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ALGORITHM FOR REPAIRING SECONDARY MAXILLARY DEFORMITIES IN PATIENTS WITH UNI- AND BILATERAL CLEFT LIP AND PALATE AFTER PRIMARY LIP AND PALATE SURGERIES

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Abstract:
Treatment of patients with congenital facial clefts accompanied by dento-mandibular anomalies and nasal deformities is one of the most difficult tasks of modern dentistry and maxillofacial surgery. Providing qualified care to this group of patients involves multistage surgical interventions, constant dispensary observation and treatment by a number of specialists - surgeons, orthodontists, speech therapists, paediatricians, otorhinolaryngologists.

Keywords: secondary maxillary deformity, cleft, cleft, upper lip, palate, primary surgery

INTRODUCTION. Improvement of diagnostic and treatment methods for patients with GVHD combined with deformities of the upper and lower jaws is determined by the increasing desire of patients to improve the quality of life, facial aesthetics, and social rehabilitation, as well as by the difficulties in obtaining qualified care in district medical centres [1,2,3]. Treatment of patients with jaw deformities requires a comprehensive approach, orthodontic and surgical stages of treatment [4,5,6,7]. Despite the continuous improvement of surgical techniques for primary surgeries such as cheilorhinoplasty and uranoplasty, there is still a significant number of secondary deformities of the midface, and in particular the maxilla (35 to 89% of cases) [8,9,10,11]. Surgical correction of secondary deformities of the maxilla is combined with orthognathic surgical treatment. Today, there are many techniques for surgical intervention on both the maxilla and mandible. Despite the fact that each of these techniques has its own peculiarities, they are united by the task of moving the upper or lower jaw to the desired position and achieving a stable result of treatment. However, according to the data of many foreign scientists and our own observations, 25-35% of patients with congenital cleft lip and palate (CPLP) after surgical treatment of jaw deformities due to postoperative scars, instability of the maxillary fragments after surgery, imperfect methods of fixation of bone fragments, etc. may relapse [2,6,12]. In this regard, improving the surgical treatment of secondary maxillary deformities in congenital clefts of the upper lip and palate is an urgent task of modern maxillofacial surgery [14].

PURPOSE OF THE STUDY: To create an algorithm for the elimination of secondary deformities of the maxilla in patients with uni- and bilateral clefts of the upper lip and palate after primary operations on the lip and palate.

MATERIALS AND METHODS OF THE STUDY: 48 children were under our observation in paediatric maxillofacial surgery of the Tashkent Dental Institute in 2020-2023 for examination and treatment.

RESULTS: Depending on the detected morphofunctional changes in the maxillofacial complex, rehabilitation of patients with GDM with combined jaw deformities consisted of several stages. The first stage of the complex treatment of patients with jaw deformities was preoperative orthodontic treatment, the main objectives of which were: correction of the shape and size of the dental arches of the upper and lower jaws; normalisation of the axial inclination of the front teeth in relation to the jaw base plane; creation of conditions for a constructive bite, so that during the surgery, when moving the jaw to the required position, there would be dense slit and tubercle contacts of the upper lip and palate, in which secondary bone grafting

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was not performed in the jaw. To improve the results of alveoloplasty of wide defects of the alveolar process, we used a bone block from the crest of the iliac bone with fixation with titanium miniplates. On orthopantomograms and intraoral dental images of the cleft area after bone grafting type I ossification and bone formation in the area of the alveolar process was noted in 84, 0 per cent of patients (85.0 per cent - in patients with OVRGN and 83.0 per cent - with DVRGN), type II - in 12.5 per cent of patients (12.0 per cent - with OVRGN and 13.0 per cent - with DVRGN), type III - in 3.5 per cent of patients (3.0 per cent - with OVRGN, 4.0 per cent - with DVRGN; 4.0% - with GVHD). Type IV ossification was not observed. Secondary bone grafting of the alveolar process allowed to fill and form secondary bone in the nasal region according to type I in 44.0% of patients, and according to type II - in 14.0% of cases.

