

PHYSIOLOGICAL CHANGES OF THE DENTAL ARCH IN PATIENTS HAVING CHRONIC TRAUMATIC ARTHRITIS OF THE TEMPOROMANDIBULAR JOINT AT COMPLEX REMOVAL OF THIRD MOLARS

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Annotation. *Patients having chronic traumatic arthritis of the temporomandibular joint, who had all four third molars (wisdom teeth) removed in complex during one visit were observed clinically. All removed teeth were misplaced and impacted. Patients, 18 people, divided into 2 groups consisting of 9 men and 9 women were subject to regular medical check-up during two years. In addition, the comparative analysis of panoramic radiographic images and diagnosis models of jaws before the surgical treatment and 2 years after in the groups being studied was made. Research results found significant difference in the length of dental arch of patients being studied before and after complex removal of the thirds, as well as the improvement of their health in part of temporomandibular joint operation. Change of occlusive interrelations between teeth of upper and lower jaw bones at complex removal of the thirds contributes to physiological alteration of occlusion and functional alteration of temporomandibular joint operation, which is very important in treatment of patients having chronic traumatic arthritis of the temporomandibular joint.*

Keywords: *patients, complex removal of the thirds, dental arch length, chronic traumatic arthritis of the temporomandibular joint.*

Functions of all elements in motor unit of the masticatory apparatus are closely connected with each other. Disorder in the operation of one of these elements causes depression of the rest functions. The orthopedics outlines a famous principle of “integrity and suffering” of joints and respective muscles. Disorder of occlusive interrelations between teeth of upper and lower jaw bones is the main factor leading to disorders in the operation of dentoalveolar apparatus. Alteration in occlusion is most commonly a result of misplacement of teeth caused by the loss of contact between antagonistic teeth due to cariosity, improper inlays and cutting wisdom teeth – the thirds.[1]

Inadequacy of teeth sizes and alveolar arch size adversely affect the dental arch. If the total mesio-distal size of teeth exceeds the size of the alveolar arch, compensatory mechanisms are activated. These mechanisms are seen in change of expressiveness of Spee’s curve and inadequate dental inclination.[2]

Disorders in the temporomandibular joint (TMJ) seldom appear unexpectedly, except for cases with an acute trauma (hit into the juxta-articular area, falling on the

jaw, sudden maximum opening of the mouth). There is a particular dependency of a chronic overload of the group of muscles at the enforced one-side chewing, pathological occlusion, partial secondary edentia, long cutting of the thirds. As a result there is a myopachynsis at the working side, which leads to a steady joint dysfunction. The main symptoms of this are clicking in the TMJ, locking at the movement of the lower jaw bone, muscular fatigue at chewing, impossibility to bite, disorders in the joining of teeth, and arthralgia. [3,4]

Vulnerability and the most common reasons of functional disorders in the structures of temporomandibular joint are teeth, dental arch, and neuromuscular apparatus.

The major guarantor of the functional balance of the dentoalveolar apparatus is a tight contact between teeth in the dental arch, and, to a great extent, genetic psychoemotional sphere of an individual. [5]

Work Objective: to trace changes in the dental arch in patients having chronic traumatic arthritis of the temporomandibular joint at complex removal of misplaced and impacted thirds.

Research Materials and Methods. The thirds of 18 patients of 18-35 years old were removed in complex. The patients were divided into two groups: 9 men and 9 women. The chronic traumatic arthritis of the temporomandibular joint was diagnosed in all patients; it was caused by the disorder of occlusive interrelations between teeth of upper and lower jaw bones. Follow up care of patients was taken during two years. Herewith, the panoramic radiographic images were analyzed, it allowed to trace dynamic changes in the dental arch after complex removal of the thirds.

Taking into account the existing joint disease, patients were recommended to remove the thirds simultaneously, which in future contributed to the compensatory alteration of occlusion due to individual operation of the muscular component of the dentoalveolar apparatus. These teeth were removed under regional anesthesia from both sides. The following anaesthetic was used: “Septanest” 1:100 000 (articaine preparation). The dose of the preparation was calculated based on the patient weight (5 mg of the dry matter per 1 kg of body weight).

