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CLUSTER APPROACH IN PRESURGICAL ORTHODONTICAL PREPARATION FOR TREATMENT OF PATIENTS WITH THE UNILATERAL CLEFT LIP AND PALATE

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Abstract

One of the current problems of modern medicine is the development and improvement of methods of early rehabilitation of children with congenital pathology of the maxillofacial region, which is characterized by pronounced structural and functional disorders of the maxillofacial region, disfiguring the face and negatively affecting the social and psychological status of patients. Carrying out primary operations at an early age during the first days of life contributes to restoration of anatomical and aesthetic integrity of structures of upper lip and nose wing to children with one-sided cleavage of lip and palate. Resently several years have been observed positive trend of using of orthodontic technics and systems in the treatment of patients with the toothpick anomaliesbirth defects , especially at an yearly age. However we have noted, incufficient data, about this problem, which necessitated this work.

The study aimed to: increase the effectiveness of treatment of children with one-sided lip and palate slits by using ortho-implants.

Under our supervision there were 40 children with a one-sided full slotted lip and palate from 3 days to a year of life. Of these, 27 patients made up the main group of patients prepared for surgery according to the proposed method, where the first stage was fixation of ortho-implants with elastic traction on the upper jaw. The second stage was removal of orthoimplants and carrying out operation of primary ceiloplasty.

Application of a complex approach with the involving specialists of different profiles, and also with using high technological methods of diagnosis with the using of micro implants in pre-operation training helps to create favorable environment for carrying out primary halioplasty in 85-90% treatment significantly reduces the time of rehabilitation and disability of patients of this group.

Keywords: *children with a cleft of lip and palate, a malformation, cluster approach, dentition deformations, ortho-implants.*

Introduction

Congenital unilateral total cleft of upper lip and sky is a heavy development taint which is characterised by expressed structural and functional infringements, odisfiguring person and negatively affecting social and psychological status of patients [*Alimova M, 2009; Starikova N et al, 2012*].

According to data of WHO frequency of the children birth rate with the cleft of the lip and palate averaging in the world 1:600. Averaging on Russia is given rating according to data of different authors accounts for from 1 on 500 newborn to 1 on 750 newborn 4 [*Mamedov A et al,2018*].

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One of current problems of modern medicine is development and improvement of methods of early rehabilitation of children with congenital pathology of maxillofacial area as congenital anomaly of development leads to deformation of a midface, disharmony of development of a facial skeleton, roughly breaks functions of various vitals and systems, an esthetics of the person and has negative effect on formation of the psycho emotional status of the child. In most cases this pathology leads to an invalidization of children that emphasizes relevance of this medico-social problem in the world [*Vodolatsky M, Vodolatsky V, 2009*].

The aspiration of surgeons to carrying out primary operations at early age contributes to the development and use of new methods of restoration of anatomical and esthetic integrity of structures of an upper lip and a wings of a nose, to children can be carried out with a unilateral crevice of a lip and palate during the first days of life [*Gonchakov G, 2009; Starikova N et al., 2012; Starikova N, Udolova N, 2012; Arsenina O et al., 2017*].

Our long time work experience with children with the cleft of the lip and palate scientific-grounded approach to the strategy and the tactics of the treatment of such children allows to offer algorithm comprehensive rehabilitation of the children with the cleft of the lip and palate. The main purpose of offered algorithm of treatment of children with the cleft of the lip and palate is an early aftercare with early restoration of the anatomy and function of units of maxillofacial area.

Special place among the complex of medical treatment is ranked by earlier rational orthodontic preparation before surgical interference [*Starikova N et al., 2012; Scacodub A et al., 2018*].

The analysis of results of orthodontic elimination the dental deformations of patients with a unilateral cleft lip and palate shows that special approach in their treatment is necessary. Individual planning of orthodontic preparation, the choice of rational methods and means of orthodontic treatment depending on age of the patient, a method planned labioplasty and uraniscoplasty, dental health, a look, type of a cleft, expressiveness of dento-maxillary deformations.

In recent years in Russia for correction the dento-maxillar anomalies and deformations at cleft pathology at early children's age are used orthodontic devices of various designs. Therefore there were great opportunities for successful treatment of patients of this category. However, in domestic literature there are not enough data on use of these devices at patients with a unilateral cleft of a lip and palate. Urgency of the problem of treatment of children with a unilateral cleft of a lip and the palate remains high.

