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EARLY ORTHODONTIC TREATMENT OF CHILDREN WITH BILATERAL CLEFT LIP AND PALATE

(LITERATURE REVIEW)

Suvonov Kayim Jahanovich

Halmanov Bakhodir Abdirashidovich

Ikramov Gayrat Alimovich

Tashkent State Dental Institute

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Abstract:

The number of children born with congenital pathology of the maxillofacial region remains significant. Congenital bilateral cleft lip and palate is the most severe form of facial cleft. Such patients have severe anatomical and functional disorders that require long-term and multi-stage recovery. Currently, the treatment of such patients is carried out comprehensively and includes the participation of a maxillofacial surgeon, speech therapist, otolaryngologist, pediatrician, orthodontist, etc. Throughout the entire period of treatment, orthodontic correction not only improves the functional and aesthetic indicators of the dentofacial system, but is also a preparatory stage to continue treatment with other specialists. At the same time, it is necessary to clarify some details of the method itself and the design features of the device, as well as to develop indications for the use of one or another type of orthodontic treatment, depending on the degree, severity and shape of the existing deformity and the choice of tactics for preparing the patient for primary surgical treatment.

Keywords:. bilateral cleft lip and palate, orthodontic treatment

Children with cleft lip and palate (CLP) require complex treatment with the participation of specialists in various fields: pediatrician, orthodontist, maxillofacial surgeon, otolaryngologist, speech therapist, geneticist, etc. In recent years, extensive experience has been accumulated in improving methods of surgical treatment of RGN, new types of operations have been developed, the approach to age-related indications for treatment has been changed, orthodontic care has been improved, and medical genetic examinations are being developed and implemented (Starikova N.B.). The importance and role of psychological and pedagogical work with families with children with congenital clefts has increased. However, as some authors note, these works mainly highlight positive experiences in helping such children.

Analysis of the results of clinical and radiological examination of patients of different age groups revealed the most characteristic growth disorders of the facial skull for each of these groups (Katasanova E.S. 2012). It is believed that a step-by-step integrated approach and timely prediction of growth and possible deformations of the facial skeleton makes it possible to develop a specific algorithm for the actions of an orthodontist at various stages of patient rehabilitation.

Bilateral cleft of the upper lip, alveolar process, hard and soft palate is the most complex of all congenital malformations of the maxillofacial region (MFA). Bilateral RGN is characterized by the division of the maxillary arch into three segments: the premaxillary bone and two fragments of the jaw (right, left). In addition, there is an anatomical defect of the hard and soft palate throughout, separation of the orbicularis oris muscle, underdevelopment of the central fragment of the upper lip, congenital shortening or absence of the skin part of the nasal septum, varying degrees of protrusion of the premaxillary bone and underdevelopment of the upper jaw as a whole. The

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clinical picture of complete bilateral cleft lip and palate largely depends on the position of the premaxilla and vomer. In some cases, the vomer fuses with the palatine processes of the upper jaw, in the anterior section it is adjacent to the premaxillary bone, connecting with the lateral fragments of the alveolar process of the upper jaw, and in the posterior section - with the palatine process. In cases where this process is disrupted, the vomer and premaxillary bone remain freely located between the palatine and alveolar processes: a bilateral cleft is formed.

Based on a pathoanatomical study of the skulls of deceased newborns with RGN, the authors presented information on the structure of the upper jaw, confirming clinical observations that showed that its deformations are not limited to changes only in the alveolar process of the upper jaw. The maxillary bone in children with RGN is reduced in size in all (sagittal, transversal and vertical) planes. The zygomatic bones are also reduced in size and deformed, the shape of the eye sockets and the cranial vault are changed. The lateral fragments of the alveolar process are displaced mesially in 80% of cases.

RGN is accompanied by a violation not only of the anatomical shape of the newborn's face - the functions of breathing and sucking are increased. Observed airway obstructions reduce the strength of the respiratory muscles, reduce the excursion of the chest, which causes diseases of the upper respiratory tract; children more often suffer from bronchitis and pneumonia.

With complete bilateral RVH, feeding difficulties arise due to the inability to breastfeed, frequent regurgitation through the nose, as a result of which the child loses weight. Ingestion of food into the respiratory tract creates a risk of developing aspiration pneumonia.

Thus, the initial data on the deformation of the facial skeleton in patients with RHN consist mainly of congenital underdevelopment and anatomical defect of the tissues adjacent to the cleft. Secondary deformities of the maxilla and other facial bones caused by dysfunction of the muscles surrounding the anatomically altered maxilla have a significant impact on treatment planning for such a patient from the neonatal period.

Children born with a complete bilateral cleft of the upper lip, alveolar process and palate need emergency medical care in order to normalize feeding conditions, prevent the process of increasing the size of the birth defect, the progression of secondary deformations of the jaw bones, and create the necessary conditions for cheiloplasty at an early age. It has been proven that early separation of the oral and nasal cavities ensures natural feeding of the child, since at these hours the sucking reflex is already developed. Feeding your baby promotes its growth and development. Some authors were distrustful of the use of obturators, fearing a loose position at the edges of the cleft, recommending their use after the completion of the formation of the temporary occlusion.

