



(CASE REPORT)



Prosthetic management of cleft lip and palate

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Abstract

Cleft lip and palate is the most frequent congenital oral dysmorphism (1/600 births). They can be associated with polyformative syndromes. The aetiology is most often unknown, but heredity is still a predominant factor. These clefts result from an absence or insufficient fusion of the different facial buds occurring from the fifth to the 7th week of intrauterine life. They can have several forms. The treatment of cleft lip and palate requires multidisciplinary management. When orthodontics is lacking, the prosthesis takes over. Combined with maxillofacial surgery, the results are spectacular.

Keywords: Cleft lip; Palate; Surgery; Prosthesis; Orthodontics; Dysmorphism

1. Introduction

Cleft lip-palate (FLP) is one of the most common deformities of the face. Their prevalence is around 1 birth / 700 worldwide. They result from a defect in fusion of the facial buds at the end of the first month of embryogenesis. The etiology appears to be multifactorial with a combination of genetic and environmental factors. Their management is complex and multidisciplinary, which involves surgical interventions, orthodontics and prosthesis. At present, no protocol or even a national consensus exists [2, 3].

In this article, we will study, through a clinical case, the management of cleft lip and palate including surgery and prosthesis.

2. General points on cleft lip and palate

Almost one in 500 children is born with a more or less marked form of cleft lip, maxillo-palate. This condition is therefore one of the most common congenital malformations in humans. Boys are more affected than girls (3/2). The cause is believed to be a combination of various genetic factors and possibly external, "environmental", unknown factors [14]. In some families, the cases accumulate over several generations without a precise mode of hereditary transmission being detected. The time at which the defect occurs during development (inhibition) determines the type of defect. If the defect occurs between the 6th and 8th week of pregnancy, a cleft lip or labial-maxilla appears (fig. 1). Palatal clefts (fig. 2) form between the 9th and 12th week. In general, clefts are best seen on ultrasound around the 20th and 22nd week of pregnancy [17, 5].

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Figure 1 Labio-alveolar cleft

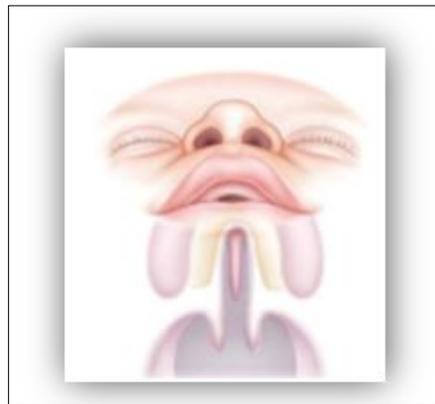


Figure 2 cleft palate

2.1. Etiopathogenesis

Clefts have a multifactorial etiology [16]:

- The genomic causes proper which include chromosomal abnormalities (trisomy 13, trisomy 18), genetic abnormalities (22q11 microdeletion, etc.).
- Teratogenic causes such as viruses, tobacco...
- Mixed causes, which are by far the most numerous quantitatively and link both the genomic terrain of the patient and the environment of the latter.

The cleft is isolated (95% of clefts) or associated with a polymalformative syndrome. The search for genetic factors responsible for clefts is extremely complex. It has already made it possible to highlight some thirty genes whose alteration would intervene in the development of different types of clefts. Among them, the $TGF\alpha$ (transforming growth factor alpha) genes, the proto-oncogene *BCL3* (Bcell leukemia / lymphoma-3), the homeobox gene *MSX1*, *IR6* (Interferon Regulatory Factor 6) and *AP2* play a major role in embryological morphogenesis. Their variation in expression contributes to the development of clefts [1, 12].

In addition, there are probably gene-environment interactions responsible for familial predisposition.

2.2. Anatomical forms

Cleft lip and palate can be unilateral or bilateral (fig. 3& fig. 4). The most common form is complete unilateral cleft. They account for almost half of such malformations and are seen in approximately one in 1000 newborns [10].

