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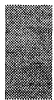
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PRACA ORYGINALNA
ORIGINAL ARTICLE

HYPERMOBILITY OF THE ARTICULAR HEADS OF THE TEMPOROMANDIBULAR JOINT: PATHOLOGY OR VARIANT OF THE NORM?

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ABSTRACT

Introduction: Among the large contingent of patients with TMJ dysfunctions, there are persons with hypermobility of the joint heads of the lower jaw. Moreover, at present, the question of the frequency of occurrence of hypermobility of articular heads of the TMJ is not reflected.

The aim of the work is to find out the frequency of occurrence of hypermobility of articular head among a healthy population and to evaluate the clinical, radiological, and electromyographic characteristics of the muscular-articular complex in these individuals.

Materials and methods: Surveys were conducted for 476 students aged 19 to 25 years. For people with revealed articular hypermobility of the articular heads, chewing and temporal muscle electromyography, TMJ aiming zonography in a lateral projection with open and closed mouth were performed with an assessment of the correspondence of the articular fossa of the temporal bone to the size of the articular head, the location of the articular heads relative to the apex of the articular tubercle.

Results: Of the examined 476 students, 95 people (20%) revealed hypermobility of the articular heads of TMJ. According to the results of clinical, functional and radiological studies of TMJ, we identified three degrees of hypermobility: light, moderately expressed, significant. With light to moderate degree of hypermobility, electromyography of the temporal and chewing muscles and TMJ zonography did not reveal a difference in performance compared to healthy ones. Most of the examined did not note functional discomfort from the joints. With a significant degree of hypermobility of the articular heads, electromyography of the temporal and chewing muscles revealed a lack of synergism in their work. On TMJ zonograms with an open mouth, the articular heads extended anteriorly beyond the tops of the articular tubercles almost under their outer base.

Conclusions: It has been established that hypermobility of the joint heads of the TMJ, which does not cause signs of pathology in the form of masticatory function disorders, discoordination of the masticatory muscles and uncontrolled displacements of the lower jaw, the presence of a pain symptom should be considered as a variant of norm.

KEY WORDS: TMJ, hypermobility articular heads, electromyography, zonography

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INTRODUCTION

The results of population studies, which relate to the prevalence of dysfunctional diseases of the temporomandibular joint (TMJ), state that they are 89% [1, 2, 3, 4]. In individuals with intact dentition and orthognathic type of bite, this pathology occurs in 57.3% - 80.9% of cases [5, 6].

The recognition of common TMJ dysfunction in the form of instability of its components: hypermobility of the articular heads, compression and dislocation phenomena in the joints, inadequate displacements of the articular disc, muscle-capsular elements, however, there are few detailed scientific developments regarding these pathological processes [7, 8, 9].

American Dental Association refers to hypermobility of the articular head of the lower jaw as a functional disorder of the TMJ [10].

Hypermobility of the articular heads in a number of sources is indicated differently: subluxation of the lower

jaw, unstable joint, dislocation syndrome, articular looseness [11, 12, 13, 14]. Speaking of hypermobility of the articular heads, it should be noted that in some cases it is considered as reactive, and in others as a pathological condition that has peculiar clinical manifestations [15, 16, 17, 18].

Thus, the problem of a reliable understanding of the essence of hypermobility of TMJ articular heads remains unresolved to date, which raises the problem of adequate pathogenetic treatment and explains the relevance of this issue.

THE AIM

The aim of our study was to determine the frequency of occurrence of hypermobility of the articular heads of the temporomandibular joint and to compare its clinical, radiological, and electromyographic manifestations.

MATERIALS AND METHODS

The results of the work are based on a survey of 476 students of the Ukrainian Medical Stomatological Academy, whose age is from 19 to 25 years. The study involved 285 women and 191 men. The examination included the study of violations of the face configuration, the nature of the bite, the presence of anomalies in the position and shape of individual teeth, dentitions, the presence of abnormal tooth wear. We found out the presence of discomfort in the area of one or both TMJs at rest, when opening and closing the mouth, the nature of the movements of the lower jaw (strictly vertical, progressive forward, Z-shaped, step-like). Separately, the size of the maximum mouth opening was measured by the distance between the cutting surfaces of the central upper and lower incisors (in mm); a comparative assessment of the mass of the right and left temporal and chewing muscles, the position of the articular heads of the lower jaw was carried out by palpation. Pain was detected with light pressure on the articular heads with a closed mouth and when the lower jaw was shifted down and to the sides. Separately, attention was fixed on the position of the articular heads with the maximum opening of the mouth, the appearance of extraneous sounds (crunching, clicking) in the joints.

