

Partial reconstruction of the upper jaw with vascularized fibula graft and implants of a patient with cleft lip and palate using implants and cad/cam

Eduardo Basáñez Ribera¹
Raymundo Ramírez Lugo²
Ettore Lupi³
Gianluca Botticelli³
Sofia Rastelli³
Stefano Mummolo³
Thomas W. Graber³
Giovani Falisi³

¹ Department of Prosthodontics, Division of Graduate Studies, Autonomous University of Queretaro, México.

² Department of Maxillofacial Surgery, Division of Graduate Studies, National Autonomous University of Mexico, México City, México.

³ Department of Life, Health and Environmental Sciences, University of L'Aquila, 67100, L'Aquila, Italy.

⁴ Manager of Swiss Porcelain Laboratory, Zahntechniker, Cuernavaca Morelos, México.

***Corresponding Author:** Gianluca Botticelli
e-mail: gianluca.botticelli@univaq.it

Abstract

The patient with cleft lip and palate represents a continuous challenge for the maxillofacial surgeon and the dentist.

This type of patient requires a multidisciplinary team approach, from the initial stages of the rehabilitation process, to minimize the deformations caused by adhesions.

Bone grafting represents a valid possibility for achieving these objectives in the various surgical procedures for restoring mandibular integrity.

In this clinical case, the authors present the multidisciplinary approach to a case of cleft lip and palate, resolved with a revascularized fibula graft in the premaxillary area and subsequent implant-prosthetic therapy with a 15-year follow-up.

Using new technologies in diagnosis and treatment allows patients to face surgical challenges with greater confidence and achieve the desired results.

Keywords: Labiopalatoschisis, Fibula Graft, Implant-prosthetic restorations

Introduction

The face and skull are formed from the 1st, 2nd, and 3rd gill arches, the upper jaw is formed from the fourth week of embryonic life, where the nasal placodes will join towards the midline, the maxillary processes and the mandibular processes do the same. In the case of maxillary processes, the tongue must descend so that the upper jaw can be formed into two components: primary palate and secondary palate; otherwise, a fissured lip or palatal process will be obtained. This occurs in the 10th week. (Figure 1,2,3). Cleft palate may be associated with other syndromes in 15% and non-syndromic forms in 85% (47). Depending on the structures involved in the fissure, due to lack of union of the processes, it can be in the lip, or alveolus of the primary premaxilla palate, in the hard palate or secondary, soft palate, there can be combinations of all the structures mentioned and they are classified as unilateral and bilateral (Figure 4).



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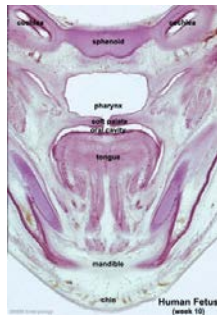


Figure 1

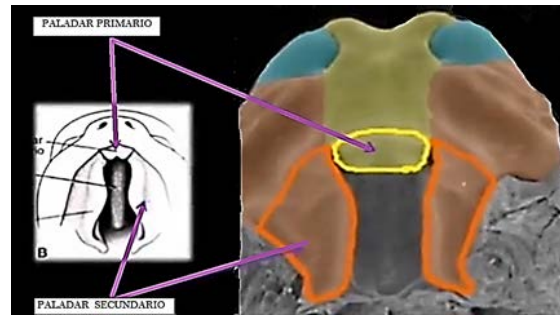


Figure 2



Figure 3

The incidence of cleft palate is 1 in 700 births (47), generally occurring on the left side in 70% of cases. The incidence is higher in men than in women, being double in men. In women, the palate is more isolated without involving the lip. This may be due to the fact that the palatal process in women fuses a week later than in men.

Cleft lip and palate are linked to genetic factors, environmental factors, poor diet, infection, hormonal disorders, and teratogenic agents (47,52,53) such as ethanol and phenytoin. Within the vertical and horizontal defects of the facial mass, the Brown and Shaw classification (5) is used, which is divided into six types of vertical defects (Figure 5).

D: More than half of the maxillectomy

Case Report

Female patient with sequelae of cleft lip and palate encompassing the primary and secondary palate presenting a type II D defect of the Brown and Shaw classification (5), the patient underwent a CT scan to see the anatomical structures of the head, a Doppler ultrasound was performed to determine the patency of the fibula angiosome (21) of the right leg and a microvascularized graft was performed to reconstruct the upper jaw—middle third of the facial mass and form part of the premaxilla and secondary palate.

