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The Technique Of Bimaxillary Osteotomy With The Help Of Intermediate Kappa-Splints For The Elimination Of Upper Retrognathy In Patients With Congenital Clefts Of The Upper Lip And Palate

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Abstract

The urgency of the problem of developing and improving the methods of surgical treatment of secondary deformities of the upper and lower jaws is determined by the increase in the number of patients with facial skeleton deformities after primary operations on the lip and palate. Numerous studies conducted by domestic and foreign scientists indicate that only the study of the long-term results of treatment of patients with jaw deformities can answer many questions, namely: how effective are the improved or developed treatment methods, is a comprehensive approach to patient planning and treatment appropriate with jaw deformities, what should be the sequence and terms of rehabilitation treatment. Answers to these questions can be obtained by analyzing the clinical material at long-term follow-up. An analysis of foreign and domestic works showed that their authors perform orthognathic operations in patients with congenital cleft upper

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lip and palate, but their long-term results are rarely described. In studying the long-term results of the surgical treatment of patients with CLP combined with upper retrognathia by bimaxillary displacement of the upper and lower jaws to a new position, we set the following tasks: to study the stability of the position of the upper and lower jaws; determination of the degree of relapse after removal of titanium miniplates and mini-screws 12 months after surgery, analysis of the results of postoperative orthodontic treatment.

Keywords: the technique of bimaxillary osteotomy, intermediate kappa-splints, upper retrognathy, congenital clefts of the upper lip and palate.

Introduction

Congenital cleft lip and palate - a severe malformation of the maxillofacial region, which is characterized by severe structural and functional disorders. The large number of patients with facial skeleton deformities primarily determines the importance of the problem of developing and improving surgical treatment methods for patients with jaw deformities after eliminating cleft lip and palate. Despite the fact that rigid internal fixation and bone grafting significantly improved the postoperative stability of orthognathic surgery, the presence of soft tissue scars and poor skeletal bone for rigid internal fixation increase the risk of relapse in patients by more than 40-60% [1,4,5,6,7]. We regard the high relapse rate in traditional surgery as an imperfection of the bimaxillary osteotomy technique, as sagittal movement of the upper jaw is carried out arbitrarily, at the discretion of the surgeon, without any technique. The displacement plane can be distorted, especially with partial secondary adentia [2,3,4].

Material And Methods

To achieve the goal and solve the assigned tasks, 45 patients with cleft upper lip and palate were examined. Of these, 24 (53.3%) are boys and 21 (46.7%) are girls aged 7 to 35 years. All patients were questioned, examined, and X-ray, laboratory and other studies were carried out, as well as simulated in a computer program. The main material was

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composed of patients who were in the clinic of the Tashkent State Dental Institute in the department of pediatric maxillofacial surgery in the period from 2018 to 2020. In addition, the separated results of clinical observations from 2010 to 2017 were retrospectively studied.

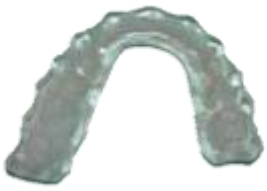
According to the WHO classification, patients were divided into 4 age groups (Table 1).

Characteristics of the research material

Table 1

Age group	**Gender**		**Total patients in the group**
	Male	Female	
7-12 years old	3	4	7
12-18 years old	12	8	20
18-21 years old	6	5	11
21-35 years old	3	4	7
Total	24	21	45

To prevent technical errors in bimaxillary osteotomy, we proposed the use of intermediate kappa-splints. To obtain the optimal result of surgical treatment before surgery, the optimal position of the upper and lower jaw was planned together with the orthodontist. The first kappa is the new position of the upper jaw and the old position of the lower jaw (for the exact placement of the upper jaw in a new final position). The second kappa is the new position of the upper and lower jaws (for the final fixation of the lower jaw in the new position of the upper jaw) (fig. 1).