During the study, the statute of limitations of the identified symptoms, the availability of therapeutic measures for dysfunctional conditions of the TMJ were clarified. In the anamnestic data, the presence of a similar pathology in close relatives, transferred and concomitant somatic diseases, injuries of the maxillofacial region was found out.

Hypermobility of the articular heads of the lower jaw was evaluated by clinical manifestations, the results of electromyography of the masticatory and temporal muscles, and targeted zonography of TMJ in the lateral projection with open and closed mouth. At the same time, attention was paid to the size and shape of the articular heads of the lower jaw, their correspondence to the articular fossa of the temporal bone, the location of the articular heads in relation to the articular tubercle, the width of the joint spaces.

RESULTS AND DISCUSSION

Of the 476 students who took part in our study, 105 people (22%) did not have any abnormalities in the dentoalveolar apparatus (healthy group).

Various deviations from the dentition occurred in 371 people (78%): 148 students (31%) experienced changes in the form of anomalies in the shape and position of teeth, malocclusions, malformations and sizes of dental arches, and jaw deformities; 223 people (47%) had muscular-articular disorders: 56 people had TMJ compression and dislocation dysfunctions, 39 people had TMJ articulation and occlusal dysfunctions, 33 people had myalgia of chewing muscle, 95 people had hypermobility of TMJ head, which was 19,98% of the total number of examined people.

Among the individuals in whom the phenomena of hypermobility of the heads of the lower jaw were found, there were 64 women and 31 men. All examined patients had a physiological bite, intact dentitions.

According to the results of clinical, functional and radiological studies of TMJ, we identified three degrees of hypermobility: light (37 people), moderately expressed (39 people), significant (19 people).

All 37 students with a light degree of hypermobility of the articular heads of the lower jaw did not observe any functional disorders of the dentoalveolar apparatus.

During the examination of external violations from the maxillofacial region was not determined. The face of the majority of the examined was symmetrical, eight of them had a slight physiological asymmetry. The mass of the right and left temporal and masticatory muscles were the same and corresponded to the constitution of the subject in each of the examined patients of this group. The joint heads of the lower jaw occupied the correct anatomical position, were painless on palpation both at rest and during movements of the lower jaw. When opening the mouth, the movements of the lower jaw were strictly vertical without deviation, the articular heads slightly extended under the base of the zygomatic arches. There were no extraneous sounds in the joints during auscultation. With maximum opening of the mouth, the distance between the cutting edges of the incisors of the upper and lower jaws was 53.24 ± 0.42 mm (in healthy people - 40.92 ± 1.33 mm).

The results of electromyography of the temporal and masticatory muscles did not reveal a difference in performance compared to healthy ones (Fig. 1).

On targeted radiographs of the TMJ, which were performed on 7 volunteers, it was noted that with an open mouth, the articular heads slightly extend anteriorly beyond the tops of the articular tubercles. With a closed mouth, the articular heads were usually located on the posterior slopes of the articular tubercles, the joint spaces in the back were widened (Fig. 2).

Of the 39 people in whom a moderate degree of hypermobility of the articular heads of the lower jaw was revealed, 31 patients had no complaints of functional discomfort from the musculo-articular complex. Eight students had periodically occurring clicking sounds in one (in 3 people) or both (5 people) TMJ.

During the examination, insignificant physiological asymmetry of the face was determined in 11 examined, in the rest the face was symmetrical. During palpation, the mass of the right and left temporal and chewing muscles were the same and corresponded to the constitution of the subject. Externally, the articular heads of the lower jaw occupied the correct anatomical position, were painless on palpation both at rest, and with movements of the lower jaw. During the opening of the mouth, the displacement of the lower jaw was strictly vertical without deviation, the articular heads were clearly emerging under the bases of the zygomatic arches equally on both sides. During auscultation, in 26 people, during the opening of the mouth, no extraneous sounds were detected in the joints, in 7 people the sounds were not very pronounced, rustling, in 6 people loud, popping sounds were detected. At the maximum opening of the mouth, the distance between the cutting edges of the incisors of the upper and lower jaws was 56.65 ± 0.62 mm.