The complete split of the bony palate results in the absence of the floor of the nasal cavities on the side of the cleft and therefore the communication of the mouth and nose. The nasal septum (septum) is deflected to the healthy side, making the middle of the face asymmetrical [18]. Depending on the width of the slit, the wing of the nose is more or less flattened and spread laterally downwards [19]. The alveolar rim of the maxilla, in which the teeth are inserted, is also affected. In

bilateral total cleft lip, maxillo-palate, the bony floor of the nasal cavities is lacking on both sides and the middle part of the maxilla, which contains the incisors (premaxilla), is clearly shifted forward [11]. This prominence of the premaxilla shortens the arch of tissue between the nostrils (the columella) and gives the tip of the nose a flattened appearance.

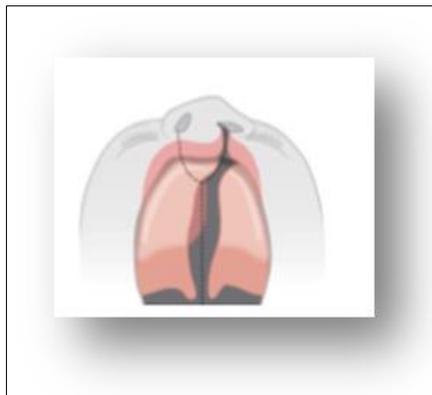


Figure 3 Unilateral cleft lip and palate

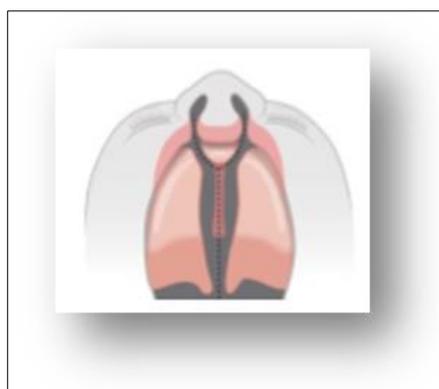


Figure 4 Bilateral cleft lip and palate

3. Clinical case

The management of patients with cleft lip and palate is long, complex and multidisciplinary from birth to adulthood.

Although protocols tend to become uniform nationally, there are many management protocols. We will present in this work a case of management of a cleft lip and palate by the fixed prosthesis.

3.1. Presentation of the case

A 15-year-old patient is referred to the dental medicine department at Farhat Hached University Hospital (TUNISIA) for possible management of a cleft lip and palate.

The patient was operated on twice by the maxillofacial team for a naso-ethmoidal teratoma. The cleft being a sequel to this tumor.

3.2. Case study

Clinical examination revealed the presence of 13, 12, 11, 21 and 23 of ectopic form, with a lack of arrangement (severe malposition) (fig. 5), the absence of 22, with an open bite very important (fig. 6.a, b).



Figure 5 dental disorders and ectopic morphology

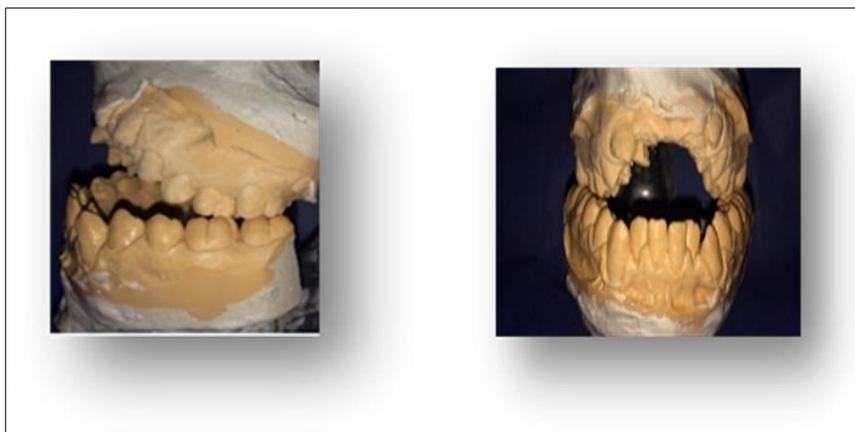


Figure 6 a, b Anterior open bite

The initial radiological examination (Fig. 7) confirmed agenesis of 22 and the absence of supernumerary teeth.

