



Orthodontic Management of Bilateral Labio-Palatine Clefts: A Case Report

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How to cite this paper: Qaderi, M., Traore, A.A., Ghorbel, S. and Ousehal, L. (2024) Orthodontic Management of Bilateral Labio-Palatine Clefts: A Case Report. *Open Access Library Journal*, 11: e11760.
<https://doi.org/10.4236/oalib.1111760>

Received: May 29, 2024
Accepted: July 21, 2024
Published: July 24, 2024

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Abstract

Introduction: The labio-maxillo-palatine clefts are the consequence of the absence of union between the facial buds. These abnormalities are present at birth and disrupt the vital functions of the patient such as feeding, phonation, breathing and their management requires a multidisciplinary collaboration in which orthodontics occupies a significant position. The aim of this work is to describe the orthodontic management of a 12-year-old patient with a bilateral cleft in the department of Orthopedics Dento Faciale of the Dental Consultations and Treatments Center of Casablanca, Morocco. **Case Report:** A 12-year-old Moroccan girl with bilateral cleft lip-palate associated with class III skeletal shift and dental abnormalities in number, shape and position (agenesis of 12 and 22 and retention of 13 and 23 and an 11 of atypical form). The aim of this treatment was to reduce the gap between bone bases, obtain a correct anterior guide, a functional occlusion and improve facial aesthetics. **Conclusion:** The role of the orthodontist within the multidisciplinary team in the management of these anomalies has been widely described in the literature; however, the interest of reporting the modalities of their management lies in the diversity of clinical forms, contextual characteristics and patient-specific factors. In this case, our work has greatly improved the esthetics and oro-facial functions of the young patient, which are essential to the well-being, self-esteem and social integration of any individual within society.

Subject Areas

Dentistry

Keywords

Cleft Palate, Treatment, Delaire Face Mask, Orthodontics

1. Introduction

Labio-maxillo-palatine clefts results from a fusion defect between nasal and maxillary buds. They are frequent facial malformations. Depending on the clinical form, they can disturb soft tissues (upper lip, nasal threshold, wing of the nose, muscle veil of the palate), hard tissues (alveolar arch, dental germs, palate) or both [1]. Aesthetic sequelae of patients with slit sequelae are a platitude of the middle stage of the face, a straight or convex upper lip, a closed nasolabial angle, an eversion with apparent hypertrophy of the lower lip. These elements respond to skeletal dysmorphism, ventilatory functional disorders and scarring [2]. Their management requires multidisciplinary from birth to the end of growth. The role of orthodontist in treatment of labio-alveolar cleft palates sequelae is to bring the teeth where they should have been if the malformation had not existed, to prepare the arches for good coordination, before a distraction or before surgery, to maintain and prepare the arch for the prosthesis that will replace any missing teeth, and thus ensure a definitive restraint [3]. Subsequently, with orthodontic or ortho-surgical treatment, orthodontist contributes to the rehabilitation and seeks to obtain a stable long-term result in the patient thus bringing him to an optimal physical and mental health.

Through this work we report orthodontic management in a young 12-year-old patient with a bilateral cleft. She previously underwent primary surgery in the pediatric department.

2. Case Report

A young 12-year-old patient consults within the Orthopedic Dento-Facial department with as a reason aesthetic in relation to a dental disharmony following her bilateral cleft lip-palate. She had already benefited from primary surgery of the slit in the pediatric department of the University Hospital Center IBN ROCHD, Casabalnaca. Exo-buccal examination (**Figure 1**) shows a hyperdivergent face,