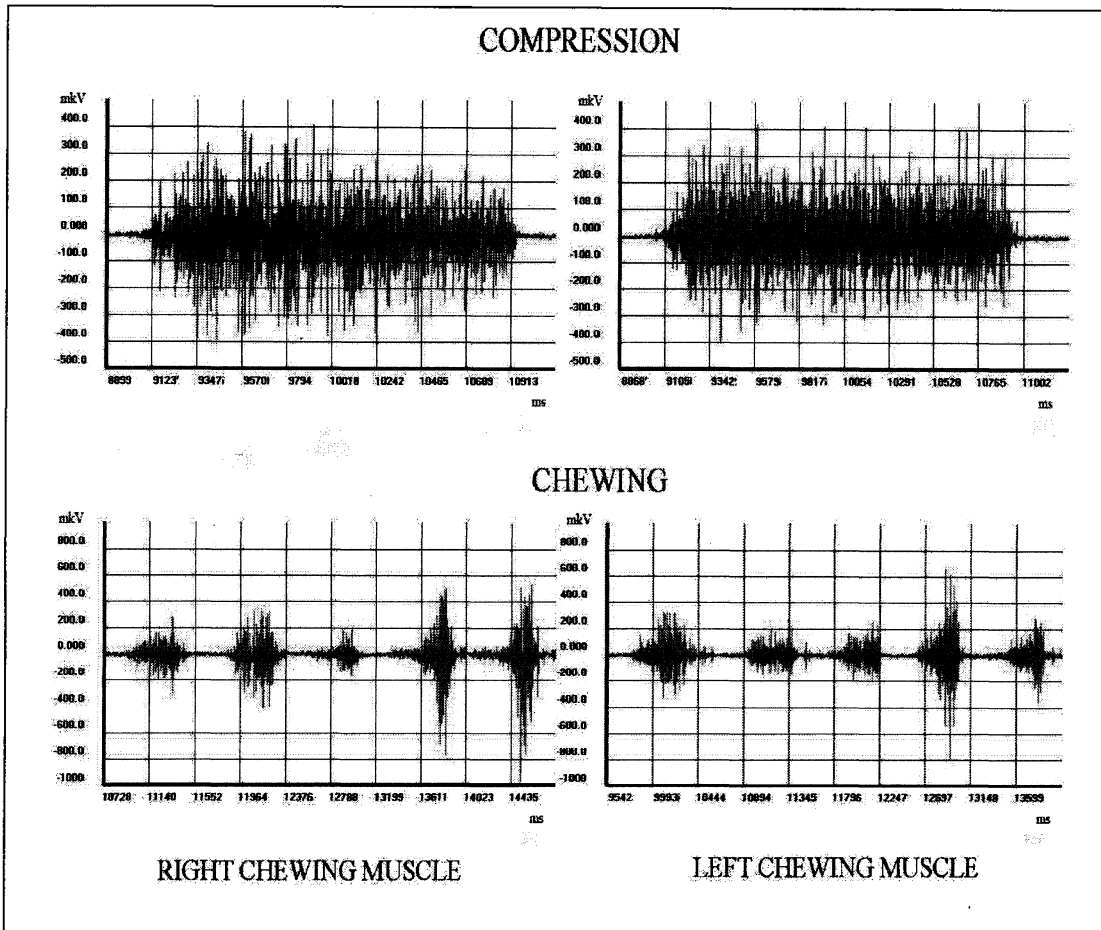


Fig. 1. Electromyograms of the actual masticatory muscles of student K., 23 years old, with light hypermobility of the joint heads of the TMJ. The physiological asymmetry of the bioelectrical activity of the right and left muscles is noted both in the periods of chewing and compression of the teeth. Myograms correspond to the characteristics of a healthy person.

