



ORIGINAL RESEARCH PAPER

ORTHOPAEDIC

ORTHOPEDIC MANAGEMENT OF THE PREMAXILLA. CASE REPORT

KEY WORDS: bilateral cleft lip and cleft palate, premaxilla, dentofacial orthopedics.

Cynthia Dabed

Orthodontist in Fundación Gantz, Santiago, Chile.

Luz M. Searle*

Dentist. Intern in Orthodontic Unit, Fundación Gantz. *Corresponding Author

Daniela Romero

Dentist. Intern in Orthodontic Unit, Fundación Gantz.

ABSTRACT

Introduction: An important aspect of the bilateral alveolar clefts is the anatomical alteration of the premaxilla, mainly due to the lack of stability that they present. This is why the complexity that arises at the time of the orthopedic-orthodontic treatment of these patients. This article aims to present the orthopedic management of premaxilla in a pediatric patient with bilateral cleft.

Case presentation: male patient, 6 years old with bilateral cleft palate history, treated at the Fundación Gantz (Santiago, Chile). The objective of the treatment was to correct the position of the premaxilla at an early age, through orthopedic treatment, ending with fixed appliances.

Discussion: Over time, different treatment plans have emerged that focus on correcting the position of the premaxilla. From surgical treatments, to orthopedic and orthodontic treatments. Through the proposed orthopedic treatment, it is possible to improve the position of the premaxilla, achieving a good alignment and leveling.

Introduction:

The Cleft lip and cleft palate (CLP) are one of the most frequent congenital malformations that affect the facial structures of the human being, which is produced by embryological defects during the formation of the face. The degree of severity is located in certain areas of the facial complex, such as the upper lip, alveolar bone, hard palate, soft palate, and the floor of the nostril. These occur due to lack of union between the elements of the upper lip and left and right palatal segments, during the ninth intrauterine week.

- 1 The orofacial clefts can have a genetic cause or can develop, through teratogenic elements or some disease contracted by the mother during pregnancy.
- 1 An important aspect of bilateral alveolar clefts is that premaxilla has a degree of mobility, because it is only attached to the vomer bone. Frequently, the premaxilla is of a prominent size and is in a protruded position, due to the lack of orbicular muscle function. This causes alterations in its position; this is how sometimes the premaxilla is rotated, causing functional and aesthetic problems.
- 2 Both the protruding and extruded position of the premaxilla is induced by excessive growth in the vomerian suture. Sagittal excess is usually physiological in bilateral clefts during childhood and often does not require treatment until the end of the pubertal growth pick. On the other hand, vertical excess does not decrease spontaneously during growth, reason why it needs corrective treatment. If this is not controlled during temporary or mixed dentition, it can cause a severe alteration in the leveling between the occlusal plane of the posterior and anterior teeth, being more difficult to correct in permanent dentition. There are several methods to correct vertical excess, such as the removal of temporary incisors, orthopedic intrusion (Liou technique) and surgical intrusion.
- 3 The main objective of treatment in bilateral patients is to achieve a bone continuity of the maxillary segments between the premaxilla and the lateral segments. This allows the eruption of permanent teeth adjacent to the cleft and, in addition, achieves an aesthetic and functional improvement.
- 4 The treatment of the bilateral cleft has been challenging compared to the treatment of the unilateral cleft, because it requires a treatment that achieves a pre and post

surgical stabilization of the premaxilla in order to stabilize the bone graft.

- 5 The presentation of this case report shows the treatment of a prominent, protruded and extruded premaxilla in a child with bilateral cleft with the use of orthopedics and fixed orthodontics.

Case Presentation

Male patient, 6 years old, with a history of bilateral palatal lip cleft. He went to Hospital del Niño con Fisura (Fundación Gantz in Santiago, Chile) at birth, to begin with the necessary treatments according to treatment plan with the multidisciplinary team. For Orthodontics, routine exams were requested.

At the extraoral clinical examination, a convex profile, protruding maxilla, retruded mandible, increased nasolabial angle, marked mentolabial groove, forced lip closure, scar due to bilateral fissure are observed. (Figure 1)

At the intraoral clinical examination, a triangular arch with protruding premaxilla is observed, supernumerary in areas of cleft, left posterior cross bite and between pieces 5.3 and 8.3. (Figure 2)

In the panoramic x-ray, mixed dentition 1st phase is observed, agenesis of upper temporal and permanent lateral incisors, pieces 1.7, 1.5, 1.4, 1.3, 2.3, 2.4, 2.5, 2.7, 3.7, 3.5, 3.4, 3.3, 4.3, 4.4, 4.5, 4.7 in intraosseous evolution. Pieces 1.3 and 2.3 in mesioinclination. (Figure 3)



Figure 1. Initial extraoral photographs



Figure 2. Initial intraoral photographs

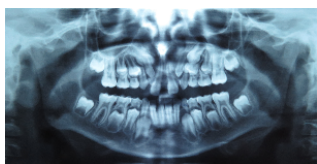


Figure 3. Initial panoramic radiograph

Diagnosis

Problem list

1. Skeletal Facial:

- Convex profile.
- Everted lower lip.
- Marked lip groove.
- Increased nasolabial angle.

2. Dentoalveolar and occlusion:

- Upper arch Supernumeraries in cleft areas.
- Overjet +1 mm
- Bilateral canine class II relationship.
- Bilateral molar distoclusion.
- Overbite +1.5 mm
- Unmatched middle lines.
- Left cross bite.

3. Functional:

- Mixed breathing
- Forced lip closure
- Occasional bruxism

Objectives of the treatment plan

1. Skeletal Facial:

- Improve profile and auto rotate mandible.
- Improve lower lip position.