The height of the bone bridge 1-3 years after secondary bone grafting was 83.0-85.0% of the normal size of the septal protrusion in the nasal region. Densimetric studies of the bone after surgery and in the dynamics of follow-up revealed bone regenerate neoplasm in all patients. In the majority of patients (85%) it completely covered the upper parts of the alveolar outgrowth defect. According to the densimetry data the density of the graft consisting of cancellous bone with a layer of cortical lamina was higher, which testifies to its greater resistance to resorption. One year after the operation the anatomical integrity of the maxilla was completely restored. The analysis of the long-term results of secondary bone grafting of the alveolar process in patients with OVRGN and DVRGN showed that positive results were obtained in the majority of cases. Secondary bone grafting of the alveolar process, performed during the period of replacement dentition at the age of 7 to 12 years, ensures adequate ossification in both alveolar and nasal parts of the maxilla. The canine eruption in the cleft area is spontaneous in most cases. Dynamic follow-up of the patients for the next 2-5 years after secondary bone grafting revealed no recurrences. After completion of secondary bone grafting of the alveolar process, patients in the late replacement dentition and later in the permanent dentition received further orthodontic treatment to normalise the position of erupting teeth, align the occlusal curve, and restrain the growth of the mandible using functional appliances.

At the second stage of rehabilitation of this category of patients, intensive palatal expansion of the maxilla in the transversal plane was performed as indicated. The indication for intensive maxillary expansion was the 3rd degree of narrowing of the upper dentition and its apical base. When examining the width of the tooth rows according to the Pon method and comparing the results obtained with the individual norm, in 20 patients on the upper jaw a significant narrowing was found in the area of the first premolars (4-4) - by 5.6 ± 0.2 mm ($p<0.05$); in the area of the molars (6-6) - by 7.4 ± 0.3 mm ($p<0.05$), i.e. in the area of the premolars (4-4) - by 5.6 ± 0.2 mm ($p<0.05$). In all 20 patients, narrowing of the upper jaw and upper dental arch was detected in the area of premolars. On collecting anamnesis in these patients, long orthodontic treatment was noted, but there was no effect. Given the unsuccessful orthodontic treatment, these patients underwent intensive palatal expansion of the maxilla. The main clinical evidence of maxillary expansion and elimination of its narrowing was the appearance of diastema between the maxillary central incisors. When examining the oral cavity, it was noted that the apices of the palatal cusps of the maxillary molars were in contact with the apices of the cheek cusps of the lower molars. Analysis of the results of TRG study in direct proportion before and after expansion revealed positive, statistically significant, changes in the studied parameters. Thus, the width of the nasal cavity increased by 2.2 ± 0.3 mm; the width of the maxilla by 3.9 ± 0.6 mm; the width between the cusps of the maxillary molars by 12.2 ± 0.8 mm; and the width of the diastema between the central incisors by 5.2 ± 0.7 mm.

At the third stage of rehabilitation, surgical elimination of the sagittal gap was performed: secondary deformities of the maxilla were eliminated using bimaxillary surgical treatment or surgical treatment with distraction osteogenesis using intramaxillary distractors. When planning the surgical treatment of mesial occlusion in patients with BPHN and choosing the surgical method of treatment (distraction osteogenesis or bimaxillary surgery), we took into account the following factors: the size of the sagittal interincisal distance; the position of the anterior teeth relative to the base of the jaws; the size of the apical base of the upper and lower jaws; the position of the upper jaw relative to the skull base; the position of the lower jaw in the sagittal plane; the condition of the periodontium of the teeth; the degree of back overlap of the anterior teeth; the degree of overlap of the anterior teeth; the position of the maxilla relative to the base of the skull; the position of the lower jaw in the sagittal plane; the position of the lower jaw in the sagittal plane; the position of the maxilla relative to the base of the skull; the position of the lower jaw in the sagittal plane. The indications for bimaxillary surgery were upper jaw retrognathia in adult patients with the need to extend the upper jaw less than 6-8 mm to eliminate the