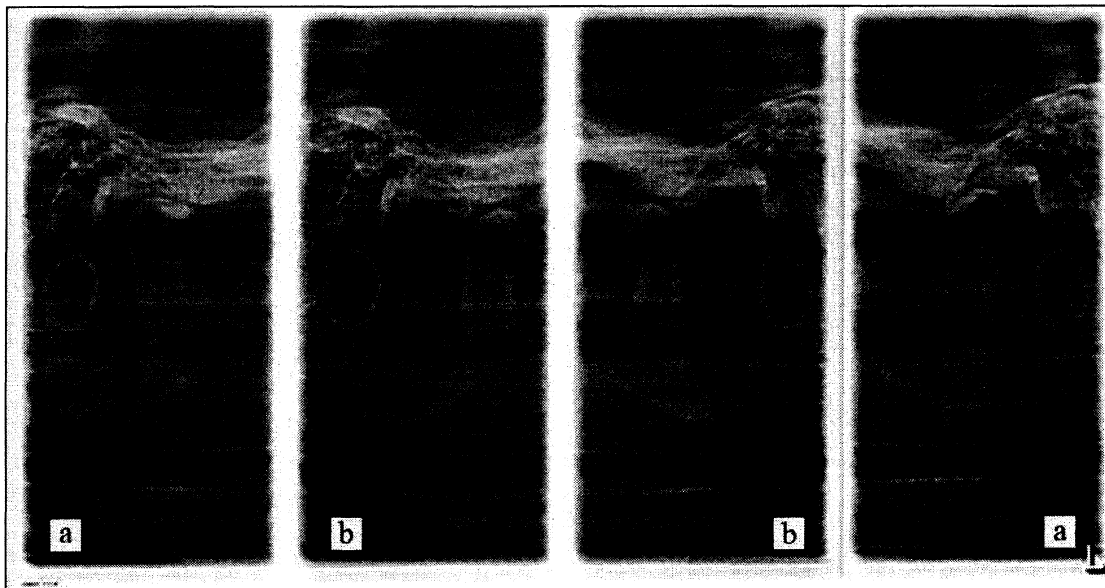


Fig. 2. Zonograms of TMJ of student K., 23 years old with clinical manifestations of mild hypermobility of the articular heads of the lower jaw. Short articular processes, small articular fossae, flat articular tubercles are determined. With a closed mouth (a), the joint spaces above and behind are widened; with an open mouth (b), the joint heads are located slightly anterior to the apices of the tubercles.

The results of electromyography of the temporal and masticatory muscles did not reveal a difference to the values in healthy people.

On targeted X-ray images of the TMJ made by 6 volunteers, it was noted that with an open mouth, the articular heads more than those with a light degree went anteriorly beyond the tops of the articular

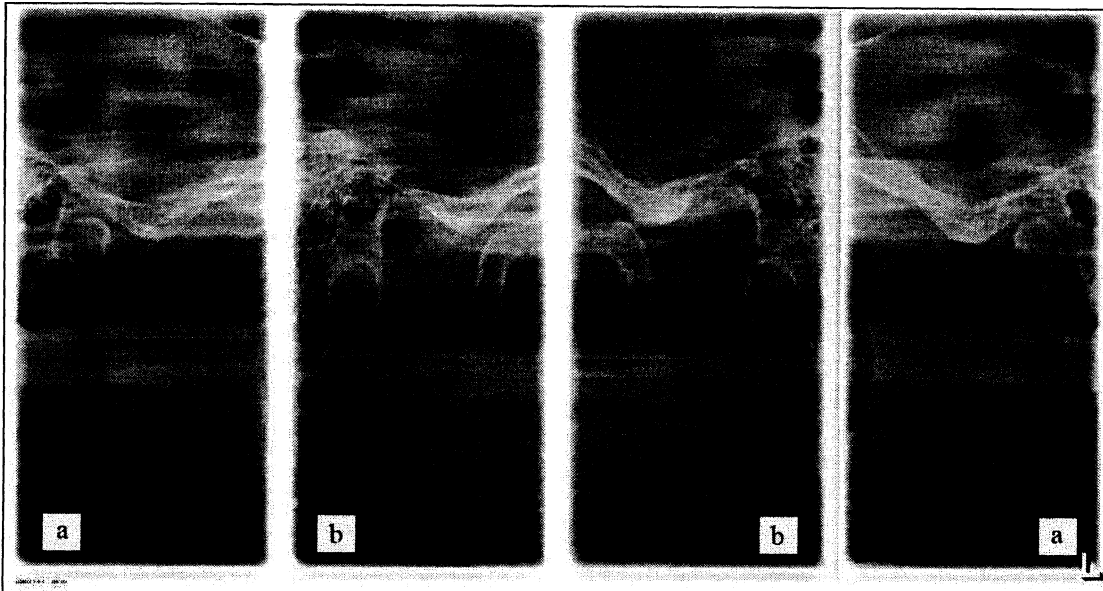


Fig. 3. Zonograms of TMJs of student A., 24 years old, with moderate manifestations of hypermobility of articular heads. The exit of articular heads beyond the tops of the articular tubercles is determined by 1/3 of their height with an open mouth (b). With a closed mouth, a slight expansion of the joint spaces in the anterior fossa (a).