T.V. Sharova et al. (1985) proved that the obturator, immersed in the depth of the cleft, with its lateral edges exerts pressure on the free edges of the palatine processes, is a mechanical spacer that restrains the growth of the palatine processes of the upper jaw and changes their topography, pressing their free edges into the nasal cavity. However, despite conflicting views on the use of a floating obturator, various modifications of it are still used in practice.

Currently, significant experience in early surgical treatment of cleft lip has been accumulated in our country and abroad. Analysis of long-term results shows that cheiloplasty performed immediately after the birth of a child, with an unfavorable ratio of fragments of the upper jaw, without preliminary orthodontic preparation, leads to the development of deformation of both the dento-alveolar arch (narrowing of the upper jaw) and to the development of secondary scar changes on the restored upper lip. Protrusion of the premaxillary bone creates difficulties when performing cheiloplasty in patients with bilateral PPH and has a negative impact on the results of the operation. With a congenital bilateral cleft of the upper lip and palate, the lateral fragments are blocked by the premaxillary bone, which leads to even greater narrowing and underdevelopment.

As is known, after primary cheiloplasty, under the influence of pressure from the restored upper lip, the lateral fragments of the alveolar process are shifted to the center, while the premaxillary bone remains pushed forward. The position of the premaxillary bone in a state of protrusion under the pressure of the lateral fragments on both sides makes their orthodontic movement difficult. The idea that restoration of the orbicularis oris muscle puts pressure on the premaxillary bone has turned out to be unfounded. And tissue healing under conditions of pronounced tissue tension is accompanied by local hypoxia, creating the threat of postoperative wound dehiscence and pathological tissue scarring. To avoid these complications when

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repairing a bilateral cleft lip, some surgeons perform resection of the premaxillary bone, although most specialists do not agree with this.

It has been established that in the area of the suture between the vomer and the premaxillary bone there is a center of its growth, which regulates the development of the upper jaw in the sagittal plane. In case of traumatic damage to the center of potential growth, the growth of the alveolar processes anteriorly stops, the premaxillary bone atrophies, is displaced orally, and subsequently underdevelopment of the entire midface zone is formed.

In order to preserve the premaxillary bone, various methods are used to reduce (move) it into the alveolar arch, for example, such as vertical or oblique osteotomy of the vomer and dissection of the cartilaginous mouth of the nasal septum. However, such operations are accompanied by significant blood loss in the absence of a pronounced positive result; subsequently, the mobility of the premaxillary bone remains, despite all attempts to eliminate it by fixing the premaxillary bone to the vomer and the anterior sections of the lateral fragments of the upper jaw with a wire ligature, synthetic thread, and metal pins. Despite such complex fixation, the premaxillary bone remains mobile, atrophies, the functions of biting and speech formation are impaired, and significant defects of the upper dentition and alveolar process appear.

The need for early preoperative orthodontic treatment of maxillary deformity in children with RGN during the neonatal period was first substantiated by S.K. McNeil (1950, 1954). The author suggested starting orthodontic treatment immediately after birth and finishing it by the age of six months of the child's life. After completion of orthodontic treatment, primary cheiloplasty was performed, and constant observation by an orthodontist was carried out until a permanent dentition was formed. In 1957, the author described a method of hardware treatment of children with bilateral PPH prior to primary cheiloplasty, which was aimed at repositioning the premaxillary bone and then maintaining it in a new position. S.K. McNeil recommended the use of this equipment when the potential for osteogenesis is very high. He was the first to express the idea of orthodontic treatment of fragments of the upper jaw in order to stimulate their growth, correct the position of the palatine processes and reduce the size of the defect. Bilateral RGN primary plastic surgery of the upper lip was preceded by surgical reduction of the premaxillary bone with subsequent retention of it in the new position. The method has found wide application abroad. It began to be used by many specialists in various clinics. All of them noted the positive aspects of early orthodontic treatment for congenital malformations of the lip and palate. Elastic rubber bands were used for preoperative extraoral orthodontic treatment of wide RHN, which the authors believe replicates similar forces to the normal orbicularis oris muscle.

According to their data, elastic pressure on the premaxillary bone normalizes the position of the premaxilla and narrows the width of the alveolar cleft. However, this method did not eliminate the protrusion of the premaxillary bone when the lateral mesial fragments were displaced.

Many experts recommend starting to correct jaw deformities in children with RGN as early as possible during the period of growth and development of all elements of the upper jaw. The earlier orthodontic treatment is undertaken, the more effective it is and, therefore, the better the functional and aesthetic results. This possibility is due to the child's potential for growth of the jaw bones. In addition, when using orthodontic appliances at an early age, it is easier to achieve balance in the action of the lips, cheeks, tongue, chewing and facial muscles of the mouth.

N.V. Starikova showed that under the influence of suction jerky movements of the tongue at the moment of sucking the nipple, the latter pushes the palatine processes up and to the sides, changing the position of the palatine processes from horizontal to vertical. The lateral fragments of the alveolar process are displaced distally, the premaxillary bone is pushed forward, thereby increasing the size of the congenital anatomical defect. The position of the palatine processes and fragments of the alveolar process is negatively affected by unusual air flow pressure due to impaired nasal breathing.

