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COORDINATION AND PROCESSES OF ELIMINATION OF VARIOUS ANAMALIES OF THE MAXILLO-FACIAL AREA

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Abstract:

This article covers the issues of surgical and orthodontic correction of maxillofacial deformities and anomalies using all techniques in combination. It presents the results of a study carried out on the base of the Department of Maxillofacial Surgery, the Osh Interregional Joint Clinical Hospital. Patients with dento-maxillofacial deformities and defects were selected and distributed into groups depending on the nature of the disease. In each group, surgical interventions were performed, as well as orthodontic interventions as necessary and in accordance with the nature of the pathology. The results of the manipulations performed are given below in the main text of the article.

Keywords: Maxillofacial Surgery, Dentoalveolar Anomalies, Facial Anomalies, Orthodontics, Gnathic Surgery.

Introduction

Correction of maxillofacial deformities is a complex medical problem that is carried out using anthropometric and computer modeling methods of facial reconstruction of the patient, aimed at achieving optimal functional and desired aesthetic results based on the use of modern methods of facial osteotomy and selection of rational ways of fixing the resulting bone fragments, ensuring their adhesion and excluding the possibility of relapse, TMJ dysfunctions and the development of aesthetic changes.

The relevance of solving this problem is due to the high prevalence of dentoalveolar and skeletal deformities of the maxillofacial region, reaching, according to various authors, 27-41% of their total population [1-4].

We share the view, developed in the specialized literature, that most patients seeking treatment first of all suffer from aesthetic appearance disorders and only then pay attention to the functional disorders of the act of chewing, speech, and breathing, caused by dental and maxillofacial deformities.

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This is explained by the fact that the existing aesthetic defect often leads to a violation of their psyche [8].

According to the literature and our observation, the resulting mental disorders are reversible and psychological rehabilitation of this group of patients invariably occurs when correcting the TMJ [1, 10]. Another important task is to achieve an optimal functional result, i.e., correction of dental arches, restoration of occlusion, and prevention of such complications as dysfunctions, innervation disorders, and tissue circulation disorders in the surgical intervention area. Estimation of the achieved esthetic result is made, first, by the patient himself. If the patient is satisfied with his/her appearance after surgery, the result can be considered good [9].

In the literature, there are papers in which the authors divide the face into several parts: lower, middle, and upper, and their movement makes it possible to simulate different ratios of the facial bones of the skull and the contours of soft tissue formations and thus predict the expected aesthetic results of surgery.

Other methods of predicting the results of reconstructive surgery, based, for example, on teleradiography, are also known. Lateral teleradiographs are used to determine the contours of the bony structures of the facial and brain sections of the skull, the cervical spine and the profile of facial soft tissues, which is achieved by applying X-ray-contrast mass to the patient's skin [1, 5].

Another method used to analyze the structure of the maxillofacial region is the X-ray cepholometric assessment of angular and linear dimensions. This method allows you to determine the proportionality of the size of the upper and lower jaws, the degree of pronounced protrusion of the central upper and lower incisors and their relative position, the inclination of the occlusal plane relative to the skull base, chronometric and gnathometric measurements, etc. The fourth method of assessing the proportionality of bone and soft tissue structures is a graphic analysis, which is based on the principle of morphometry [1, 7, and 10].

Based on the above, it can be noted that despite the greater number of publications covering the treatment of upper and lower prognathia, there are still many uncertainties. The terms of orthodontic treatment of this category of patients are not defined; osteotomy methods require improvement; there is a need to clarify the indications for their use depending on the volume of the planned surgery, the reconstructive nature of secondary deformities and postoperative complications; and to develop methods for planning surgical interventions where a balance between functional and aesthetic results can be achieved, taking into account the patient's desire [5, 6, 8].

The aim of the study was to increase the effectiveness of treatment of patients with jaw defects and deformities by applying innovative methods of orthodontic and surgical treatment planning to achieve aesthetic and functional results.

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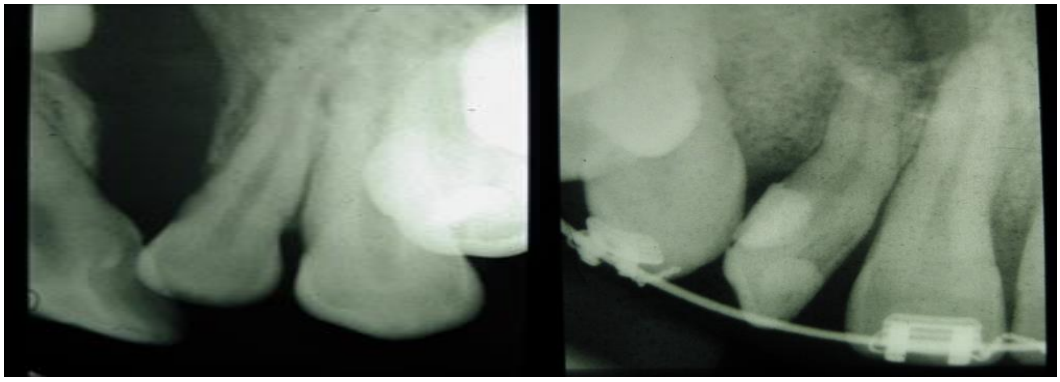
Materials and methods of research