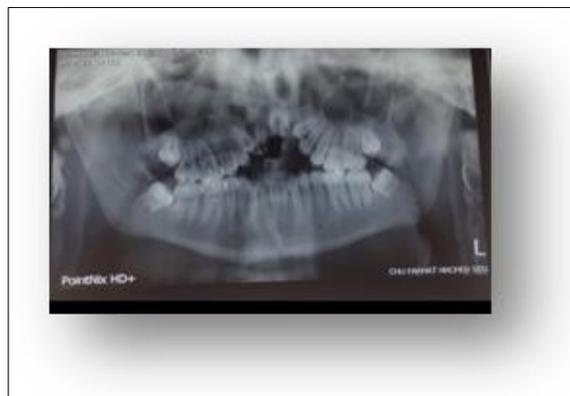


Figure 7 Initial radiological examination

A dentoscan (fig. 8) was performed to visualize in 3D the volume of the slit and its location [4]. This examination was able to demonstrate almost total bone loss, which immediately contraindicated the use of orthodontics.



Figure 8 Dentoscan: almost total loss of substance at the anterior level

The phonetic check-up revealed an easily detectable air leak, due to oral-nasal communication. Hearing was also impaired due to the entry of air into the middle ear resulting in altered ventilation and tympanic pressures.

3.3. Therapeutic decision

Ideally, orthodontic treatment should be initiated in order to contain the disjointed bone fragments, correct incisor malpositions, place the premolars and canines in normal occlusion, and restore a normal arch curve to the maxilla. However, the significant bone loss contraindicated this orthodontic management [7]. This decision was confirmed by the inability to do a bone graft at this level, as the timing of the bone graft varies between 8 years and 10 years. Before the eruption of the canine or after the eruption of the canine in the small fragment around the age of 12 in adolescent dentition [15].

The analysis of all these diagnostic elements led to our treatment decision in favor of a 10-element bridge ranging from the 2nd right premolar to the 2nd left premolar.

The four right and left premolars served as bridge support teeth. The anterior teeth were retained to prevent further loss of anterior substance. However, they did not serve as a bridge support, on the contrary, they were spared.

3.4. Clinical and laboratory steps

The preparation of 14, 15, 24 and 25 marked the start of the clinical protocol. The prepared teeth were protected with provisional prostheses.

In order to spare the anterior teeth from the prosthetic design, overdentures were made. Wax models of these overdentures were first sculpted (fig.9) and then cast. The sealing of the cast metal overdentures marked the end of this first phase of treatment (fig.10).



Figure 9 Carving of the over-teeth

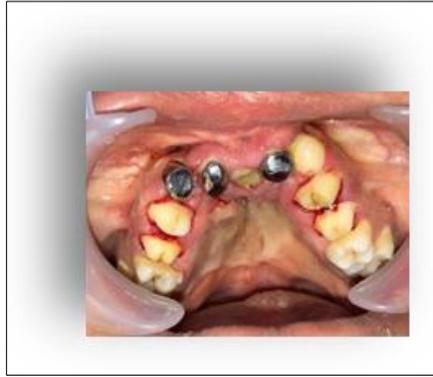


Figure 10 sealing of the over-teeth

An impression of the prepared teeth was therefore taken (fig. 11) for the final prosthetic realization. The models resulting from this impression were mounted on an articulator guaranteeing a faithful transfer of the occlusal situation from the patient to the laboratory (fig. 12). This set-up allowed us to carry out the prosthetic resin project, which foreshadowed the final prosthetic realization (fig. 13.a, b). This project made it possible to study the prosthetic feasibility but also to obtain the patient's adherence to the treatment plan.

