

X-ray verification of the possibility of the mandible articular head restoration: A clinical case

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ABSTRACT

Improvement of the methods of diagnosis and treatment of temporomandibular joint (TMJ) dysfunction is of prime importance in increasing the efficacy of orthopedic treatment. The aim of the study was to prove the possibility of TMJ structures restoration in the normalization of the lower jaw position during orthopedic treatment. The study confirmed the need to normalize the interalveolar height, to form multiple contacts for the antagonizing lateral teeth that allow to eliminate both joint heads distal displacement and bilaminar zone compression and, consequently, to reduce degenerative changes in TMJ joints.

KEY WORDS: Bilaminar zone, Bony tissue reparative processes, Joint splint, Rational prosthodontics, Temporomandibular joint dysfunction

INTRODUCTION

The dentoalveolar system functions as a result of a complex interaction of the masticatory muscles, teeth, and temporomandibular joints. All processes associated with the functioning of each part are coordinated by the trigeminal nerve system with sensory and motor nuclei, which, in turn, work in close cooperation with the subcortical and cortical centers of the brain and other systems of the human body. Proper functioning of the chewing and speech apparatus can be possible only in case the occlusal-articulatory relationships of the dentition are balanced.^[1] According to recent studies, 28%–76% of dental patients experience problems with the temporomandibular joint (TMJ).^[2] At present, the number of patients with TMJ dysfunction has significantly increased.^[3,4] According to some experts, the fact is associated with irrational prosthetics and orthodontic treatment, leading to profound alteration of the dentoalveolar system.^[5] Challenges in obtaining a complete picture of the morphofunctional state of the dentoalveolar system arise due to the lack of a universally recognized classification and algorithm for curation of TMJ dysfunction patients, thus not allowing us to make a rational treatment plan.^[6,7]

Varied clinical symptoms complicate the diagnosis of TMJ pathology, making the patient a “hostage” to various profiles doctors. The patients are forced to be subjected to neurology, otorhinolaryngology, therapy, rheumatology, and other kinds of examinations for a prolonged period. The most appropriate approach is to supervise TMJ pathology patients by a team of doctors including those specializing in gnathology and neurology.^[8]

Aim of the Study

This study aims to confirm the possibility of TMJ morphological structures restoration by the normalization of the lower jaw position in dentition defects replacement.

Objectives

The objectives of this study were as follows:

1. To assess the findings of main and additional methods of research including computed tomography (CT) contribution to making the plan and tactics of the treatment of patients with degenerative changes in the articular process of the lower jaw.
2. To prove the possibility of reparative processes in temporomandibular joints in rational prosthetic treatment with articular elements relationships X-ray control.

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MATERIALS AND METHODS

A clinical study on the diagnostic and treatment results of patient D., aged 52, with TMJ dysfunction is given in the article.

Anamnesis data state that the patient was subjected to therapeutic and surgical treatment of separate teeth before, though she did not apply for prosthetic aid. In 2012, she lost 3.7 tooth. Clicks in the left TMJ appeared for a time, but the patient experienced grinding, pain, and a burning sensation in the tongue and throat.

Since 2013, she frequently consulted different profile doctors including prosthodontists, dental surgeons, and neurologists. However, treatment measures did not give a positive result. Pain in the joint and throat caused the patient's visit to a mental hospital with suicidal ideas - (according to oral information provided by the patient: "I did not want to live").

In September 2015, she asked us to help her. On initial examination, the patient presented a removable prosthesis, made about a year ago, which the prosthodontist described as relieving occlusal splint [Figure 1]. The occlusal splint was manufactured like a removable immediate denture, but it did not take into account the therapeutic position of the lower jaw and occlusal surface deformations. Several computer tomograms with the conclusion of the radiotherapist were also presented: Left TMJ osteoarthritis, subchondral erosion, and perifocal osteosclerosis [Figure 2].

As it was seen from the presented computer tomograms, the lytic lesion size in the left articular process of the lower jaw significantly increased in the course of 3 years. CT dated November 2015 showed that there was practically no space in the left joint between the lateral surface of the articular head and the glenoid fossa. Panoramic reformations of dental arches for the years 2012–2015 showed considerable infraocclusion of 2.6 and 2.7 teeth. For 3 years, there was their significant displacement toward the missing teeth of the III sector [Figure 3].

After gross conference consisting of different profile doctors: Dentists of various specialties, a neuropsychiatrist and a neurologist, the patient was diagnosed with denture defects: Maxillary defect Class III, Subclass 1, and lower jaw defect - Class II, Subclass 1 according to Kennedy's classification, dysfunction of the left TMJ and subchondral erosion of TMJ left head.