The aim of this study is to increase in efficiency of treatment of children with a unilateral cleft of a lip and palate due to application of ortho-implants.

MATERIALS AND METHODS

From the 2015th to 2018 at department of dentistry of children's age and orthodontics in cooperation with orthodontists has been developed an algorithm of treatment of children with a unilateral cleft of lip and palate in clinic of children's city clinical hospital of NG Speransky No 9 is developed.

Under our supervision there were 40 children with a unilateral total cruciform lip and palate from 3 days to a year of life. 27 of this patients formed the main group of prepeared to operation according to the proposed method where the first method was fixation of ortho-implants with elastic link on the upper jow. The second stage was the removal of ortho-implants and the operation of primary heiloplastic (CH1312-07, ConMet, Russia).

The control group consisted of 23 children with a one-sided complete cruciform lip and palate, who did not receive pre-surgical orthodontic.preparation. Patients were distributed according to clinical and anatomical classification [*Mamedov AA, 2016*].

Before operation of primary cheiloplastika to the patient prints for further production of an individual spoon, and also control diagnostic model were taken, photos of an object researches are conducted. By means of a caliper measurements of the size a diastase between big and to small fragments of the upper jaw were carried out.

In small and big fragments of the upper jaw were established ortho-implants. On the head of orthoimplants the elastic chain was recorded. Within two weeks of activation of an elastic chain between fragments of the upper jaw with permanent adjustment was made of force of a tension . Force with which there was a movement of fragments was retsiprokny and was defined by a 200*g* scale dynamometer (Ortho Organizers Inc. USA).

After 2 weeks before operation, ortho-implants were removed from fragments of the upper jaw, repeatedly removed impressions with an individual spoon and the control diagnostic model for performing anthropometrical measurements and 3d scanning was cast. Then primary one-stage unilateral labioplasty is made.

Results

Orthodontic protocol.

All 40 patients from unilateral cleft lip and palate at primary reference impressions were removed by silicon. Control-diagnostic model was poured for manufacturing of individual spoon (Fig. 1) and as well anthopometrical measurements were conducted with the help of 3D of scanning.

Anthropometrical measurements of diagnostic models were performed by the JH Sillman method. Considered parameters in the transversally plane: interfangs width of an alveolar arch, the intermolar width of an alveolar arch; width in the field of hillocks (Fig. 2A) [*Sillman J, 1951, 1964*].

Surgical protocol

Before surgical treatment ortho-implants are fixed on a small and big fragment of the upper jaw (Fig. 3A).In the area in a projection of fangs and a projection of molars. Ortho-implants are connected among themselves with the help of an elastic chain. Force of draft is measured by a dynamometer (120 *g*). The orthodontist together with the surgeon daily examine the patient. Checking stability of ortho-implants and a tension of a chain. In a week after installation of ortho-implants the orthodontist activates an elastic chain on 50 *g* (Fig. 3B, C). After 2 weeks at achievement of an optimum condition of fragments of the upper jaw under an endotracheal anesthesia extraction of ortho-implants (Fig. 3D), repeated removal of a impression by means of an individual spoon and operation primary labioplasty is carried out. Further the control-diagnostic model is made and 3D scanning and anthropometrical measurement of model is taken (Fig. 2B).

Figure 1. *Photo of the patient, 14 days. Diagnosis unilateral full cleft of a lip and palate*

According to the results of orthodontic preparation for the initial stage of surgical treatment - surgery one-moment one-sided heiloplasty was done to all 40 patients in the neonate period. In two weeks after fixation of mini-implants and rubber draft the clearance between the lateral fragments of the alveolar process of the upper jaw decreased by 50%.

Thus, the use of microimplants in pre-operative training plays an important role in surgical reha-