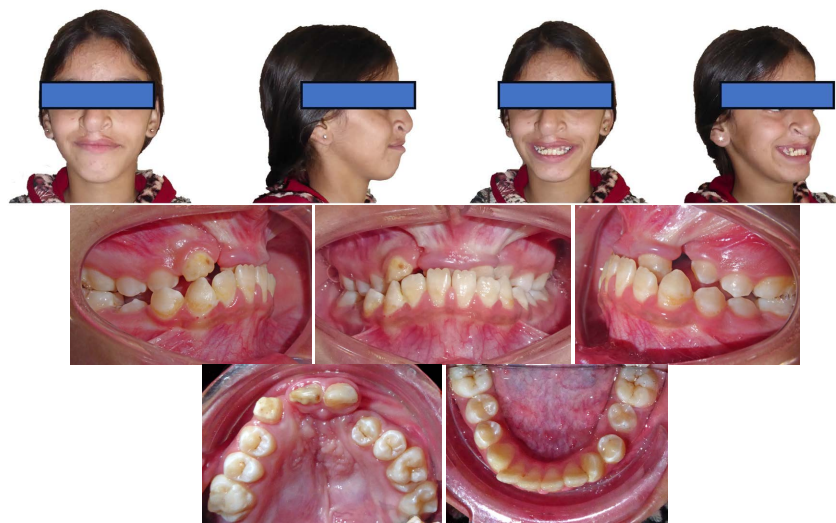


Figure 1. Exo and endo oral photographs before treatment.

concave profile, an inverted labial ratio and forced closure with major deviation of the nasal septum. The smile of the young patient is poor exposing the mandibular incisors only. Intra-oral photographs (**Figure 1**) reveal insufficient hygiene with cicatricial flanges at the mucous membranes; a mixed denture with an anterior reversed articulation and central incisors egression; the maxillary arch has an asymmetrical V shape with a movable maxillary bud; the mandibular arch is U with the presence of all permanent teeth from 6 to 6.

Radiological investigations (**Figure 2**) confirm at the panoramic an absence of anomalies of the general structures; at the dental level we have an agenesis of lateral 12 and 22, the retention of canines 13 and 23 and the right central incisor 11 which is rizziform; As for profile telerradiography, it highlights signs of posterior rotation of the mandible in favor of hyperdivergence.

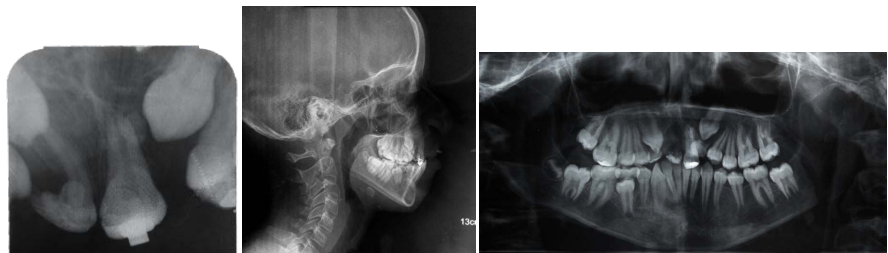


Figure 2. Occlusal bite, tele-profile, and Panoramic X-rays before treatment.

Cephalometric analyses show in **Table 1** and **Table 2** an increased vertical dimension ($GoGn/Sn = 42^\circ$ and $FMA = 29^\circ$); the upper incisor has a palatal inclination $I/NA = 1$ mm; the lower incisor is in the correct position on its bone base $I/NB = 4$ mm.

Table 1. Steiner cephalometric analysis before.

STEINER ANALYSIS		Avant treatment
Cephalometrics	Objectives	
SNA	82°	78°
SNB	80°	79°
ANB	2°	-1°
AoBo	$-2 \text{ mm} \pm 2$	-3 mm
SND	76°	75°
I/NA	22°	6°
I/NA mm	4 mm	1 mm
I/NB	25°	22°
I/NB mm	4 mm	4 mm
I/i	131°	156°
Pog/NB		1 mm
Occ/SN	14°	20°
GoGn/SN	32°	42°

Table 2. Tweed cephalometric analysis before.

TWEED ANALYSIS		Avant Treatment
Cephalometrics	Objectives	
FMA	25° ± 3°	29°
FMIA	67° ± 3°	66°
IMPA	88° ± 3°	85°
SNA	82°	78°
SNB	80°	79°
ANB	2°	-1°
AoBo	-2 mm ± 2	-3 mm
Occ/F	10°	10°
Angle Z	75°	67°
Upper Lip	/	10 mm
Total Chin	/	12 mm
HFA	45 mm	30 mm
HFP	65 mm	53 mm

3. Diagnostic and Treatment

▪ Diagnostic

In the light of these diagnostic elements, we can conclude that the patient has a skeletal class III malocclusion associated with hyperdivergence, anterior cross articulation and agenesis of the upper lateral incisors 12 and 22.