Prosthodontic treatment included the repair of occlusal surface deformation, wherefore rough selective grinding of teeth 2.6 and 2.7, which were significantly infraoccluded, was performed. Then, the freeway height and occlusal height were determined by



Figure 1: The so-called relieving occlusal splint on initial examination

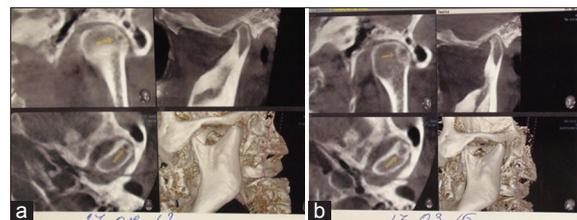


Figure 2: Computed tomography of patient D.: (a) - 2012, (b) - 2015. In dynamics, an increase in the radiobacillarity of the left articular head (indicated by an arrow) and a decrease in the lumen of the joint space

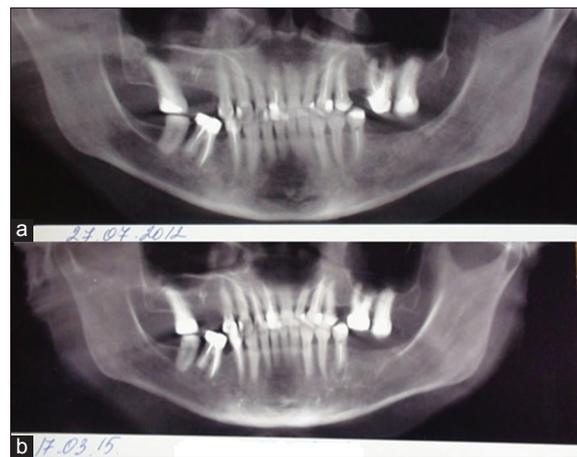


Figure 3: Orthopantomograms of patient D.: (a) - 2012, (b) - 2015. Increased infrared occlusion of 2.6 and 2.7 teeth

anatomical and physiological method. As it is known, the difference between the latter is about 2–3 mm.

Controlled by the TMJ computer tomogram, the therapeutic position of the lower jaw and constructive occlusion determination accuracy were confirmed. With the help of provisional appliances (removable and non-removable), fixation of this position was made [Figure 4]. Concurrently, the patient was referred for consultation with a neurologist.



Figure 4: First set of provisional designs: (a) - upper dentition, (b) - lower dentition, (v) - occlusal splint made in view of the therapeutic position of the lower jaw, (g) - provisional designs of the upper jaw and temporary removable prosthesis of the lower jaw

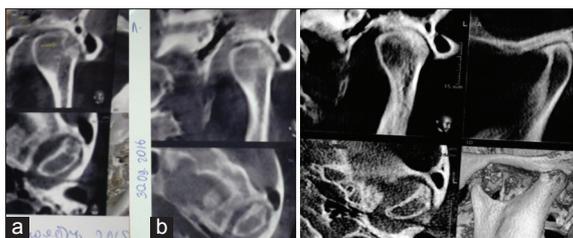


Figure 5: Computed tomography in comparison: (a) - before the onset of treatment (November 2015), (b) - after treatment (September 2016), (v) - control examination (July 2018)

The patient used temporary appliances during 6 months with their stepped replacement. After the reduction of complaints and adaptation to the new position of the lower jaw, permanent dentures were made: Non-removable porcelain fused metal dentures for upper and lower teeth and a removable partial clasp (bugel) denture with lock system for the lower jaw.

RESULTS

The control CT showed reparative processes and signs of osteosclerosis in the former area of inflammable remodeling of articular process spongy substance, reduction of resorptive lesions, and disappearance of radiographic inflammation signs. The joint space was observed all over the articular head.

Long-term results, 2 years following the treatment, show radiographic signs of the formation of the terminal plate of the articular process and the presence of an articular gap in the sagittal plane; however, on the frontal sections, there is insufficient clearance of the joint space. We associate this picture with the presence of a removable prosthesis on the lower jaw, which is supported and timely subjected to relocations does not provide a sufficient stop on the left [Figure 5]. Despite the patient's refusal to install implants on the

lower jaw during prosthetics 2 years ago, today, after the demonstration of restoration results of the articular surfaces, an agreement for their installation was obtained and preparations for the surgical implantation stage are being conducted.

DISCUSSION

The presented clinical observation confirms the importance of maintaining multipoint teeth contacts in lateral areas. Unilateral or bilateral deprivation of vertical supports in the lateral areas of dental arches may cause distorsion of articular heads, compression of TMJ bilaminar zone with further degenerative changes of articular surfaces, and disc and refractory expressed pain symptomatic.^[9,10]

Planning of treatment and follow-up of patients with TMJ dysfunction must be performed with the participation of different profile doctors after defining of the most probable cause and process of the disease.^[11] Prosthodontic aid with the planned lower jaw position change must be carried out step-by-step under radiologic control of articular heads position with careful correction of occlusal and articulation relations and further dispensary follow-up.