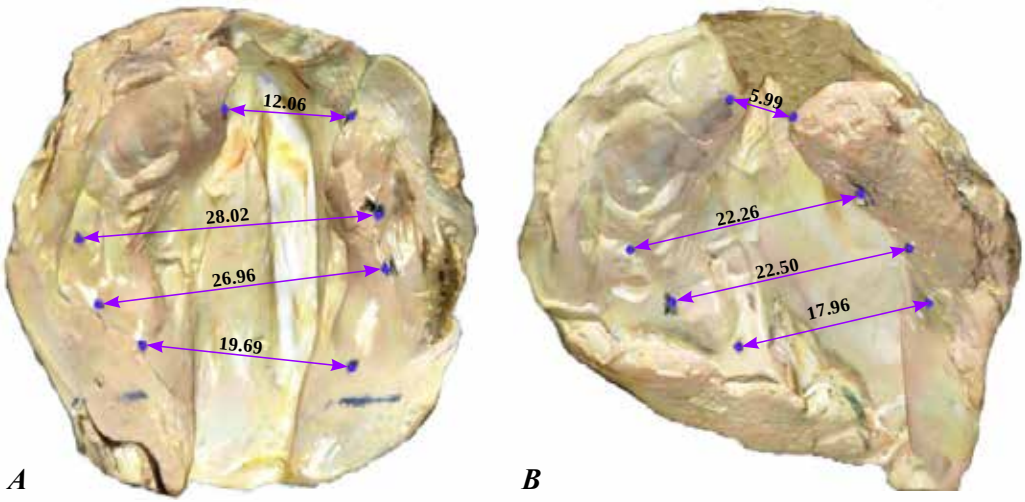

Figure 2. *The virtual image of plaster model of the patient with cleft lip and palate (A), and for the concret patient (B) with a marking for measurement the transversal parameters of J.H. Sillman [Sillman JH, 1951, 1964].*

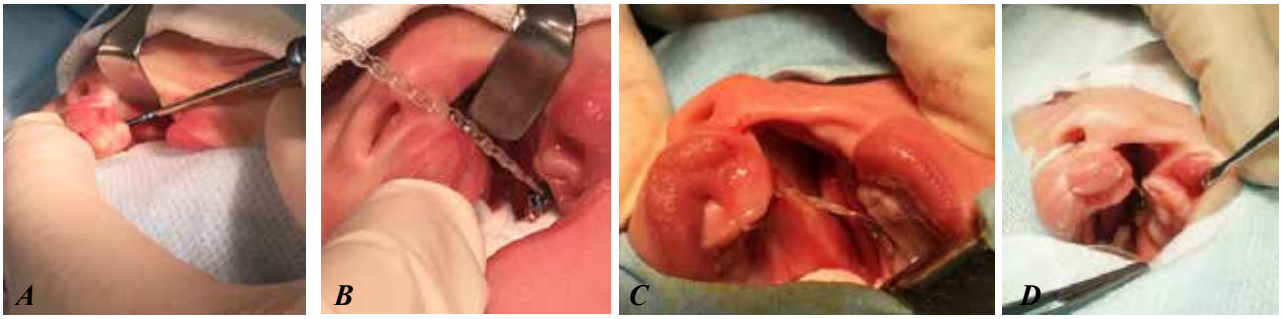

***FIGURE 3**. In 2 weeks, before surgical treatment (A), installation of an orthoimplant in a small fragment of the upper jaw (B), fixing of an elastic chain (C, D).*

bilitation and allows surgeons to perform quality primary surgery, which positively affects the healing of lip tissues. In order to compare the results of pre-operative training and two weeks after, children with unilateral cleft lip and palate, we carried out anthropometric research of jaw models. After the carried-out presurgical preparation with use of microimplants with rubber draft, carrying out primary unilateral heyloplastic will reach full face contact between fragments of the upper jaw that is confirmed at static processing of material ($p<0.05$).

***FIGURE 4.** A photo in 3 months after operation right angle (A), left angle (B).*

So, the use of orthodontic training contributes to the creation of favorable conditions for primary heiloplasty and allows to significantly reduce the length of rehabilitation of patients of this group.

Thus, through a comprehensive approach to the rehabilitation of children with unilateral lip and palate slits, with the involvement of specialists of various profiles, as well as the use of high-tech diagnostic methods, we have managed to achieve a stable result in 85-90% of cases of treatment and reduce the length of disability in patients with this pathology.

CONCLUSION

The algorithm of presurgical orthodontic preparation with application of orthoimplants with an elastic chain at children with a creft of lip and palate, allows to reduce terms of orthodontic preparation, to reduce the size a diastase by 6-8 *mm*, (50%) that, in turn, creates favorable comfortable conditions for the surgeon when carrying out primary labioplasty. The algorithm reduces treatment terms, terms of rehabilitation and improves esthetic results, creates favorable conditions for the vital functions of an organism, such as sucking and breath that gives the chance to the child to gain weight and to develop normally according to age.

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