage tissue. at the same time, the process of strengthening bone tissue, the formation of the collagen matrix and bone with the participation of bone morphogenetic collagen proteins takes place [2,3,4,7].

Thus, a set of measures – occlusal correction, MRI analysis in the form of determining the necessary distance between the articulating surfaces of the TMJ elements for free repositioning of the meniscus into a physiological position, determining the places of filler insertion in order to prevent meniscus displacement into pathological positions and using an orthotic as an element centering the lower jaw and separating the articular surfaces, – It allows to obtain a faster effect of pain relief, normalization of occlusion of dentition, and create conditions for the physiological functioning of TMJ elements [5,8].

Conclusion. The TMJ changes detected by MRI in the form of deformations, perforations, ruptures, degenerative changes in the meniscus, deformations of the mandible heads have a more pronounced tendency to recover when using the patient's autoplasm as a substrate containing growth factors that trigger regenerative processes in the TMJ. The use of an individual mouthguard made for the lower jaw and the introduction of platelet-enriched autoplasm in the treatment complex, separating the dentition and articular surfaces of the TMJ, makes it possible to reduce pain, strengthen the

physiological position of the meniscus on the head of the lower jaw, restore the centric position of the lower jaw relative to the upper one.

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