During the period 2014-2020, we observed 352 patients (213 women and 139 men) aged from 16 to 45 years. They were divided into two main groups according to the nature of their diagnosed dental defects and deformities. All patients were divided into 4 groups depending on the diagnosis and further divided into subgroups depending on the method of treatment. In reconstructive surgery of dentoalveolar anomalies and deformities, preoperative orthodontic treatment contributes to the treatment effect. According to some authors in the literature, the need for orthodontic treatment varies between 85% of people with dentoalveolar anomalies and deformities. Of all patients, only 21 (5.6%) did not require pre-correction of dental arches and had reconstruction of the lower jaw in the chin area for aesthetic reasons. Preoperative orthodontic preparation was required in 331 patients we examined (94.4%) depending on the diagnosis made. Clinical and additional methods of research were carried out: diagnostic jaw models, X-ray, cephalometric analysis, 3D computer tomography, echosteometry, anthropometric measurements and photographic method of examination.

Research results and discussion

There were 90 patients with congenital maxillary alveolar process cleft in group I. Autocostal plasty according to the own method (Patent of KR № 2062) was carried out [3]. According to the results of our study, we can judge that with defects of the alveolar process, the use of our modified method improves the outcome of the surgical treatment, due to the established cortical plate at the base of the nose and prevents microflora from getting into the nasal cavity. Treatment efficacy is also confirmed by the results of clinical, radiological and densitometric studies, and when using the modified method the defect was restored 1.5 times faster than with the traditional method. Mixing collapane gel with the cat graft improved resistance to opportunistic pathogenic flora due to its antibacterial action.



A **B**

Fig. 1. A. Dental X-ray showing the bone defect of the alveolar process of the upper jaw before surgery. B. X-ray taken 6 months after surgery. (No cavity, full bone formation and tooth eruption in place).

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Group II consisted of patients with inferior prognathia - 75 patients of whom 55 patients were treated according to our method (Patent of KR № 2180) [4]. We treated 75 patients with mesial occlusion (anomalies of the III class according to Engl), (from them 49 women and 26 men) - 1.8 times more women than men.

The results of the study showed that already on the 3rd month of treatment the effect of the application of the chin implant was reflected in the changes of the cephalometric parameters. On average, the main sagittal cephalometric angles changed by ± 0.430 during 3 months of treatment. Patients in the age groups of 12-15 and 16-18 years had more pronounced parameters of disturbed bite in comparison with the age group of 19-21 years. The use of both the chin implant and the chin thrust was proven to be more effective during the period of skeletal growth.

Lower jaw growth was more easily delayed during this period compared to older patients. Consequently, the higher the age, the less effective were the methods we used to treat Engle class III occlusion. According to the results of cephalometric analysis at the 3rd month of treatment of the main group patients depending on their age, we can see that the average value of SNA angle increased up to 79, 5±3, 30, with significant changes in the age categories of 12-15 and 16-18 years old. No particularly significant changes were observed in the 19-21 age category.

Consequently, according to the results of treatment at the 3rd month, the protrusion of the maxilla in patients in the age category 19-21 years old in the main group was significantly lower compared to the patients in the age group 12-15 years old and slightly lower than that in the age group 16-18 years old.

A **B** **C**

Fig. 2. A. Chin implant placed on the lower jaw. B. The apparatus in the oral cavity after suturing the mucosal-periosteal flap. C. An installed chin implant in action.

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A **B**

Fig. 3. A. Chin sling on the patient in profile. B. Chin sling on the patient from the front

In the sagittal plane, there was a change in the SNA and SNB angles to the normal values in the main group when using a chin implant and in the comparison group when using a chin slider. Along with this, the delay in vertical growth on the mandible in the main group had a significant difference compared to patients in the comparison group. In the main group, the AR-GO-ME, N-GO-ME indices significantly decreased in relation to the compared group, indicating a delayed growth of the mandible and transformation of the growth type. Due to this, the tendency of mandibular growth was significantly lower in patients with a chin implant than in patients wearing a chin sling. The molar ratio in the main group improved by an average of 1.4 mm, a significant difference in the proclination of the lower incisors up to 2.4 compared to patients in the compared group.