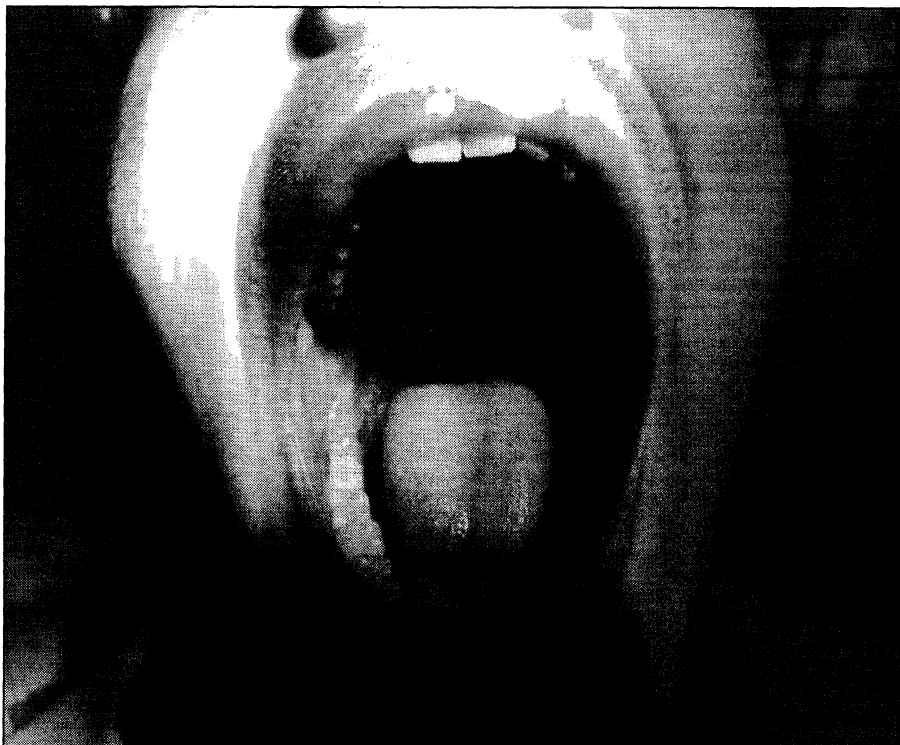


Fig. 4. Photo of the student's maximum mouth opening with a significant degree of hypermobility of the articular heads of the lower jaw.

tubercles. With a closed mouth, the articular heads usually occupied the correct anatomical location in the articular fossa (Fig. 3).

With a pronounced (significant) degree of hypermobility of the articular heads of the lower jaw (Fig. 4), which was established in 19 students, 15 of them did not express the presence of masticatory apparatus disorders.

Five students had periodically occurring clicking sounds in one (in 2 people) or both (3 people) joints with wide opening of the mouth.

Physiological asymmetry of the face was observed in 6 patients; in the rest, the face was symmetrical. On palpation,

the mass of the right and left temporal and chewing muscles were the same on both sides. Externally, the articular heads of the lower jaw occupied the correct anatomical position, were painless on palpation both at rest and with movements of the lower jaw. During the opening of the mouth, in 16 people the displacement of the lower jaw was strictly vertical without deviation, in 3 students the lower jaw made z-like movements. The joint heads with maximum opening of the mouth expressed out under the bases of the zygomatic arches equally on both sides of all examined. During auscultation, in 11 people, when opening the mouth, no