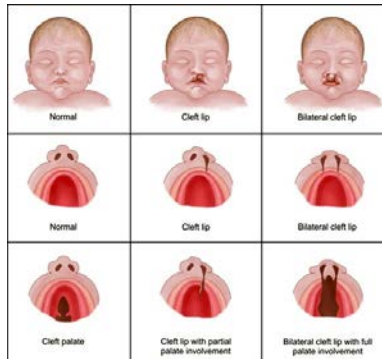


Figure 4

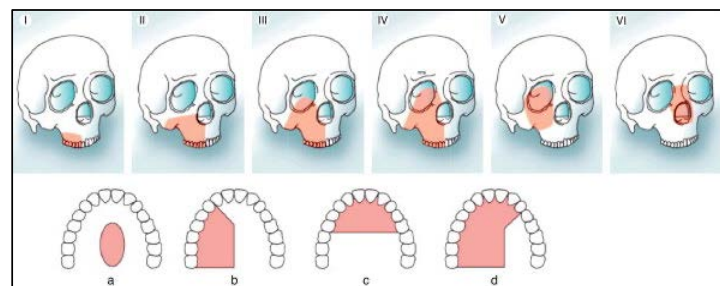


Figure 5

Tipo 1: Maxilectomía que no causa una fístula oro nasal

Type 2: Does not involve the orbit

Type 3: Involves the adjoining orbit with retention

Type 4: Orbital enucleation or exenteration

Type 5: Maxillary orbital defect

Type 6: Nasomaxillary defect

As for horizontal defects, the letters of the Brown and Shaw classification (5) refer to the complexity of the alveolar and palatal process defect, qualifying the vertical dimension of the defect. The classification is given as follows:

A: palate-only defect

B: Less than or equal to half 1/2 unilateral left to right

C: Less than or equal to half 1/2 unilateral in the anteroposterior direction

Dr. Erick Santa Maria performed the fibula graft at Gea Gonzalez Hospital; it was joined to the left facial artery by vascular microsurgery. The graft viability was checked, with the island of skin that makes up the palate and serves as an irrigation control. Doppler also checks it. A prosthetic spacer was placed, and surgery was performed to shape the buccal and labial vestibule with skin grafting; The tissue changes from skin to mucosa. Impressions are made, models are assembled, and waxing and provisionals are performed to determine the craniomandibular relationships, such as the Vertical Dimension and Centric Relationship, as well as the relationship of the microvascularized graft with the mandible to see if it is a Class 1,2 3.

The prosthetic planning, placement and guidance of 4 upper implants (13) donated by the Titanium Fix brand

were carried out, avoiding the screws and fixation plates of the graft, as well as the artery of the microvascularized graft. In the lower part, orthodontic treatment was planned to achieve a better relationship of the upper and lower arch since there is a crossbite. Once the implants were integrated, the second phase was performed to place healing plugs, and the subcutaneous fatty tissue of the island of skin tissue was thinned and converted into mucosa. An upper impression was taken with an

the cranio-mandibular relationships, spacing, contour, support, aesthetics, and occlusion. (Figs. 6,7,8).

For this situation, a Doppler analysis is performed to assess the patency of the veins and arteries of the leg and determine the angiosome to be used for the reconstruction of the upper jaw; An angiosome is the cutaneous, subcutaneous, and muscular anatomical territory supplied by an artery and a vein. (Figs. 9,10,11).

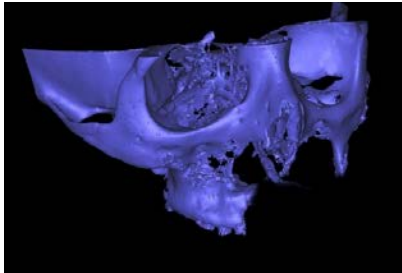


Figure 6

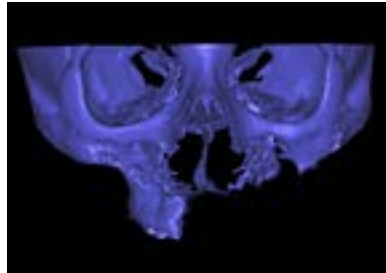


Figure 7

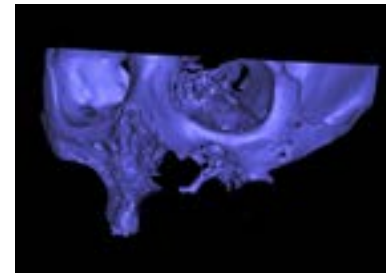


Figure 8

open spoon; the upper model was scanned based on a previous wax-up in Exocad, and a cobalt chrome bar was designed and customized due to the occlusal contours and spaces with an axial attachment on four implants. For the upper part, the wax-up was copied in the GC pattern and tested in the mouth to corroborate

The micro vascularized fibula graft is fixed by plates and screws to the malar and connected with microsurgery to the facial artery (Figs. 12,13,14) a CT scan is performed to analyze the craniomandibular relationships between the upper jaw and the mandible (Figs.15,16,17,18,19,20)