Specialized care was provided from the first moment of life of the newborn through the use of a preformed standardized plate. At the age of one month, a device was made for the child to reduce the premaxillary bone, which was a monolithic plate containing a multi-link structure for the anterior part of the upper jaw. The device provided targeted growth of the facial skeleton. First, the intermaxillary bone was brought out to the axis of symmetry, then an external bandage was used to realign the intermaxillary bone. Reposition of the premaxillary bone was achieved over a treatment period of 25 days to 6-8 months. It was noted that the earlier treatment was started, the faster

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it was possible to achieve reposition of the premaxillary bone The disadvantages of this method were the use of standardized devices, which do not allow taking into account the individual characteristics of jaw deformation in a particular child, as well as the need to manufacture a large number of devices that may not be in demand. A number of authors proposed early orthodontic treatment to bring the alveolar processes closer together due to their natural growth in the direction specified by the doctor. For this purpose, an apparatus was made with an obturating part and a screw; the premaxillary bone was covered with a mouth guard connected to the parts of the apparatus with a wire arch. When the screw was activated, the arch was tensioned, the premaxillary bone was repositioned, and an extraoral pressure bandage was additionally used. The duration of treatment was 4-8 months, which depended on the age and general condition of the child.

Analyzing the experience of early orthodontic treatment, we can conclude that the use of removable intraoral appliances ensures the separation of the nasal and fatal cavities and normalizes feeding. During the treatment process, an optimal ratio of upper jaw fragments is created for primary cheiloplasty. The duration of treatment is on average 4 months, but sometimes it increases depending on the severity of the deformation of the upper jaw, the age of the child at the time of treatment, the parents' compliance with the doctor's recommendations, etc.

However, this approach also has disadvantages. This is insufficient good fixation of the device, frequent replacement of devices, frequent corrections of the basis of the device. The experience of using additional extraoral fixation devices indicates that they also did not provide sufficient fixation of intraoral devices and, in addition, traumatic damage to the oral mucosa in children is possible, increasing the time required to eliminate the deformity.

N.G. Georgiade described a method for correcting maxillary deformity prior to primary cheiloplasty in children with complete bilateral cleft lip and palate using a fixed intraoral appliance. This involves using Kirschner wires, which are passed through the cheek under local anesthesia into the distal area of the upper jaw posterior to the dental follicles. The anterior wire is inserted using a hand drill through the vestibular surface of the premaxillary bone in the area of the apical base. An additional Kirschner wire is then inserted to provide additional fixation. The knitting needles are laid in the buccal grooves so that their free ends are transformed into hooks for rubber traction. Rubber rods are fixed to this point, and movement is carried out in the sagittal plane - backward or along the buccal surface, depending on the type of cleft. At the same time, the lateral fragments are expanded.

This device with intraosseous fixation was used for the first time as a non-removable dynamic orthodontic device to eliminate deformities of the upper jaw. However, the N.G. Georgiade has not found wide use in orthodontic practice due to its bulky size, imperfect anesthesiology, and reduced elasticity of rubber rods.

In 1980-1999 D.R. Millard and R.A. Latham presented a detailed description of the modified dynamic device and the results of treatment of children with complete bilateral cleft lip and palate. They explained the posterior displacement of the wings of the nose by the retroposition of the lateral fragments of the alveolar process of the upper jaw. The device consisted of plastic mouthguards placed on the lateral fragments of the alveolar process of the upper jaw and connected to each other by a dynamic device. The aligners are fixed to the alveolar process using intraosseous rods. Planning for the insertion of rods is carried out in a dental laboratory on plaster models of the jaws. The locking part of the rods is immersed in the base of the apparatus. The device is applied under intubation anesthesia in an operating room. A metal pin is passed through the premaxillary bone and connected with an elastic rubber chain to the base of the base. As the lateral fragments expand, the chain becomes tense, causing retrusion of the premaxillary bone. Treatment duration is on average 3 weeks.

A fixed device has its advantages and disadvantages. The advantage is reliable fixation, quick achievement of results, simultaneous elimination of jaw deformation in all planes (sagittal, transversal and vertical), the absence of auxiliary extraoral elements. However, there is a danger of damage to the rudiments of permanent teeth, and in some cases, a secondary infection and screw rejection may occur.

Conclusions: Thus, early orthodontic treatment of children with congenital bilateral cleft lip and palate remains an important and pressing problem. Early orthodontic treatment using fixed appliances in this group of patients is poorly covered in the literature, and the question of the optimal age period for this type of treatment has not been resolved. There is no informative set of diagnostic measures. There are conflicting opinions about the advantages and disadvantages of this method. Some details of the

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method itself and the design features of the apparatus require clarification. There are no indications for the use of one or another type of orthodontic treatment, depending on the degree, severity and form of the existing deformity and the choice of tactics for preparing the patient for primary surgical treatment.

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