The following scheme of drug treatment, the components of which were to normalize the metabolism of the body, was prescribed in the post-surgery period:

Dexamethasone, Dicynone, Ketolong, Furosemide (per 1 ampul) were used once as four intramuscular injections immediately after surgical procedures. In case of pain, Nimesil was used (1 pack of powder was dissolved in 100 ml of water and drank once a day, 5 days, following meals).

In order to prevent the development of inflammatory process and pathological changes related to it the following drugs were used: Suprastin and mefenamic acid (1 pill twice a day, during 5 days, following meals, washing it out with plenty of water), Cyclo 3 fort (1 capsule twice a day, during 10 days) – to normalize haemodynamics in the body. Two days after surgical procedures, Azimed was prescribed (500 mg once a day during three days) – a broad-spectrum antibiotic of macrolide group with Azithromycin as an active substance;

Linex (1 capsule twice a day, during four days) is a preparation based on lyophilized alive lactate bacterial cultures restoring indigenous flora of intestinal tract, which was damaged in particular by an antibiotic.

Five days after, the patients were additionally recommended to apply Dr. TheissBeinwellSalbe locally in the area of the temporomandibular joint, externally twice a day during 10 days. This preparation has anti-inflammatory, regenerative, antirheumatic, and antioxidative effects.

Total period of rehabilitation of patients after surgical procedures made 1.5 months.

The panoramic radiographic images were analyzed with the help of “PlanmecaRomexis” application of “PlanmecaProMax” apparatus, which allows to measure length of the dental arch. The dental arch length was measured before the complex removal of the thirds and two years after. For this purpose, the dental arch length was calculated based on the highest exposed point of distal surface of coronal part of twelve-year molars from both sides of the upper and lower jaw bones. Figure 1, 2.



Figure 1.The dental arch of a patient having chronic arthritis of the temporomandibular joint before the removal of the thirds.



Figure 2.The dental arch of a patient having chronic arthritis of the temporomandibular joint after the removal of the thirds.

The alteration of dental arch lengths in the groups being studied were compared.

Results and their discussion. Measurement of dental arches with the help of “PlanmecaRomexis” application allowed to receive the following results: in the first group of men the dental arch length before the removal of the thirds was 80.7 ± 0.32 mm

at the upper jaw bone and 76.5 ± 0.64 mm at the lower jaw bone; in the second group of women it was 80.1 ± 0.32 mm at the upper jaw bone and 73.2 ± 0.77 mm at the lower jaw bone. In the first group of men the upper dental arch length / lower dental arch length ratio was 1.055, and in the second group of women it was 1.094, which proved that in the first group of patients the load on the dental arches was distributed more evenly. The upper dental arch length / lower dental arch length ratio shall go to one.

After complex teeth removal, measurements were made two years after and their results were as follows: in the first group of men the upper dental arch length was 88.1 ± 0.98 mm and the lower dental arch length was 83.4 ± 0.69 mm; in the second group of women the upper dental arch length was 85.7 ± 0.39 mm and the lower dental arch length was 78.5 ± 0.57 mm. In the first group of men the upper dental arch length / lower dental arch length ratio after the complex removal of the thirds was 1.056, and in the second group of women it was 1.091. While comparing the values of the upper dental arch length / lower dental arch length ratio before and after complex removal of the thirds, significant difference was not found.

In order to specify the changes taking place in the length of the dental arch of the upper and lower jaw bones in the groups being studied before and after complex removal of the thirds, we summed up the values of the length of the upper and lower jaw bones and then found the difference between them. In the first group of men, the total length of the dental arch of the upper and lower jaw bones before and after complex removal of the thirds was 157.2 mm and 171.5 mm respectively. In the second group of women, the total length of the dental arch of the upper and lower jaw bones before and after complex removal of the thirds was 153.3 mm and 164.2 mm respectively. Table 1.