Figure 9



Figure 10



Figure 11

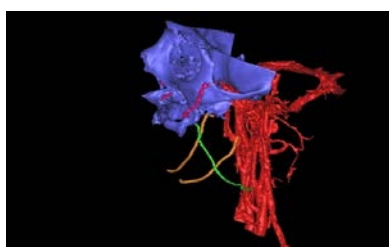


Figure 12

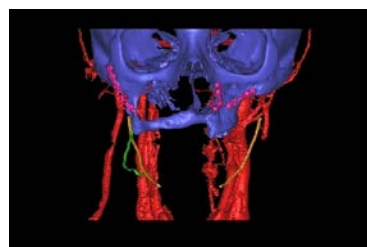


Figure 13

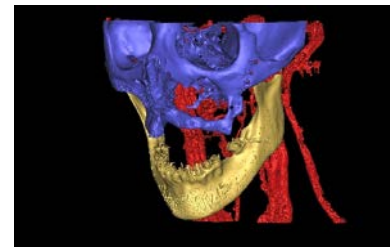


Figure 14



Figure 15



Figure 16



Figure 17

Subsequently, the soft tissue is formed as the skin is transformed into mucosa, the hair follicles disappear, and the mucosa is keratinized. Dental implant sites are established in an attempt to avoid graft fixation plates and screws, as well as the superior angiosome of the facial artery (Figs. 18,19,20). There was a discrepancy in the relationship between the upper jaw and the mandible (Figs. 21,22,23). The company Titaniux Fix donated four implants for the upper part, and they were placed in the microvascularized fibula graft (4), which had a type I and II density. The four implants were osseointegrated. (Figs. 24, 25,26,27)

Once the implants were integrated, the second phase was carried out by placing healing plugs and thinning the tissue of the skin island of the microvascularized graft due to the high content of fatty tissue. (Figure 28,29,30)

An upper impression was taken with an open spoon, craniomandibular relationships were obtained, such as vertical dimension and centric relationship, a wax-up was performed with placement of teeth in the upper part, to determine the aesthetics, contours, space, lip support for a mouth test. (Figure 31,32, 33,34,35,36)



Figure 18



Figure 19

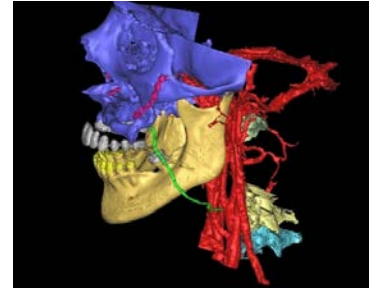


Figure 20

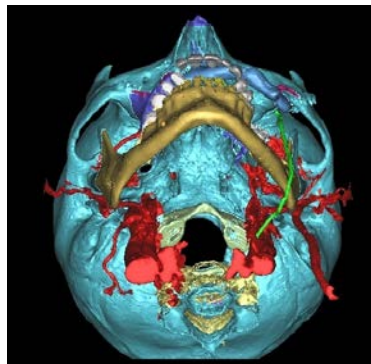


Figure 21

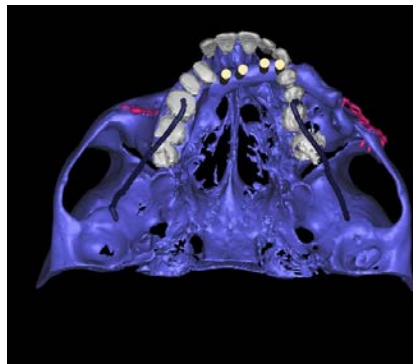


Figure 22

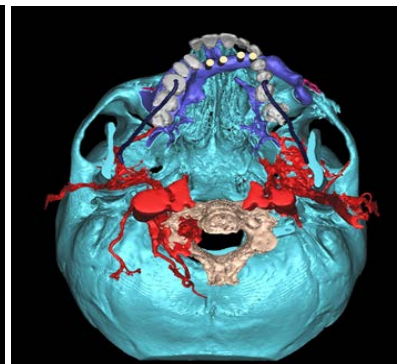


Figure 23



Figure 24



Figure 25



Figure 26



Figure 27



Figure 28



Figure 29



Figure 30

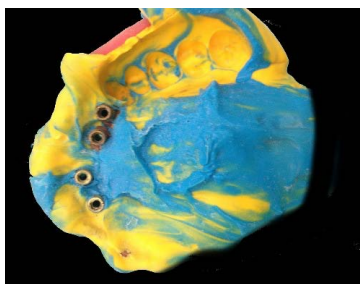


Figure 31



Figure 32



Figure 33



Figure 34



Figure 35



Figure 36

The upper model and the wax-up were scanned in the Exocad program, and a custom cobalt chrome bar (13) with occlusal rests was made, with an axial attachment and its corresponding housing for an acrylic over-denture due to the space and contour of the fibula

grafting process (Figure 37,38,39,40,41,42)