		
A - the first initial kappa-splint, to determine the state of occlusion before	B - kappa-splint, for precise positioning of the upper jaw in a new final position.	C - the final kappa-splint, for the final fixation of the lower jaw of the new position of

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surgery and the position of the TMJ.	In this case, the lower part of the kappa is fixed in the lower jaw (initial position). Then the upper jaw is fixed using titanium mini-plates.	the upper jaw.

Fig. 1. Intermediate kappa-splint for precise positioning of the jaws in a predetermined orthognathic position.

The technique of bimaxillary osteotomy with the help of intermediate kappa splints with the elimination of upper microretrognathia and lower prognathia

The first stage - under endotracheal anesthesia, a typical Lefort I osteotomy was performed, freeing from soft tissues, the upper jaw was brought forward. The first kappa splint was put on the lower jaw. In this state, the cut off upper jaw was worn on the mouthguard splint. After making sure that the jaw teeth are firmly in the mouthguard, the entire block is pressed to the osteotomy line. In this position, the cut off upper jaw was fixed to the base with 2-3 mini-plates on both sides. To prevent soft tissue interposition and stimulate bone regeneration in 12 patients, we simultaneously performed bone grafting of the anterior maxillary wall defect with a bone block from the iliac crest fixed by mini - plates. After rigid fixation of the upper jaw, the mouthguard splint was removed. The wound was sutured in anticipation of the mouth.

Second stage. A typical cut along mucosal external oblique line denude jaw and carried by Dal Pont osteotomy. A second splint mouthguard is put on the upper jaw, pressing it firmly to the teeth of the upper jaw, a freely moving lower jaw is put on the mouthguard splint. Holding the lower jaw in this position, the cut-off fragments from both sides are fixed by mini-plates. A soft tissue wound is sutured in layers. For stable retention of displaced jaw fragments, tires (made of aluminum wire) are installed on the teeth of the upper and lower jaw and pulled together by an intermaxillary rubber traction. The use of a mouthguard-splint allowed to establish in the desired position not only a completely osteotomies fragment of the upper jaw, but also, dividing the upper jaw

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into 2-3 fragments, to fix them in an orthognathic bite with multiple fissure- tubercular contacts between antagonist teeth.

The results in the operated patients were monitored for from 1 year to 3 years. The results were evaluated clinically, according to an X-ray examination, based on functional and aesthetic parameters. The position of miniplates and the sensitivity of tissues in the innervation of the infraorbital nerve were determined when assessing the state of the upper jaw. Bone tissue and the position of fragments of the upper and lower jaws when removing miniplates were evaluated, as well as cephalometric and anthropometric indicators in comparison with the norm.

Results And Discussion

After an osteotomy of the upper jaw according to Lefort I and extension to a new position using intermediate kappa splints, the SNA angle was 82.1 ± 2.1 degrees, the ANB angle was 2.1 ± 1.2 degrees, and after the lower jaw was displaced posteriorly, the SNB angle was 79.4 ± 2.2 degrees. Control cephalometric measurements in the dynamics of observation, performed after 12 (T3) and 24 (T4) months, showed a stable position of the upper and lower jaw. In 20 patients, no recurrence of angular and linear parameters was observed.

According to clinical and radiological studies and assessment of the state of occlusion, bimaxillary surgical treatment gives a stable anatomical and functional result in 87% of patients. An increase in U6- Ptv and a significant improvement in the angular parameters of ANB, SNA, SNB and SNPog indicate a change in the position of the upper and lower jaws relative to the base of the skull and relative to each other. In 13% of patients who had a reverse sagittal displacement of the upper jaw, the deformation became less pronounced than before the operation. After bimaxillary surgery, the proposed method patients improved cephalometric indicators SNA, which from left 82.5 ± 2.1, SNB 79.4 ± 2.2, ANB 2.1 ± 0.3. Cephalometric measurements in dynamics after 12 and 24 months revealed a stable position of the upper and lower jaws.

A clinical example of the elimination of secondary deformation of the upper jaw in a patient with unilateral CLP and analysis of the stability of the position of the upper and

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lower jaws in the dynamics of observation.