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discrepancy; patient's age over 16 years; gnathic form of mesial occlusion when orthodontic treatment was ineffective. In order to achieve the planned postoperative position of the jaws, we proposed intermediate captive splints that allow matching the jaws in an orthognathic bite with maximum fissure-bump contact. To prevent interposition of soft tissues into the osteotomy gap and to stimulate regeneration, it is necessary to perform a one-stage bone grafting of the defect of the anterior wall of the maxilla with a bone block from the crest of the iliac bone, fixing it with miniplates. According to the data of clinical and radiological examination and occlusion assessment, bimaxillary surgical treatment gives a stable anatomo-functional result in 87% of patients. An increase in U6-Pty and a significant improvement in the angular parameters ANB, SNA, SNB and SNPog indicate a change in the position of the upper and lower jaws relative to the skull base and relative to each other. In 13% of patients in whom reverse sagittal displacement of the maxilla was noted, the deformity became less pronounced than preoperatively. Taking into account the above-mentioned disadvantages of bimaxillary osteotomy, we first substantiated the possibility of sagittal displacement of the upper jaw (up to 24 mm) and elimination of upper retromicrognathia without osteotomy of the lower jaw, using the principle of distraction osteogenesis with the help of an intramaxillary distractor. The use of distraction osteogenesis as an alternative method of treatment is indicated for patients with congenital cleft lip and palate complicated by gnathic form of mesial occlusion, when the defects are so severe that the use of standard orthognathic jaw surgery would be fraught with a higher risk of instability and recurrence. An important role in the success of rehabilitation of patients with cleft lip and palate combined with severe forms of jaw deformities is the choice of surgical treatment method, which should be individually justified. When selecting patients with maxillary retrognathia and Engle class 11 for maxillary distraction, we adhered to the following parameters: gnathic form of mesial occlusion with Engle class W, when orthodontic treatment is ineffective; in retrognathia of the upper jaw in patients after cheilo- and uranoplasty, when the upper jaw needs to be extended more than 8 mm to eliminate the mismatch between the upper and lower jaws; cephalometric analysis of the most significant angular and linear parameters, the difference in the ratio between the angles SNA and SNB is more than 7 degrees with a negative angle ANB; the index SNB in the limit of norm (80,0±3º); facial angle analysis concave profile of a patient with gnathic form of mesial occlusion. An algorithm of surgical treatment of upper retro-micrognathia using an intramandibular distractor (K.Wangerin design) and a distraction protocol were developed: after osteotomy according to Lefort 1, the upper jaw is fully mobilised and the lystractor is placed, the latency period continues, the distractor is poured, the latency period is longitudinal.

5 days, then the device is activated twice at 0.5 mm daily for 18-24 days. The consolidation period has been found to be 16 weeks and the retention period at least 12 months. Moving forward (from 9 to 24 mm) the osteotomised fragment of the maxillary complex resulted in displacement and redistribution of the soft tissue complex of the middle facial zone. Thus, the nasolabial angle increased on average by 240 and mainly due to the change in the position of the apical bases in the frontal jaw section, this had an effect on the soft tissues, which led to a change in the convexity of the face, its lower third, the position of the lips, and was reflected in the size of the nasolabial, chin-lip and interlabial angles. The main criterion of the effectiveness of the method of treatment of secondary maxillary deformity with the help of intramandibular distractor should be considered not only the change in the position of the maxilla fragments and facial profile according to the craniognathometry data, but also the stability of the maxilla 12 and 24 months after the treatment. Analysis of craniognathometry data, but also the stability of the maxilla 12 and 24 months after treatment. The analysis of cephalometric measurements of the TRG in lateral projection indicates that after the completion of distraction of the maxilla there was a normalisation of angles (SNA, SNB, ANB, Max 1-NSL) and linear parameters (A-RM, ANS-S (V), ANS-S (H), U6-Ptv, ANS-RM, Co-A). Moving forward (from 9 to 24 mm) the osteotomised fragment of the maxillary complex contributed to the displacement and redistribution of the soft tissue complex of the middle facial zone, which leads to a positive change in soft tissue parameters (Gl-Sn-pog, SnCM-SnLbSup, LbSup-SnWPog) ($p<0.05$) The fourth stage was postoperative orthodontic treatment aimed at: stabilisation of the new positions of the upper and lower jaws obtained as a result of surgical treatment, final correction of interocclusal relationships of the dental rows and creation of adequate functional load, elimination of conditions leading to jaw displacement, normalisation of mandibular movements, chewing and ar- ticulation and muscle functions of the maxillofacial region in the new jaw position.

On the basis of examination, treatment and dispensary observation of patients with dento-mandibular-facial pathology, a detailed algorithm for rehabilitation of

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children with congenital cleft upper lip, alveolar process and palate combined with gnathic form of occlusion disorder was created.

Conclusions: Thus, secondary maxillary deformities after cheilo- and uranoplasty, manifested as upper retromicrognathia, can be corrected according to the following protocol including: preoperative orthodontic treatment, alveoloplasty; intensive palatal expansion of the maxilla; distraction of the maxilla; bimaxillary osteotomy and mutual displacement of the jaws using intermediate cap-splints, or distraction of the maxilla with an intramandibular distractor. The presented algorithm of surgical treatment at the final stages of complex rehabilitation of patients with congenital cleft lip, alveolar process and palate with dentoalveolar deformity allows to restore function and improve aesthetic parameters, which in turn leads to social adaptation of these patients in society.

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