CONCLUSIONS

1. Appropriate recovery of the interalveolar height and normalization of articular heads position allow to reduce or eliminate pain syndrome in TMJ dysfunction and to provide the restoration of its morphological structures.
2. Complex orthopedic treatment in patients with changes in the lower jaw position should be carried out only after a comprehensive evaluation of the anamnestic data, the determination of the most proper pathogenesis, in teamwork with different profile specialists and timely monitoring of treatment results with informative X-ray methods.

REFERENCES

1. Abolmasov NN. Sistemnyj Podkhod k Diagnostike, Kompleksnomu Lecheniyu i Profilaktike Zabolevanij Parodonta (Kliniko-Geneticheskoe Issledovanie): Avtoref Diss Doktora Med Nauk. [System Approach to Diagnostics, Complex Treatment and Prevention of Diseases of the Parodont (Clinic-Genetic Research): Autoref Dissertation for a Doctor's Degree in Medicine]. Sankt-Peterburg: Sankt-Peterburgskij Gosudarstvennyj Meditsinskij Universitet IM. Akad. I. P. Pavlova; 2005. p. 15.
2. Prygunov KA, Abolmasov NN, Bulycheva EA, Rogatskin DV. Reparativnye processy v sustavnoj golovke VNCHS, obuslovlennye vyborom racional'nogo plana lecheniya [The reparative processes in an articulate head of TMJ caused by the choice of the rational plan of treatment]. *Maestro Stomatologii* [MAESTRO Dent Mag] 2017;1:9.
3. Costa YM, Porporatti AL, Stuginski-Barbosa J, Bonjardim LR, Conti PC. Additional effect of occlusal splints on the improvement of psychological aspects in temporomandibular

- disorder subjects: A randomized controlled trial. *Arch Oral Biol* 2015;60:738-44.
4. Arsenina OI, Shishkin KM, Shishkin MK, Popova NV, Popova AV. Tret'i postoyannye molyary, integraciya v zuboal'veolyarnye dugi. Retenciya i izmenenie ih pozicii v processe formirovaniya [Third constant molars, integration into dento-alveolar arches. Retention and change of their position in the course of formation]. *Ortodontiya* [Orthodontics] 2015;1:35-40.
 5. Qi K, Guo SX, Xu Y, Deng Q, Liu L, Li B, *et al.* An investigation of the simultaneously recorded occlusal contact and surface electromyographic activity of jaw-closing muscles for patients with temporomandibular disorders and a scissors-bite relationship. *J Electromyogr Kinesiol* 2016;28:114-22.
 6. Thiele OC, Brom J, Dunsche A, Federspil P, Frerich B, Hölzle F, *et al.* The current state of facial prosthetics - A multicenter analysis. *J Craniomaxilla Fac Surg* 2015;43:1038-41.
 7. Makeeva IM, Avdeenko OE. Osobennosti stomatologicheskogo statusa u chlenov organizovannykh kollektivov i professional'nyh soobshchestv [Features of the dental status at members of organized collectives and professional communities]. *Stomatologiya* [Stomatology] 2016;1:63-6.
 8. Dahiya P, Kamal R. Hyaluronic acid: A boon in periodontal therapy. *North Am J Med Sci* 2013;5:309-15.
 9. Olivo SP, Pitance L, Singh V, Neto F, Thie N, Michelotti A. Effectiveness of manual therapy and therapeutic exercise for temporomandibular disorders: Systematic review and meta analysis. *Phys Ther* 2016;96:9-25.
 10. Yanushevich OO, Arutyunov SD, Antonik MM. Sovremennye metody komp'yuternoj diagnostiki narushenij okklyuzii i funkcii visochno-nizhnechelyustnogo sustava [Modern Methods of Computer Diagnostics of Violations of Occlusion and Function of a Temporomandibular joint]. Vol. 22. *Uchenye Zapiski Sankt-Peterburgskogo Gosudarstvennogo Medicinskogo Universiteta im. St. Petersburg: Akad. I.P. Pavlova* [Scientific Notes of the St. Petersburg State Medical University of a Name of the Academician I.P. Pavlov]; 2015. p. 43-5.
 11. Roldán Barraza C, Janko S, Villanueva J, Araya I, Lauer HC. A systematic review and meta analysis of usual treatment versus psychosocial interventions in the treatment of myofascial temporomandibular disorder pain. *J Oral Fac Pain Headache* 2014;28:205-22.

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