Patient B.R., born in 1983, diagnosis: one-sided through cleft of the upper lip and palate, retrognathia of the upper jaw. He turned to the clinic of maxillofacial surgery with complaints of aesthetic face deficiency after operations on the lip and palate. The patient suffered cheiloplasty of Millard at the age of 8 months. And palatoplasty at 2 years, at the age of 12, bone grafting of the alveolar bone. Subsequently, the patient received orthodontic treatment in order to normalize the ratio of dentition and eliminate narrowing of the upper jaw.

On direct X-ray diffraction patterns, an asymmetric decrease in the transverse size of the upper jaw on the left, a disproportionate increase in the lower zone of the face vertically, and a jaw mismatch in the transversal area were revealed . At the age of 14, the patient underwent intensive expansion of the upper jaw after Lefort osteotomy and, using the apparatus for expanding the upper jaw, its narrowing was eliminated. The patient showed a displacement of the maxillary complex posteriorly and lower jaw forward. The upper zone of the face is of normal shape and size, the superciliary arches are well pronounced. The middle zone of the face is sunken, infraorbital, zygomatic, and zygomatic and paranasal regions are weakly expressed, especially on the left. On the lateral X-ray, a retroposition of the middle zone of the face is noted as a result of a decrease in the sagittal size of the upper and an increase in the size of the lower jaw with unfolded angles. The articular processes of a symmetrical shape both have a distal slope. When studying diagnostic models of the jaws installed in the occluder, it was noted: the ratio of dental arches according to Engle 's III class , sagittal mismatch in the frontal region of 6 mm (Fig. 2). In the constructive bite, the optimal ratio of the dental arches of the jaws with multiple fissure- tubercular contacts is established. On the basis of a clinical and radiological examination, the diagnosis was made according to the program: upper retrognathia, lower macrognathia with a predominant increase in the vertical dimensions of the lower zone of the face and the progenic ratio of the dentition. In this patient, the indication for surgical treatment of secondary deformity of the upper jaw was a skeletal mismatch in all three planes, especially in the sagittal plane. Computer analysis using data from a comprehensive examination showed the possibility of achieving an

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optimal balance of soft tissues of the face as a result of moving the middle zone of the face anteriorly and lower zone posteriorly and upward (Table 2). A one-stage osteotomy of the maxillary complex was performed according to Lefort with its movement 6 mm anteriorly and an osteotomy of the lower jaw according to the Dal Pont method with a large fragment being moved 5 mm posteriorly with fragments fixed with titanium mini-plates and mini-screws. During surgery, splint-mouth guards were used to perfectly position fragments of the upper and lower jaws in the ratio of orthognathic bite. As a result of the movement of the maxillary complex anteriorly by 6 mm and a large fragment of the lower jaw posteriorly by 6 mm, an optimal ratio of dental arches of the jaws and an acceptable facial aesthetics were achieved. An orthognathic bite with multiple fissure-tubercular contacts between antagonistic teeth.

With a visual assessment of the models, the midline shift becomes more apparent than with the assessment of photographs. The cutting edges of the incisors are located at different levels. Transversal problems of the lateral segments are also noticeable. When evaluating models from the side, you can see the correlation according to class III (on both sides). From the occlusal point of view, a significant asymmetry of the dental arches is visible.

A-before operation	B- before surgery	C- before surgery	D- after surgery	E- after surgery

Fig. 2. Models of the patient's jaws before and after surgery.

The results of X-ray studies of the bones of the facial skull indicated an improvement in the morphological proportions of the middle and lower zones of the face in the vertical

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and sagittal planes and their location relative to the anterior base of the skull.

Table 2.