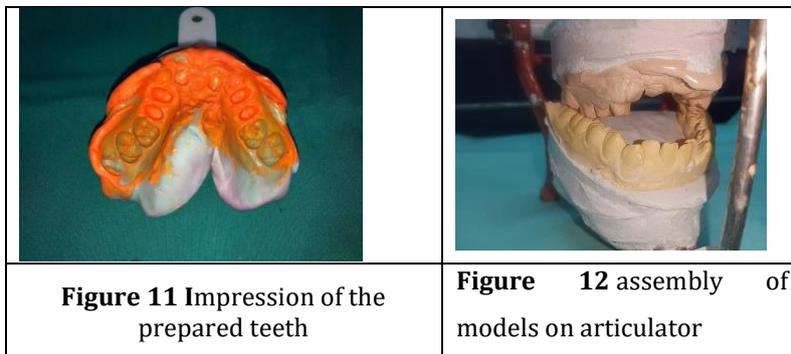


Figure 13 a, b Prosthetic resin project

During the sculpting phase of the wax model of the bridge (fig. 14), we took into account the exaggerated loss of substance at the anterior level, and we provided a hollow mesh inside, which will compensate for this bone loss.

The fabrication of the metal framework of the bridge was carried out by CFAO (fig. 15). This framework was tested on a model (fig. 16) then in the mouth (fig. 17.a, b).

The assembly of the cosmetic ceramics finalized the prosthetic project. This assembly was also carried out by CFAO (fig. 18. A, b).



Figure 14 wax model of the bridge



Figure 15 CAD / CAM fabrication of the bridge framework



Figure 16 trying on the metal frame on a model



Figure 17a, b Try-in of the framework in the mouth

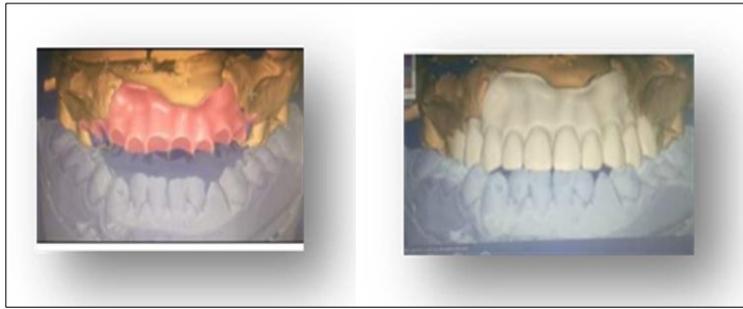


Figure 18 a, b Final prosthetic fabrication (CAD / CAM)

Upon receipt of the finished bridge (fig. 19), we first proceeded to the model verification (fig. 20), then to the try-in in the mouth (fig. 21). The result (fig. 22) was satisfactory in the eyes of the patient and the entire healthcare team (dentist and prosthetist).



Figure 19 finished Bridge



Figure 20 Model verification of the finished bridge



Figure 21 Try-in of the finished bridge in the mouth



Figure 22 Final aesthetic result

4. Conclusion

The timing of prosthetic and surgical cleft treatment has evolved with the emphasis now placed on praxia in facial growth. Therapeutic sequences are complex and each protocol has advantages and disadvantages [9].

The difficulty of these treatments lies in the compromise to be adopted, in which according to Talmant: "the best possible balance must be found between the most perfect anatomical distribution and the lowest scar price." [13]

The quality of the results will be influenced by the treatment schedule, and especially by the close cooperation and mutual understanding of the surgeon and prosthodontist [8].

We can consider that currently the treatment of cleft palates has clearly progressed thanks, of course, to the definite improvement in surgical management but above all thanks to the multidisciplinary approach. The treatment is heavy but effective and brings good results [6].

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest.

Statement of informed consent

There is no research that has been done. The clinical case was treated according to the rules of the department.

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