▪ Treatment

Treatment objectives

The aim of treatment was the correction of skeletal class III and thus that of the anterior reversed articulated, arrangement space of agenetics teeth in order to finish with relations of class I Canine and molar as well as a clear improvement of smile and face aesthetics.

Treatment evolution

We proceed to the pasting of the maxillary arch with brackets 0.022 × 0.028; arches alignment and leveling were realized with arcs Ni-Ti 0.014, 0.016 and 0.16 × 0.022 successively; Parallel to alignment and leveling, correction of the antero-posterior offset between upper and lower jaws was undertaken by maxillary protraction using a Delaire's facial mask. We then arranged space for upper canines and lateral with space opening springs, which helped to help jump anterior inverted articulated and spontaneous leveling of the Spee curve. The use of retro-incisor wedges allowed us to raise occlusion and promote the jump of the anterior reversed hinge. Hooks clipped between the two maxillary premolars on the right and left were used to hang the elastics to continue the maxillary protraction with the Delaire's facial mask.

Figure 3 and **Figure 4** below illustrate the exo-oral intra-oral photographs of

the patient during treatment.

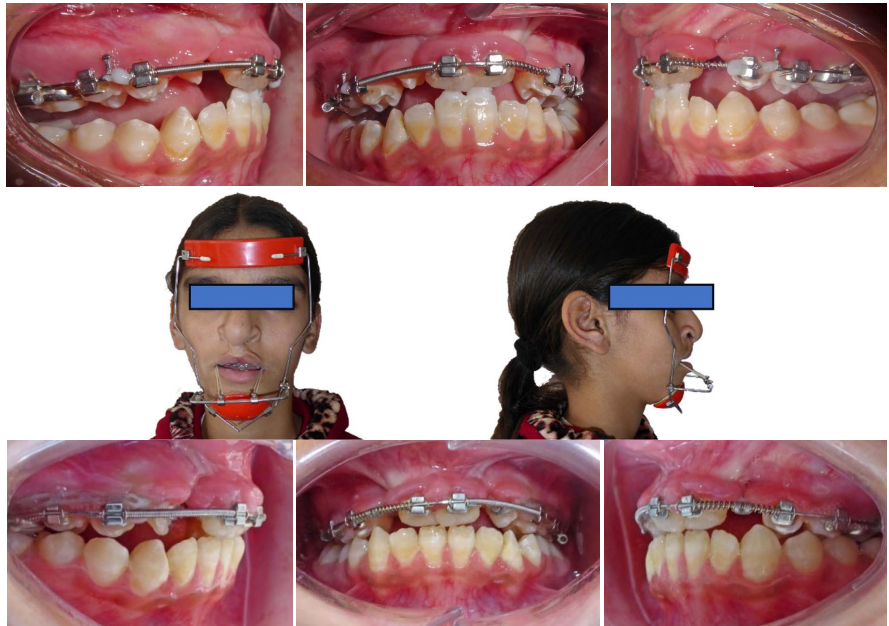


Figure 3. Exo and endo oral photographs during treatment.

We then bonding the mandibular arch with the same procedure as the maxilla and we passed at the level of the two arches on rigid steel arches 0.017×0.025 to make the patient wear elastic class 2 to correct the canine class II and premolar. The vertical elastics to wear in the evening were also put in place in order to install the previous guide. We also set up temporary prosthetic teeth in place of the maxillary laterals to improve the aesthetics of the young patient.

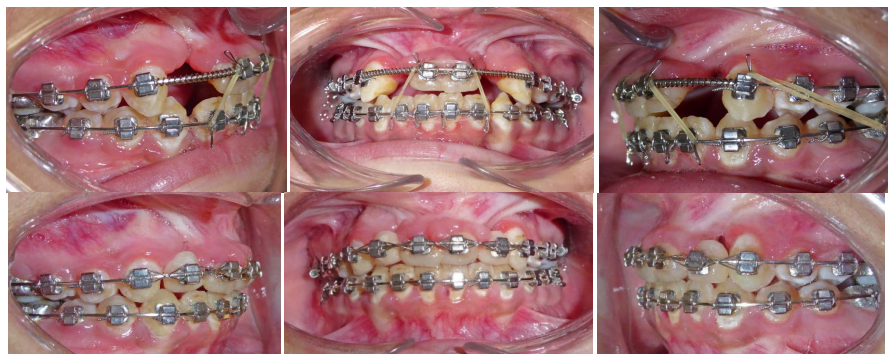


Figure 4. Endo-oral photographs during treatment.