Table 1

Indices of dental arch length of upper and lower jaw bones in groups being studied

Groups	Number of people (n)	Dental arch length (mm)			
		Before teeth removal		After complex teeth removal	
		Upper jaw bone	Lower jaw bone	Upper jaw bone	Lower jaw bone
1 Men	9	80.7 ± 0.32	76.5 ± 0.64	88.1 ± 0.98	83.4 ± 0.69
2 Women	9	80.1 ± 0.32	73.2 ± 0.77	85.7 ± 0.39	78.5 ± 0.57

In the first group of men the difference between the upper dental arch length and the lower dental arch length after complex removal of the thirds was 14.3, and in the second group of women it was 10.9 mm. A significant difference in the values of length of dental

arch of upper and lower jaw bones before and after complex removal of the thirds was found, $P < 0.05$. During two years the patients of both groups were subject to regular medical check-up regarding the chronic traumatic arthritis of the temporomandibular joint. Two months after complex removal of the thirds, during clinical examination the patients noted changes in the temporomandibular joint operation, 12 (66.7 %) patients did not feel drawing pain and discomfort in the area of the temporomandibular joint. Figure 3.

The complex removal of the thirds contributes to alterations in the dentoalveolar apparatus, in particular, the total length of the dental arch of upper and lower jaw bones is increased, and this leads to the change of occlusive interrelations between teeth of the upper and lower jaw bones that in its turn decreases load in the structures of the temporomandibular joint. 6 patients (33.3 %) required additional remedial actions on the part of the temporomandibular joint. Figure 3. Change of occlusive interrelations between teeth of upper and lower jaw bones after complex removal of the thirds contributes to even distribution of the masticating pressure due to physiological alteration of occlusion.

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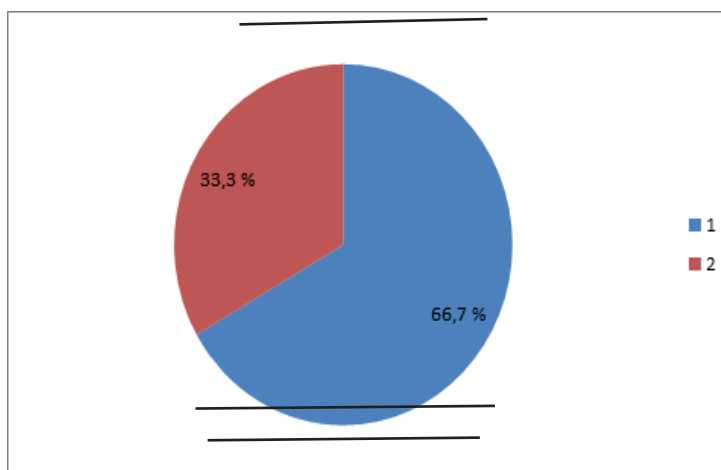


Figure 3. Diagram of changes in the temporomandibular joint operation of patients after complex removal of the thirds.

Conclusions: 1. Significant difference ($P < 0.05$) in the total length of dental arch of upper and lower jaw bones in patients before and after complex removal of the thirds

was found.

2. In the first group of men the difference between the upper dental arch length and the lower dental arch length after complex removal of the thirds was 14.3 mm, and in the second group of women it was 10.9 mm.

3. The complex removal of the thirds contributes to alteration of occlusive interrelations in the dentoalveolar apparatus, even distribution of the masticating pressure and reduction of loads on temporomandibular joint structures due to physiological alteration of occlusion.

References:

1. Kleinrock M. Functional disorders of the motor part of the chewing apparatus. Lviv: GalDent; 2015:256.

2. Ralph E., McDonald, David R. Avery Dentistry of children and adolescents. M.: Medical Dental Agency; 2003:766.

3. Timofeev A.A. Manual on Maxillofacial Surgery and Surgical Dentistry. Kiev .: ChervonaRuta-Tours LLC; 2004:1062.

4. Timofeev O.O. Shepelno-facial surgeries: [pidruchnik]. K.: VSV «Medicine»; 2011:512.

5. Semenov K.A., Drohomyretska M.S., Denha O.V., Horokhivskyi V.N. Normalization of occlusional relationships within dentitions as the main stage of treatment of disorders of temporomandibular joint. Modern Science – Moderniveda. 2016;6:144-150.