# CHANGE IN DENTITION IN CASES OF COMPLEX EXTRACTION OF THIRD MOLARS USING STANDARD ORTHODONTIC GUARDS

***Konstantin Semenov,*** *Ph.D.,*
*Department of Dentistry, Faculty of Postgraduate Studies,*
*Dnipro State Medical University, Ukraine*

***Annotation.*** *A study was conducted on the change in dentition in patients with complex extraction of third molars. Clinical observations were carried out in 15 patients who were diagnosed with dystopia and retention of third molars. The extractions of the third molars were carried out in a complex fashion in one visit; the patients were recommended to wear a blue orthodontic guard T4A one month before extraction and one month after extraction of the third molars. The mouth guard was worn at night for up to 6 hours.*

*A comparative analysis of panoramic radiographs and diagnostic models of the jaws in the study groups before and 2 years after surgical intervention was carried out. The results of the study: significant differences in the lengths of the dentition and the occlusal relationship of the teeth of the upper and lower jaws in the studied patients before and after the complex extraction of the third molars using a T4A orthodontic guard were revealed.*

*Changes in the occlusal relationship of the teeth of the upper and lower jaws with the complex extraction of third molars and the use of standard orthodontic guards contributes to the physiological restructuring of the bite and functional changes in the way the dentoalveolar apparatus operates.*

***Keywords:*** *patients, complex extraction of third molars, length of dentition, standard T4A orthodontic guard.*

The functions of all elements of the motor part of the masticatory apparatus are closely related to each other. Disruption of the activity of one of the elements causes the oppression of other functions. Alteration of the occlusal relationship of the teeth of the upper and lower jaws is the main factor leading to disturbances in the work of the dentoalveolar apparatus. Changes in bite are most often the result of tooth displacement caused by the loss of contact between the antagonist teeth due to the caries process, improperly performed fillings, as well as erupting wisdom teeth – the eighth teeth [1,5,6] .

The discrepancy between the size of the teeth and the alveolar arch adversely affects the entire dentition. If the total mesiodistal size of the teeth exceeds the size of the alveolar arch, compensatory mechanisms get activated, manifesting themselves in changes in the intensity of the Spee curve and incorrect inclination of the teeth [2,3,6].

The main guarantor of the functional balance of the dentoalveolar apparatus is the close contact between the teeth in the dentitions and the largely genetically determined psycho-emotional sphere of the person [2,4].

Purpose of the work: to trace changes in the dentition and the interrelations between dentitions in patients with complex extraction of dystopic and impacted third molars using standard orthodontic guards.

**Research materials and methods.** In 15 patients aged from 16 to 35 years, a complex extraction of the third molars was performed. The patients were divided into two groups. The first group consisted of 8 patients who underwent complex extraction of the third molars. The second group consisted of 7 patients who were recommended to wear a standard blue T4A orthodontic mouth guard for a month before surgery and continue using this mouth guard for a period of 1 month 10 days after the surgery. The mouth guard (T4A Trainer) was recommended to be used after tooth brushing in the evening and at night.

In modern dentistry, the traditional method of bite correction is the installation of braces. But in cases where this defect is insignificant, it is possible to use an alternative method – wearing a trainer. This device is a one-piece construction made of flexible, elastic and transparent silicone and polyurethane, in the form of a two-jaw mouth guard. T4A Trainer is designed to correct the occlusion, align the dentition and eliminate problems with the tone of facial and chewing muscles. The trainer has a semicircular shape that follows the outline of the dental arch.

The main elements of this type of orthodontic devices:

1. two dental canals of an arched shape for the lower and upper dentition – they play the guiding role for the teeth, allowing the patient to accurately fix the trainer on them;

2. lateral arches limiting the dental canals from the outside of the mouth guard – it is the lateral arches that cause the main therapeutic effect, due to their pressure on the teeth. For comfortable wearing, the height of the lateral arches is designed so as to only partially overlap the gingival margin at the level of the alveolar ridge;

3. the tongue restraint and the training tip, located on the inside of the T4A mouth guard, which are necessary for the formation of nasal breathing and the correct position of the tongue, respectively;

4. lip bumper and the bumpers that allow keeping the device on the teeth during the time of sleep;

5. pterygoid base for teeth with elongated distal ends; contributes to the correction of the position of the lower jaw.

We recommended using a blue model, which is made of a more elastic and softer material – silicone, which exerts little pressure on the dentition (Fig. 1).

Dispensary observation of patients was carried out for two years. At the same time, panoramic radiographs were analyzed, which made it possible to trace the dynamic changes in the dentition after the complex extraction of the third molars.

Patients were recommended the simultaneous extraction of the third molars to obtain the effect of compensatory restructuring of the bite and change in the interrelationship of the dentitions, by changing the position of the teeth in the dentition and the individual work of the muscular component of the dentoalveolar apparatus. The extractions of these teeth were performed under conduction anesthesia on both sides. The used anesthetic was Septanest 1:100,000 (Articaine family drug). The calculation of the drug dosage was carried out according to the body weight of the patients (5 mg of dry matter per 1 kg of body weight).