4. Treatment Results

We obtained a reformation of the maxillary arch thanks to the transverse and anteroposterior expansion resulting from our therapeutic thus correcting the anterior inverted articulation, install a Class I canine and molar occlusion and obtain better superior lip support and improvement of our patient's smile; Subsequently, we proceeded to extract the 11 and performed a coronoplasty and

conservative care on the 21 and a provisional prosthesis pending the realization of the final. **Figure 5** and **Figure 6** respectively illustrate the end-of-treatment photographs and radiographs as well as the general and local superpositions.

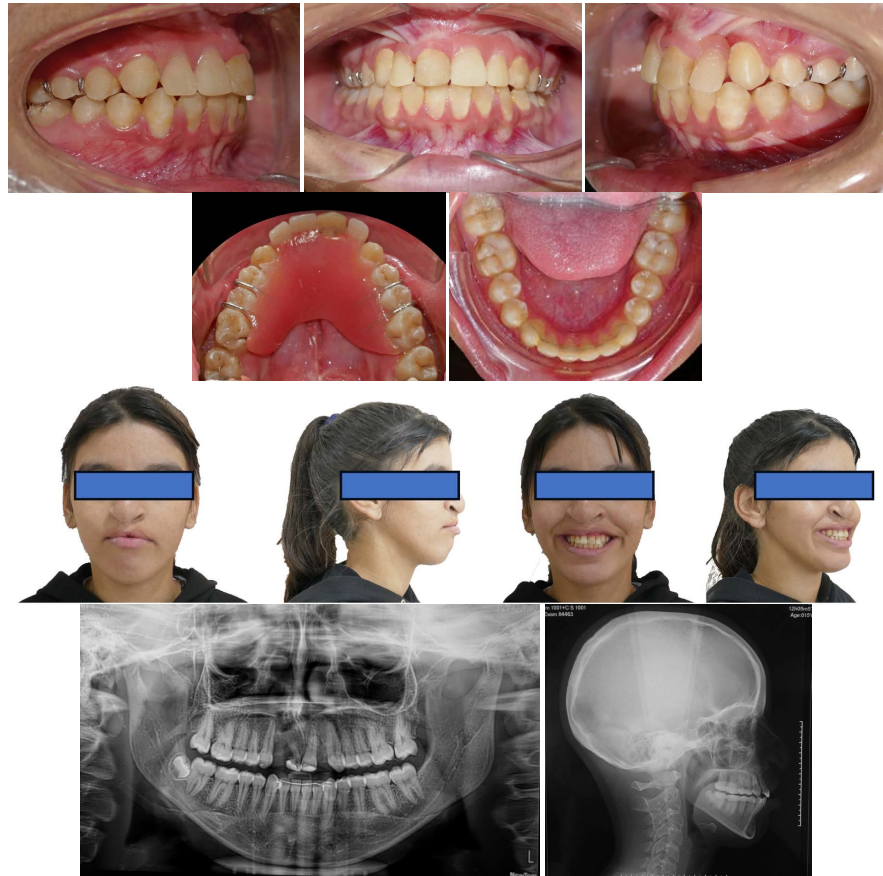


Figure 5. Photographs and X-rays at end of treatment.

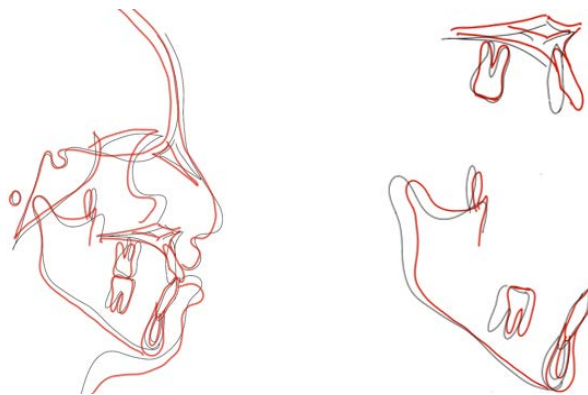


Figure 6. General and local overlays.