Some cephalometric parameters of the patient before and after bimaxillary surgery

The parameters	Normal	Before surgery	After surgery	After 24 month
SNA º	82.0 ± 3º	75	79	80
SNB º	80.0 ± 3º	80	78	78
ANB º	2.0 ± 2º	-5	1	2
NL / NSL º	8.5 ± 3º	13	12	12
ML / NSL º	32.0 ± 6º	40	37	37
NL / ML º	23.5 ± 3º	27	25	25
SNPog º	82.0 ± 3º	82	81	81
NSBa º	130.0 ± 6º	129	129	129
arGoGn º	126.0 ± 10º	134	130	130
Max1-NA º	22.0 ± 3.0º	34	29	29
Mand1-NB º	25.0 ± 3.0º	23	24	24
Max1-NSL º	102.0º ± 2.0	110	107	107
Mand1-ML º	90.0º ± 1.5	88	88	88
SN , mm	77.7 ± 1.0	65	65	65
U6-PtV , mm	21.0 ± 1.0	11	18	18
Go- Pg , mm	73.2 ± 1.5	72	70	70
N-Me , mm	109.0 ± 1.5	116	113	113
N- Sna , mm	50.0 ± 1.0	51	50	50
Sna - me , mm	59.0 ± 2.0	65	61	61

Cephalometric measurements performed 12 and 24 months after the operation showed a stable position of the upper and lower jaws while maintaining the relationship of the dentition according to the orthognathic type with multiple fissure- tubercular contacts. Subsequently, the patient received orthodontic treatment to preserve the results

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and, after completion of treatment, he underwent rhinoseptoplasty. After bimaxillary surgery, the deficit of the middle zone of the face was almost completely eliminated by the anterior displacement of the upper jaw. The height of the upper lip became closer to ideal due to the shortening of the lower part of the face (Table 2). The tension of the chin muscles disappeared when the lips closed (Fig. 3-6).

Table 2

Patient profilometry indicators before and after bimaxillary surgery

The parameters	Normal	Before surgery	After surgery
Sn - GV	6 mm ± 3	- 1	4
WPog -GV	0 ± 4 mm	6	3
LbSup-SnWPog	3 ± 1 mm	-2.2	3
LbInf - SnWPog	2 ± 1 mm	4, 2	3
Bm - SnWPog	4 ± 2 mm	1	4
GSn-SnWPog º	12 ± 4º	5, 2	11.9
CWMe-SnWPOg º	100 ± 7º	82	97
SnCM-SnLbSup º	102 ± 8º	84	102
Gl '- Sn ' - pog º	12 ± 3,5 º	2	10

The research results showed high efficiency of use in the surgical treatment of patients with VRHN with upper retrognatia of intermediate kappa splints with further fixation of osteotomized fragments of the jaw with titanium miniplates. The absence of complete relapses of secondary deformations of the jaws at different times (from 12 months to 3 years) after simultaneous operations on the jaws, proved by the criteria for evaluating the results of complex treatment, confirms the advantages of the proposed method of pre-surgical preparation for surgical treatment in comparison with operations performed on both jaws without preliminary preparation of splints and fixation with titanium miniplates , in which relapses amount to 35.0%, which is also confirmed by literature data.

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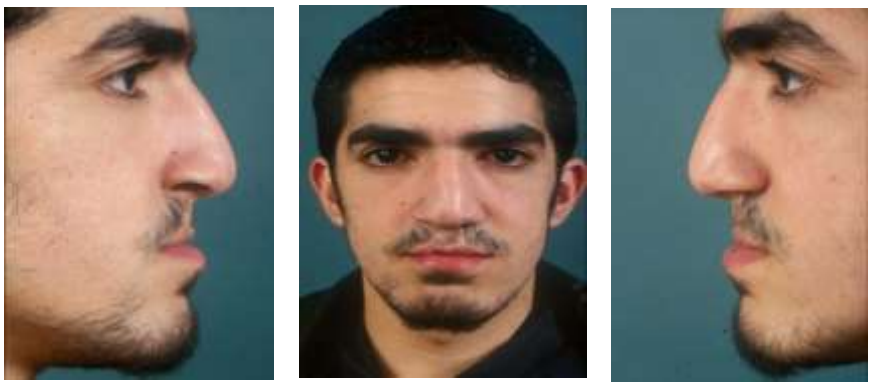

A- Profile and facet image before surgery

B- Profile and facet image after surgery

Fig. 3. Profile and facet pictures of the patient before and after surgery.