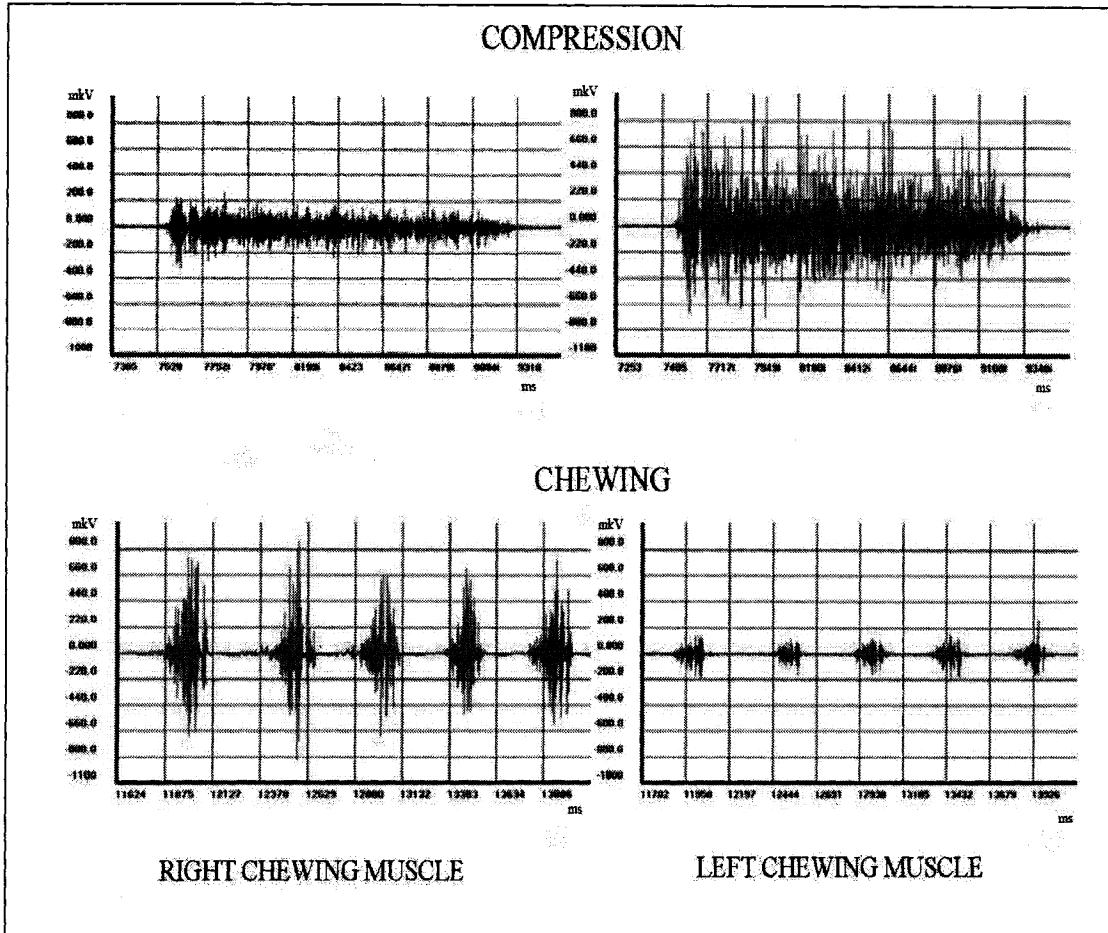


Fig. 5. Electromyograms of the temporal muscles of a student V., 25 years old, with significant manifestations of hypermobility of TMJ articular head. There is a dissonance in the bioelectric activity of the right and left muscles during chewing and compression of the teeth.