Fig. 1. T4A Orthodontic Trainer, blue mouth guard

In the postoperative period, the patients were prescribed the following drug treatment regimen, where the action of the components was aimed at normalizing the body's metabolic processes:

Dexamethasone, Dicynone, Ketolong, Furosemide (1 ampoule each) – were used once in the form of four intramuscular injections, immediately after the surgical intervention. For pain, Nimesil was used (1 powder dose was dissolved in 100 ml of water and drunk 1 time a day, during 5 days, after having a meal).

To prevent the development of the inflammatory process and pathological changes associated with it, Suprastin and mefenamic acid were used (1 tablet each x 2 times a day, during 5 days, after meals, accompanied by drinking plenty of water).

Suprastin has an antipruritic, antiedemic, sedative and hypnotic effect; it relieves spasms of smooth muscles, reduces capillary permeability, and prevents the development of anaphylactic shock and allergic reactions.

Mefenamic acid has anti-inflammatory, antipyretic and analgesic properties. The mechanism of anti-inflammatory action is due to the ability to inhibit the synthesis of inflammatory mediators (prostaglandins, serotonin, kinins, etc.), to reduce the activity of lysosomal enzymes that are involved in the inflammatory reaction. Mefenamic acid – stimulates the formation of interferon.

In order to normalize the body hemodynamics, the following drug was prescribed: Cyclo-3-Fort (1 capsule 2 times a day for 10 days). Pharmacotherapeutic group: venotonic agent of plant origin. The drug increases the venous tone, which is associated with a direct stimulating effect on the postsynaptic α-adrenergic receptors of the smooth muscle cells of the vascular wall, and also affects the activity of noradrenalin released from the storage granules in the presynaptic nerve endings. In addition to this, the drug has a lymphatic effect, improves lymphatic outflow from peripheral tissues, which is

very important after surgical interventions. Cyclo-3-Fort reduces capillary permeability and increases capillary resistance.

2 days after surgical intervention, the patients were prescribed Ciprolet A – active ingredients: ciprofloxacin, tinidazole; 1 coated tablet contains ciprofloxacin hydrochloride, equivalent to 500 mg of ciprofloxacin, tinidazole – 600 mg. The mechanism of action of ciprofloxacin is due to the inhibition of the DNA gyrase enzyme of bacteria. The result of such suppression is a derangement of the bulk structure of bacterial DNA, which makes further division of bacterial cells impossible. The main indications for antibiotic therapy: Local infection with the risk of spreading to surrounding tissues (acute purulent periodontitis, pericoronitis, periostitis); Exacerbation of chronic generalized periodontitis and other chronic diseases of the maxillofacial region; Purulent inflammatory diseases of soft tissues (lymphadenitis, abscess, phlegmon); Inflammatory process of bone tissue (osteitis, osteomyelitis). Drug administration schedule: 500 mg (1 tablet) 2 times a day 1 hour before or 2 hours after meals, during 5 days.

In order to restore the microflora, Linex was prescribed (1 capsule 2 times a day for four days); this drug is based on lyophilized live lactic acid cultures of bacteria; the action of this drug is aimed at restoring normal intestinal microflora, disturbed, in particular, by the action of an antibiotic.

Heparin ointment was applied externally, lubricating the skin in the area of edemas and swelling 2 times a day for 10 days. Heparin ointment is a direct anticoagulant; it causes anti-inflammatory and local analgesic effect, prevents the formation of blood clots and promotes the resorption of edemas and hematomas.

Rinsing of oral cavity was carried out with “Forteza”; the active ingredient of the drug is Benzydamine, which has analgesic and antiexudative properties. When applied topically, Benzydamine acts as a disinfectant. Its effectiveness in topical applications is due to the ability to penetrate the epithelial layer and achieve effective concentrations within inflamed tissues. When applied topically, Benzydamine is absorbed by the mucous membrane; however its concentration in the blood plasma is so low that it cannot have any pharmacological effect. Benzydamine is excreted from the body mainly through the urine in the form of inactive metabolites or conjugation products. This drug is used only for rinsing the oral cavity.

One cap (15 ml) of rinsing solution was recommended. After rinsing, the solution was spat out; the procedure was repeated 3-4 times a day for 7 days.

The total recovery period of the patient’s body after surgical intervention was 1.5 months.