2. Dentoalveolar and occlusion:

- Anterior expansion of the maxilla, to generate space and thus align the premaxilla to the lateral segments of the maxilla.
- Premaxilla intrusion.
- Achieve coincidence of middle lines.

3. Functional:

- Achieve lip closure.
- Tone lower lip.
- Interconsultation to Phonoaudiology.

Treatment

Because the patient presented bilateral alveolar and lip cleft, multidisciplinary care was necessary, consisting of plastic surgeons, kinesiologists, phonoaudiologists, pediatric dentists, otolaryngologists, orthodontists, maxillofacial surgeons, as well as psychologists.

After the study, orthodontic treatment began with the installation of a superior cemented device (McNamara), to achieve maxillary expansion and correct the cross bite. This consisted of lateral planes, with screw and posterior hinge, to achieve an anterior expansion. Its use was for a period of 12 months and the controls were carried out once a month. (Figure 4) After removing the cemented device, an upper removable device was installed, consisting of lateral planes, protrusion springs, vestibular handle and screw plus posterior hinge. The use should be during the afternoon and evening, to improve the inclination of the upper incisors and contain the expansion.

After nine months, the installation of a lower anterior plane began. Subsequently, the fixed apparatus was installed with a 2 x 2 technique (due to agenesis of permanent lateral incisors), both treatments in order to intrude the premaxilla. (Figure 5) Subsequently, complete upper and lower fixed appliances were continued in order to achieve proper

alignment of all teeth. Once the correct alignment of the premaxilla in the arch was achieved, an interconsultation to Plastic Surgery was performed, for the bone graft, which would subsequently achieve the sagittal and vertical stability of the premaxilla to prevent recurrence. (Figure 6)



Figure 4. McNamara device

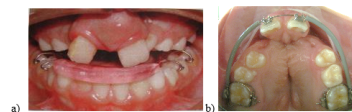


Figure 5. a) Lower removable anterior plane. b) Fixed superior appliances, (no bone graft)

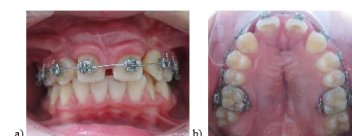


Figure 6. Fixed appliances (with bone graft).



Figure 6.

Results

There was an improvement in the patient's profile, adequate alignment and leveling of the premaxilla was achieved, both in the sagittal and vertical direction with the maxillary lateral segments. Also, it was possible to correct the left posterior cross bite, and coincidence of middle lines. This results in a stable and functional occlusion.



Figure 7. Final extraoral photographs

DISCUSSION

Over time, different treatment plans have emerged that focus on correcting the position of the premaxilla. From the resection of the premaxilla, osteotomy at an early age, during or even before the labial closure (causing a disastrous effect on the maxillary growth), the osteotomy of the premaxilla with the alveolar bone graft, up to the treatment only with orthopedics and fixed orthodontics. 2 Therefore, the opportune time to treat the position of premaxilla in patients with bilateral cleft remains a controversial issue. 6 7 8

With regard to treatments performed at an early age without surgery, good results have been reported. Orthopedic interventions are used to guide the growth of the jaws from birth. In many cases this achieves an improvement in the position of the premaxilla, avoiding osteotomy. Liou et al 9 describe in their case report, the treatment of eight patients during mixed dentition, between the age of 8 and 11 years. This consisted of an orthopedic treatment to reduce mainly the vertical excess of premaxilla. It was performed with a cemented distractor in the upper molars, which in addition to performing the premaxilla intrusion corrected the

sagittal excess. In all patients, an intrusion was achieved until the occlusal plane was leveled, and at 4 weeks there was already a marked improvement in the sagittal relationship, prior to bone grafting.

One of the areas where the growth of the upper jaw occurs is through the vomerian suture, the same place where the osteotomy is performed. This can potentially produce an impact on the center of growth responsible for the growth of the middle facial third in the sagittal and vertical direction, causing a decrease in growth at later ages.

In another report, carried out by Cronin et al 10, they discuss the impact of surgical correction or resection of premaxilla, performed during the neonatal period to improve lip closure. A comparison of cephalometries was performed between patients treated with osteotomy, and those who were not treated, after growth. In the group of patients who underwent osteotomy, poor maxillary growth was observed, unlike the group of patients who were not treated.

In other reports, the use of combined treatments has been observed, starting with orthodontic treatments, followed by premaxilla osteotomy and bone grafting. It has been observed that through the osteotomy the center of the maxillary growth can be affected, so it is important to pay attention to long-term damage. In addition, to avoid the great damage produced in the growth of the middle facial third, the osteotomy should be performed to correct the position of the premaxilla after 6 years, when 90% of the growth of the middle facial third is completed. 11 12

As for the bone graft, it has been reported in the literature that should be done between 9 and 11 years, prior to the eruption of the permanent upper canines and when they have reached between a third to half of the full root length. 13

Due to the different treatments proposed, the question arises which therapeutic option to use in patients with bilateral cleft. There is no consensus regarding this situation, however, it is advisable to perform orthopedic or orthodontic treatments, prior to the decision to perform osteotomies. 2

In the present case report this same treatment order was made, achieving good results in a short term. The main advantage was to perform maxillary expansion at an early age, as there was a spontaneous alignment of the premaxilla. In addition, aligning the premaxilla prevented further extrusion of it, since it achieves contact with the antagonist. It is important to highlight the importance of performing bone grafting in a timely manner to avoid subsequent recurrence of the position of the premaxilla.

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