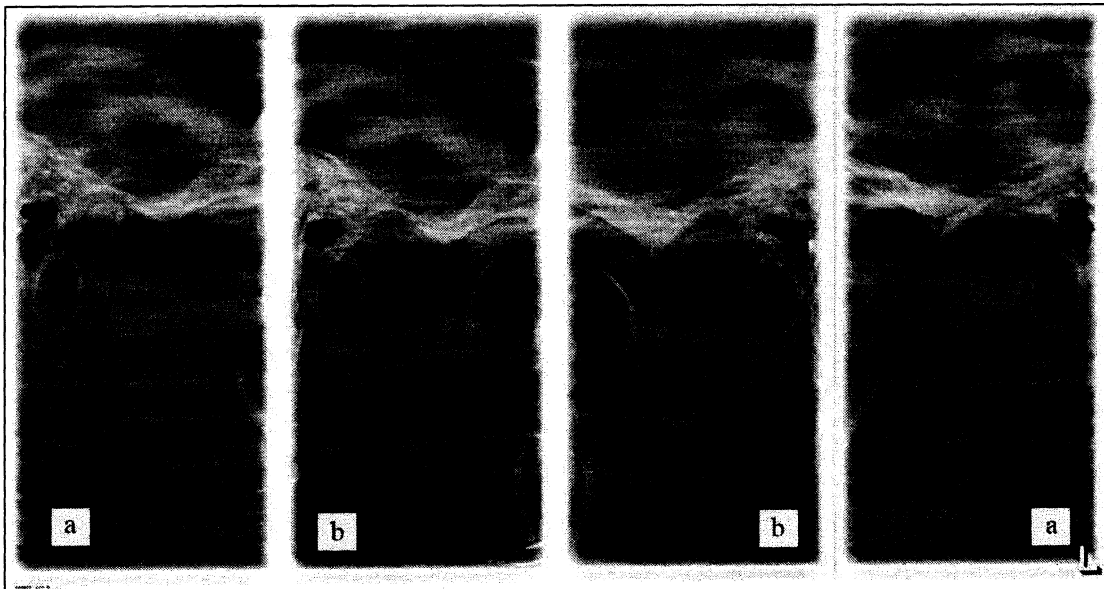


Fig. 6. Zonograms of TMJ of a student Sch., 21 years old, with the phenomena of hypermobility of the articular heads of a significant degree. There is a departure of the articular heads beyond the tops of the articular tubercles by almost 2/3 of their height, with an open mouth (b). With a closed mouth, the expansion of the joint spaces in the anterior and posterior fossa (a).

extraneous sounds were detected in the joints, in 5 people they were not very pronounced, rustling, in 3 people - the sounds were sonorous, like crackling, crunching. At the

maximum opening of the mouth, the distance between the cutting edges of the incisors of the upper and lower jaws in this group of students was equal to 62.51 ± 0.72 mm.

The results of electromyography of the temporal and masticatory muscles, made by 4 students with a crunch in the joints and deviation of the lower jaw, revealed paradoxical phenomena in the form of discoordination of the temporal and masticatory muscles (lack of synergism) (Fig. 5).

On targeted X-ray images of the TMJ made by 7 volunteers, it was noted that with an open mouth, the articular heads went anteriorly beyond the tops of the articular tubercles almost under their outer base. With a closed mouth, the articular heads were usually located in the upper poles of the articular fossa, the articular fissures were usually widened posteriorly and anteriorly, in 2 people the articular tubercles were smoothed (Fig. 6).

First of all, when discussing this topic, it is worth observing that according to published data hypermobility of TMJs is considered an inadequate dislocation of one articular head of the lower jaw, forgetting to give a description of the state of the symmetrical joint [19, 20, 21]. However, with the hypermobility of one joint head in the opposite joint, compression phenomena occur, that is, compression-dislocation dysfunction of the TMJ develops [22, 23]. Thus, with true hypermobility of a TMJ, both joint heads of the lower jaw are in a state of dislocation.

In our opinion, hypermobility of the joint head of the TMJ, which does not cause signs of pathology in the form of violations of the chewing function, support function of the articular surfaces, discoordination of the masticatory muscles and uncontrolled displacements of the lower jaw, the presence of a pain symptom should be considered as type of the norm, as well as for individuals, low blood pressure or different height of a person. In those cases when the above symptoms appear, it can be argued about the development of joint dysfunction on the background of hypermobility of the heads of the lower jaw, the same as in individuals without hypermobility, and carry out appropriate treatment.

CONCLUSIONS

According to the results of our studies regarding the incidence of hypermobility of TMJ articular heads in persons aged 18–25 years, this indicator was 19.98%. A systematic analysis of clinical, electromyographic and radiological studies of the muscular-articular complex made it possible to establish three degrees of hypermobility of the articular heads: light, moderate and significant. In the predominant number of examined patients, the presence of clinically determined hypermobility of the articular heads had no complaints about inadequate opening of the mouth. Radiologically determined displacement of the articular heads beyond the tops of the articular tubercles anteriorly to various degrees did not cause functional disturbances in the activity of the masticatory and temporal muscles, with the exception of isolated cases with significant degree of hypermobility. In this case, probably, the leading role played by the violation of the structural and functional structures of the right and left joints due to changes in the mechanical qualities of their

capsule and ligamentous apparatus without its injury. Thus, hypermobility of the joint head of the TMJ, which does not cause signs of pathology in this category of subjects, should be considered as variant of the norm.

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Conflict of interest:

The Authors declare no conflict of interest.

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