Fig. 4 . Bite condition before surgery and after bimaxillary surgery.

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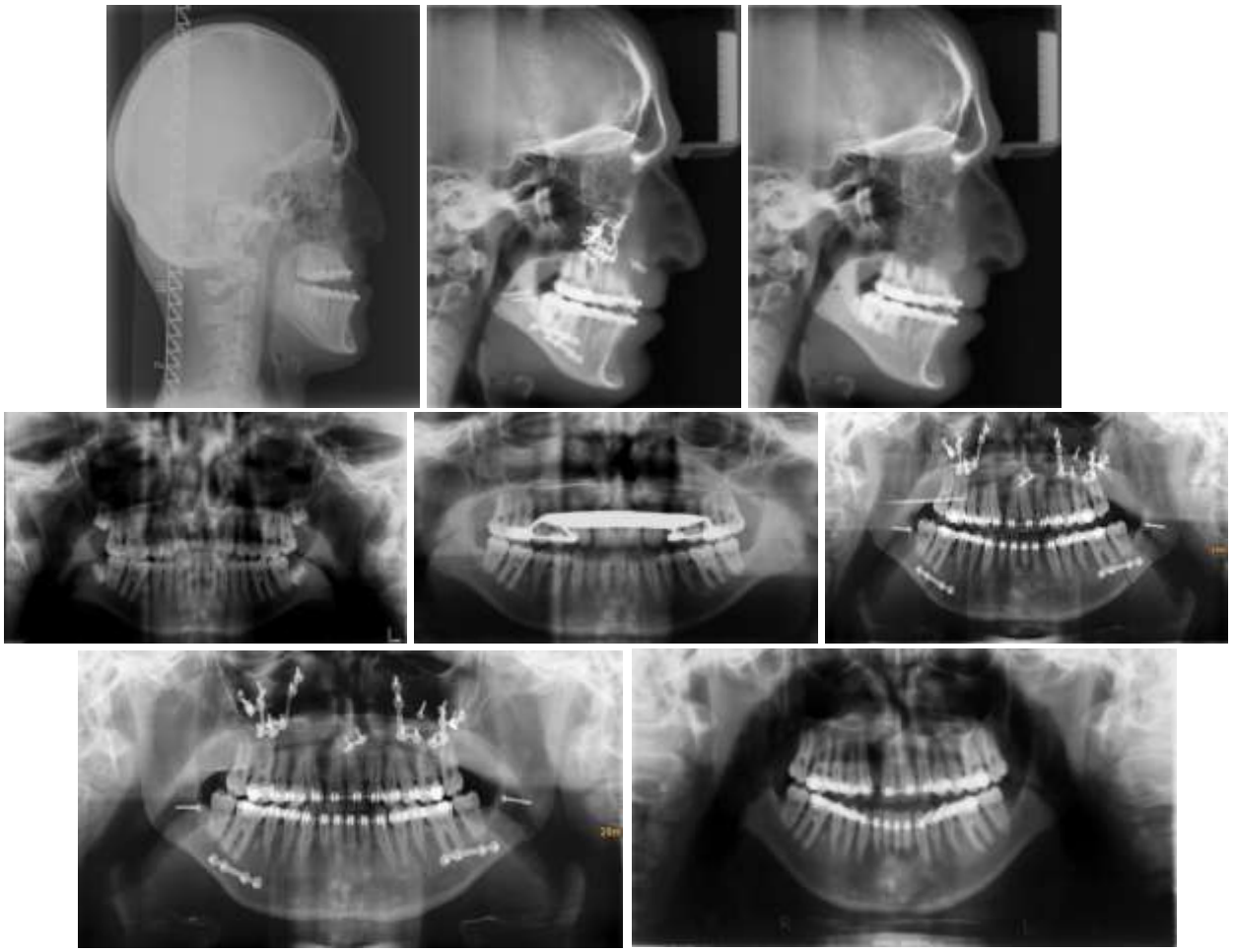

Fig. 5. X-ray images of the patient before, after and in the dynamics of observation 24 months after bimaxillary surgery. Panoramic photographs of the patient before surgery, after intensive expansion of the upper jaw, after bimaxillary surgery and 12 and 24 months after surgery.