The prosthetic bar was placed, the passivity was checked with the Sheffield test (13), and the adjustment by Rx and torqued; the overdenture was placed. (Figure 43,44,45,46,47,48)



Figure 37



Figure 38

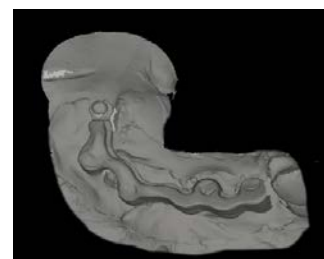


Figure 39



Figure 40



Figure 41



Figure 42



Figure 43



Figure 44



Figure 45



Figure 46



Figure 47



Figure 48

Surgery of the upper lip and columella

Based on the aesthetic profile, the maxillofacial surgeon performed surgery of the patient's upper lip and columella to improve aesthetics, lip contouring by contraction of the lip scar, Le Mesurier was used (Figs. 49,50,51,52,53,54)

After the skin has healed, the stitches are shaved, and the patient's profile is analyzed to correct the left buccal corridor using resin veneers to compensate for the patient's crossbite, obtaining an optimal final result in both occlusion and aesthetics (Figs. 55-60).



Figure 49



Figure 50



Figure 51



Figure 52



Figure 53



Figure 54



Figure 55

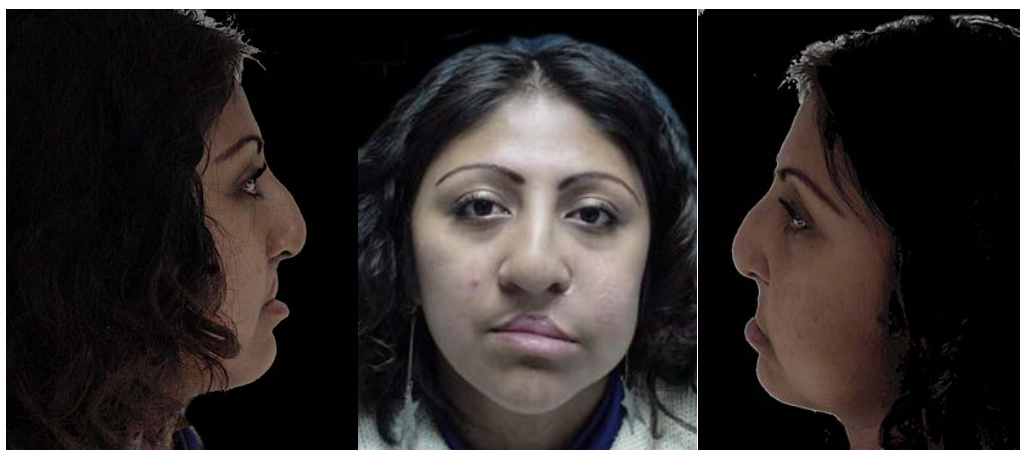


Figure 56. Initial situation



Figure 57. Planning



Figure 58. Lip surgery



Figure 59. prosthetic rehabilitation



Figure 60. 15 years follow-up

Conclusions

In complex cases of maxillelectomies and vascularized grafts, it is necessary to perform an analysis using a computerized CT scan and a Doppler to visualize arteries, veins, angiosomes of the fibula and face, as well as soft tissues and Langers' lines.

Microvascularized fibula grafts can be used to restore the middle third of the upper jaw by restoring the vertical dimension, phonation, chewing, and psychosocial security, as well as the identity of the person who has suffered orofacial defects. Patients with cleft lip and palate require a multidisciplinary team and many years of treatment to achieve an optimal result, which includes specialists from birth and requires different processes such as

- Early Counseling and Prenatal Feeding (47)
- NAM Alveolar Nasal Conformation Modeling (47)
- Lip repair, Palate repair
- Speech therapy Pharyngeal flap
- Orthodontics Alveolar grafts for the palate (47)
- Orthognathic surgery
- Tooth replacement Prosthesis
- Lip and nose revisión

The use of implants allows us to establish an alternative for the development of prosthetic treatments (12, 13, 50)

such as overdentures, scanning and design by cad-cam to elaborate the corresponding prostheses and restore puckering and aesthetics in the different scenarios of cleft lip and palate defects or hemimalelectomized, the treatment was inspected after 15 years without an problems except for the change of the female retentions and repolished of the resins (Figure 56,57,58,59,60)

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