Cephalometric analyses show in **Table 3** and **Table 4** a vertical dimension rather preserved with a GoGn/Sn that increased by only two degrees (42° to 44°); as well as the upper incisor palatal tilt correction present with an I/NA that went from 1 mm to 6 mm.

Table 3. Tweed cephalometric analysis after.

TWEED ANALYSIS		Avant Treatment	Après Treatment
Cephalometrics	Objectives		
FMA	$25^{\circ} \pm 3^{\circ}$	29°	33°
FMIA	$67^{\circ} \pm 3^{\circ}$	66°	61°
IMPA	$88^{\circ} \pm 3^{\circ}$	85°	86°
SNA	82°	78°	80°
SNB	80°	79°	79°
ANB	2°	-1°	1°
AoBo	$-2 \text{ mm} \pm 2$	-3 mm	0 mm
Occ/F	10°	10°	10°
Angle Z	75°	67°	68°
Upper Lip	/	10 mm	11 mm
Total Chin	/	12 mm	12 mm
HFA	45 mm	30 mm	38 mm
HFP	65 mm	53 mm	69 mm

Table 4. Steiner cephalometric analysis after.

STEINER ANALYSIS		Avant treatment	Après Treatment
Cephalometrics	Objectives		
SNA	82°	78°	80°
SNB	80°	79°	79°
ANB	2°	-1°	1°
AoBo	$-2 \text{ mm} \pm 2$	-3 mm	1 mm
SND	76°	75°	76°
I/NA	22°	6°	26°
I/NA mm	4 mm	1 mm	6 mm
I/NB	25°	22°	32°
I/NB mm	4 mm	4 mm	5 mm
I/i	131°	156°	125°
Pog/NB		1 mm	1 mm
Occ/SN	14°	20°	16°
GoGn/SN	32°	42°	44°

5. Discussions

The cleft labiopalatine is the most common congenital malformation; it is an embryopathy due mainly to a defect of coaptation of the different facial buds and which takes place between the 4th and the 7th week of the intrauterine life. Aesthetic damage, functional, psychological and social consequences are very

important and can be at the origin of family dramas. In a human society that is becoming increasingly materialistic and elitist, social integration in school and then professional can be difficult from childhood for these patients if they remain asymmetric, deformed, unable to normal oral expression, and their disgrace worsens with growth [4]. Management of young patients with these malformations has improved considerably in recent years due to better coordination between the different specialties involved through a multidisciplinary team [5]. This support aims to allow these children to obtain a quality result both aesthetically and functionally, which will have a strong impact on their self-confidence and self-esteem [6]. The role of orthodontist within the multidisciplinary team consists essentially in the correction of the sequelae following the surgery of these slits. These sequelae lead through scarring, class III by superior retrognathic, maxillary endognathies due to the presence of scars on the upper lip and at the palate as well as many disturbances in the number, shape or position of the teeth. These endo-retromaxillia are aggravated by the existence of dysfunctions in oro-facial functions and especially in ventilation and lingual function [7]. Hypoplasia is very often three-dimensional, but the most important growth deficit is in the horizontal direction. To correct these disorders of maxillary development and the alveolar-dental system, orthodontist can call on several therapeutic arsenals including, among others, tractions on the maxilla via the Delaire's facial mask, technique that has been well described by Delaire and collaborators [8]. In the clinical case we presented, the young patient presented a maxilla in retroposition with respect to the mandible thus requiring an advance. Installation of Delaire's mask thus contributed very strongly to skip the inverted articulated and to improve considerably the relationships between the maxillary and mandibular bone bases. According to A Duret *et al.* [1], retromaxillium correction is very relevant in these cases because it also helps in the removal of the prognosis and establishment of an anterior calibration. According to another author, this correction of the gap between the two bone bases by the Delaire's mask is crucial because in addition to improving the maxillomandibular and transverse anteroposterior skeletal relationships, it also improves the occlusal conditions, thus enabling subsequent orthodontic treatment to be carried out under more favourable conditions [9]. Agenesis lateral incisor on the side of the slit is very common and very often associated with dento-maxillary disharmony, teeth included, or agenesis. According to several authors, orthodontics of a patient with slit sequelae is based on the same concepts as for patients who do not have them. Orthodontist aims to establish a stable dental occlusion as part of a functional and aesthetic facial harmony. Thus, it is better to provide for the replacement of aging or abnormal teeth. In our case, patient presented in addition to laterals agenesis, a shape anomaly in the right central incisor (riziform). We opted for extraction of 11 while taking care to maintain and arrange its space as well as that of the agenetic laterals in order to obtain in the long term an arcade length compatible with the mandibular arch, normalize future positions of the lingual and dental and promote nasal ventilatory function. However, most au-