The panoramic radiographs were analyzed using the Planmeca Romexis application of the Planmeca ProMax unit, which allows measuring the length of the dentition. The lengths of the dentitions were measured before and 2 years after the complex extraction of the third molars. To do so, the length of the dentition was calculated based on the maximum protruding point of the distal surface of the coronal part of the seventh teeth on both sides of the upper and lower jaws

**Results and their discussion.** The measurements of the dentitions using Planmeca

Romexis application allowed us to obtain the following results: in the first group, the length of the dentition before the extraction of the third molars was 81.1±0.32 mm in the upper jaw, 74.2±0.77 mm in the lower jaw; in the second group, the same value for the upper jaw was 81.7±0.32 mm, and for the lower jaw – 77.5±0.64 mm; The ratio of the length of the upper dentition to the length of the lower dentition in the first group was 1.093, and in the second group – 1.054; this indicated that in the first group of patients, the load on the dentition was distributed less evenly. The ratio of the lengths of the upper and lower dentition should tend to unity.

After the complex extraction of the third molars, the measurement was carried out two years later, and the following results were obtained: in the first group, the length of the upper dentition was 86.7±0.39 mm, and the length of the lower dentition was 79.5±0.57 mm. In the second group, where a T4A orthodontic guard was used after complex extraction of the third molars, the length of the upper dentition was 89.1±0.98 mm, and the length of the lower dentition was 84.4±0.69 mm. The ratio of the length of the upper dentition to the length of the lower dentition after complex extraction of the third molars in the first group was 1.091, and in the second group it was 1.056.

When comparing the values of the ratios of the length of the upper dentition to the length of the lower dentition before and after complex extraction of the third molars, no significant differences were found.

In order to clarify the changes in the length of the dentition of the upper and lower jaws in the study groups before and after the complex extraction of the third molars, we summarized the length values of the upper and lower jaws, and after that we found the difference between them. The total length of the dentition of the upper and lower jaws in the first group before and after the complex extraction of the eighth teeth was 155.3 mm and 166.2 mm, respectively. The total length of the dentition of the upper and lower jaws in the second group before and after the complex extraction of the third molars was 159.2 mm and 173.5 mm, respectively. See Table.

*Table 1*

**Indicators of the lengths of dentitions of the upper and lower jaws in the study groups**

| groups | Number of patients (n) | Length of dentition (mm) | | | |
|---|---|---|---|---|---|
| | | Before tooth extraction | | After complex tooth extraction | |
| | | Upper jaw | Lower jaw | Upper jaw | Lower jaw |
| first | 8 | 81,1±0,32 | 74,2±0,77 | 86,7±0,39 | 79,5±0,57 |
| second | 7 | 81,7±0,32 | 77,5±0,64 | 89,1±0,98 | 84,4±0,69 |

The difference in the total length of the dentition of the upper and lower jaws before and after the complex extraction of the third molars was 10.9 mm in the first group, and 14.3 mm in the second group. Significant differences in the values of the difference in the total length of dentition of the upper and lower jaws before and after the complex extraction of the eighth teeth ($P<0.05$) were obtained. The use of a blue T4A orthodontic

guard contributed to a more intensive restructuring of the bite, as evidenced by the indicators of the difference in the total length of dentition of the upper and lower jaws in the groups before and after the complex extraction of the third molars. Figure 2.

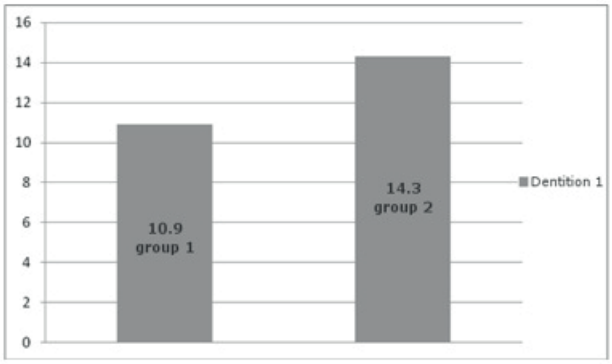


Fig. 2. The difference in the total length of the dentition of the upper and lower jaws in the groups before and after the complex extraction of the third molars.

For two years, patients of both groups were registered at the dispensary.

The complex extraction of the third molars contributes to the restructuring in the dentoalveolar apparatus, in particular, an increase in the total length of the dentition of the upper and lower jaws occurs, and this leads to a change in the occlusal relationship of the teeth of the upper and lower jaws, which in turn reduces the load in the structures of the temporomandibular joint as well as the load on the chewing muscles.

Changes in the occlusal relationship of the teeth of the upper and lower jaws after complex extraction of the third molars contributes to the uniform distribution of the chewing pressure due to physiological restructuring of the bite.

**Conclusions.** Significant differences ($P<0.05$) in the total length of the dentition of the upper and lower jaws in patients before and after complex extraction of the third molars were obtained.

1. The difference in the total length of the dentition of the upper and lower jaws before and after the complex extraction of the eighth teeth was 10.9 mm in the first group, and 14.3 mm in the second group, where the blue T4A orthodontic guard was additionally used.

2. The complex extraction of third molars contributes to a change in the occlusal relationship of the dentitions, as well as a uniform distribution of the chewing pressure and a decrease in the load on the structures of the dentoalveolar apparatus due to physiological restructuring of the bite.

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