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Fig. 6. Condition before and after reconstructive rhinoseptoplasty.

Conclusion

The planning of the surgical treatment of patients with superior retrognathia should be carried out taking into account the data of all research methods and the creation of an optimal bite balance with multiple fissure-tubercular contacts between the antagonist teeth. For this purpose, it is necessary, together with the orthodontist, to make intermediate kappa-splints, which increases the possibility of precise setting of the jaws in a predetermined orthognathic position. The use of titanium miniplates and miniscrews ensures reliable fixation and stabilization of jaw fragments after bimaxillary surgery. To achieve the planned postoperative position of the jaws, it is necessary to use in stages our proposed intermediate kappa-splints, which make it possible to match the jaws in orthognathic bite with the maximum fissure-tubercular contact. To prevent the interposition of soft tissues into the osteotomy gap and stimulate regeneration, it is necessary to carry out simultaneous bone grafting of the defect of the anterior wall of the upper jaw with a bone block from the iliac crest, fixing with miniplates.

References

1. Arnett, G.W. and Gunson, M.J. (2010). Esthetic treatment planning for orthognathic surgery. J. Clin. Orthod. 44 (3): 196

ISSN (e): 2689-1026 DOI: https://doi.org/10.37547/TAJMSPR/Volume02Issue07-11

2. Bockmann, R., Meyns, J., Dik, E., and Kessler, P. (2015). The modifications of the sagittal ramus split osteotomy: a literature review. Plast. Reconstr. Surg. Glob. Open. 2 (12): e271.

3. DeSesa, C.R., Metzler, P., Sawh-Martinez, R., and Steinbacher, D.M. (2016). Three-dimensional nasolabial morphologic alterations following Le Fort I. Plast. Reconstr. Surg. Glob. Open 4 (8): e848

4. Liou, E.J.W., Chen, P., Chen, Y. et al. (2011). Surgery-first accelerated orthognathic surgery: postoperative rapid orthodontic tooth movement. J. Oral Maxillofac. Surg. 69 (3): 781–785

5. Moores, C., DeSesa, C., and Steinbacher, D. (2016 Mar). Cleft Le Fort I osteotomy: a video presentation. J. Craniofac. Surg. 27 (2): e112–e113.

6. Murphy, C., Kearns, G., Sleeman, D. et al. (2011). The clinical relevance of orthognathic surgery on quality of life. Int. J. Oral Maxillofac. Surg. 40 (9): 926–930

7. Peiroʹ-Guijarro, M.A., Guijarro-Martıʹnez, R., and Hernaʹndez-Alfaro, F. (2016). Surgery first in orthognathic surgery: a systematic review of the literature. Am.J.Orthod.DentofacialOrthop.149 (4): 448–462

8. Proffit, W.R., Fields, H.W. Jr., and Sarver, D.M. (2014). Contemporary Orthodontics. Elsevier Health Sciences

9. Schendel, S.A. (2015). Computer simulation in the daily practice of orthognathic surgery. Int. J. Oral Maxillofac. Surg. 44 (12): 1451–1456

10. Steinbacher, D.M. (2015). Three-dimensional analysis and surgical planning in craniomaxillofacial surgery. J. Oral Maxillofac. Surg. 73 (12 Suppl): S40

11. Veeramani, A., Sawh, R., and Steinbacher, D. (2017). Orthognathic surgery and rhinoplasty to address nasomaxillary hypoplasia. Plast. Reconstr. Surg. 140: 930–932.