As a result, in the follow-up control examination and analysis of cephalometric indexes, diagnostic models, the changes proceeded with the same stable intensity at 6 and 9 months, and in patients aged 12-15 years the changes proceeded much faster. This fact, in turn, proves that the use of orthodontic methods for the treatment of anomalies of the dentoalveolar system in the early permanent bite age is more effective in comparison.

The complex use of the apparatuses for rapid expansion of the maxilla together with the chin implant and the barb was obligatory in the study; due to this, the upper jaw protrusion in the late period of the mixed bite was much higher in patients with underdeveloped maxilla where the apparatuses for rapid expansion of the maxilla were additionally used than in patients with a permanent bite. The average difference in maxillary protrusion at the 3rd month of treatment in the main group was 1.2-2.4 mm, and the numbers of VITS in the main group were also 0.5-1.2 mm higher. The results of this study showed the significant effectiveness of using the chin implant in comparison to the sling, which the patients often simply refused to wear due to aesthetic discomfort.

Group III included 83 patients (48 women and 35 men) with distal occlusion and dystopia of the anterior teeth with class II according to Engl. The upper jaw was expanded using

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the RPE apparatus (which is attached directly to the upper jaw bone with pins (mini-implants) on both sides), and then after the necessary expansion, the teeth were aligned with a bracket system.

A **B**

Fig. 4. A. Measurement of distance before treatment. B. Distance measurement after treatment.

Group IV consisted of 104 patients depending on the area in which surgical intervention was performed using different methods of osteotomy.

Surgical correction of mandibular prognathia with intervention on both branches of the lower jaw was performed in 42 patients, aged 17 to 31 years. All patients were operated on using the method of retromolar sagittal osteotomy of the lower jaw branches with the complete detachment of the muscles around the branch (Racial Proposition 26/18). Analyzing the results of the operative treatment of the discussed group of patients, we can conclude that the optimal functional and esthetic results in patients with mandibular protognathia, as well as underdevelopment of the lower jaw can be achieved if the following indications are observed: if the sagittal gap does not exceed 1.0 cm and the central incisal line is not shifted, then ne

Patients with upper prognathia - 21 patients (12 females and 9 males) aged 17 to 31 years. Surgical treatment of upper prognathia was performed using two methods oriented to the sagittal gap between the dental rows. Surgical treatment of which was carried out in the volume of fragmentary osteotomy in the anterior part of the upper jaw and high horizontal osteotomy of the upper jaw. The presented clinical observation quite reflects the general results of the use of the upper jaw fragmentary osteotomy method developed by us (Racial Proposition № 27/18) and high horizontal osteotomy of the upper jaw, which provides, if the indications are observed, restoration of the bite of patients with preservation of their appearance. We did not observe the development of any complications in the postoperative period or recurrence of the corrected deformity in all examined patients.

Surgical treatment of lower prognathia with one-stage, for aesthetic reasons, osteotomies

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in the chin area was performed in 30 patients. Consequently, our clinical examples show that the intervention in the chin area when correcting lower pronatility and restoring occlusion in the discussed group of patients is performed using the techniques of retromolar sagittal osteotomy of lower jaw branches and chin area horizontally osteotomy only for aesthetic indications.

Conclusion

Thus, surgical treatment of mandibular branch osteotomy normalizes the bite but does not provide the desired aesthetic effect. This goal, in accordance with the wishes of the patient, is achieved by "additional" intervention in the mandibular region of the lower jaw.

The consolidation of the results of orthodontic treatment in the preoperative period is decisive for the successful outcome of the intervention. No less important is determining the optimal time to start orthodontic treatment in the postoperative period as well. Determining the optimal time to start orthodontic treatment in the postoperative period reduces the risk of complications, especially relapse.

The division into groups according to the nature of the defects and deformities of the jaws and the individual approach to each patient allowed us to normalize the bite after the surgery and obtain a patient's satisfactory appearance, without causing any complications and secondary deformities.

Postoperative rehabilitation of patients is an important link in the context of treatment and largely determines the outcome of surgical correction of maxillodental deformities. The postoperative period consists of three main stages: intermaxillary immobilization, functional load on the maxillary apparatus, orthodontic and orthopedic treatment. The continuity and sequence of these stages determines the degree of probability of complications, the possibility of relapse, and, in the end, the achievement of optimal results of the planned and performed surgical intervention with restoration of the anatomic-functional state and the aesthetic appearance of the patient.

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