thors strongly advise against extractions of permanent teeth in cases of clefts labiopalatine. Thus, Olivier W *et al.* reported that the extraction of permanent teeth in the management of crack cases is generally detrimental to the final skeletal harmony [10]. However, for others, orthodontics treatment of labio-alveolar-palato-velar slits sequelae is very different, according to the protocol implemented during primary surgery. If this surgery took into account functional factors, the environment of the maxillary fragments, if it did not create scars between the pterygoid apophyses and the maxilla, and if the vomerian mucosa and muscles were respected, we will evolve in a favorable context and orthodontics will be a simple orthodontic, accompanying growth [7]. Otherwise, we will be faced with unfavorable growth, due to postoperative scars that will limit the movement of bone parts and disorders of breathing, chewing, swallowing, phonation that will contribute to installation of significant bone shifts. This leads the orthodontist to consider results obtained after the primary surgery and to adapt treatment according to the clinical situation. As for prosthetic rehabilitation in these patients, it is an integral part of the management of these types of malformations and has several objectives namely to obtain normal orofacial functions and a stable dental occlusion, maintain the height of the alveolar bone, guaranteeing sufficient gingival height and allowing support and good projection of the nasolabial region participating in the harmony of the smile [10]. Prosthetic rehabilitation has no specific particularity, and all the classical possibilities can be proposed. However, the particular terrain of the labio-maxillo-palatine clefts makes that several constraints can meet and even add up to make this rehabilitation complex [7]. Collaboration between prosthodontist, orthodontist, speech therapist and odontologist appears fundamental. This collaboration is decisive when it comes to secondary correction of aesthetic and functional sequelae. Implant-supported dental prosthetic rehabilitation is the most desired. However, given bone growth and socio-economic considerations, it is not always feasible. In our patient, we proceeded to the installation of a removable prosthesis pending the realization of the final. This allowed us to temporarily level the aesthetic damage related to the absence of dental units on the one hand, but also to improve the phonatory and respiratory functions. However, many authors agree that this multidisciplinary approach, even very good behaviour may be insufficient in some cases since all the factors likely to influence the final result are not always under the control of the healthcare team. Thus, a poor scarring that is confirmed at each surgical sequence, or a family tendency to a class III facial growth, are very unfavourable, as is the absence of parental participation in all phases of treatment [11]. Recent refinements such as rhinoplasty, chemoplasty or even orthognathic surgery can therefore be useful in some cases to optimize the aesthetic rendering. Anything we recommend for our patient because the changes in the facial profile seem limited compared to the standards.

6. Conclusion

Through this clinical case we tried to highlight the contribution of orthodontics

in the multidisciplinary management of the sequelae of cleft labiopalatine. Thanks to the orthopedic treatment of the maxillary protuberances by Delaire mask combined with the multi-attachment orthodontic treatment, we managed to obtain in our young patient a functional occlusion and to arrange on the surface the space for a prosthetic rehabilitation. This treatment has largely contributed to improve the smile and self-esteem of the patient and a very significant psychological impact. However, the profile changes remain limited; for a better aesthetic rendering, the treatment will have to be supplemented by rhinoplasty and possibly orthognathic surgery after the end of the growth.

Ethical Considerations

We have submitted the work to the approval of the department manager and the centre through the main supervisor. We sought and obtained the verbal informed consent of the patient's guardian for the publication of the result of our work with the scientific community.

Conflicts of Interest

There is no conflict of interest in this work.

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