The Dentist

ISSN 2688-934X

Research Article

Use of the Iliac Crest Cortex for Premaxilla Fixation in the Reconstruction of Bilateral Cleft Palate Patients

Joao Luiz Carlini[1], Cassia Biron[2], Guilherme Strujak[2] and Maurcio Romanovoski[2]*

[1]Department of Stomatology, Federal University of Parana, Brazil

[2]Department of Oral and Maxilofacial Surgery, CAIF, Brazil

Abstract

The aim of this study is to evaluate in 16 patients with bilateral alveolar cleft fissure, the effectiveness of the premaxilla fixation to the remaining maxillary stumps, using the iliac crest bone cortex. The technique was used in patients who required surgical repositioning of the premaxilla, due to the severe anterior projection and mispositioning of the premaxilla. In 15 patients, we observed a good graft adaptation in the recipient region, absence of exposure of the graft to the environment and especially cost savings, since no miniplates are required for fixation. Postoperative control was performed through periapical and occlusal radiographs, performed after 3 and 6 months of surgery, as well as clinical examination. After this period, the patients were referred for orthodontic treatment. Of the 16 patients evaluated, only one patient presented unilateral graft loss and awaits further surgical intervention.

Keywords: Bone graft; Iliac crest; Bilateral cleft; Premaxilla repositioning

Introduction

The benefits of bone graft for the treatment of cleft palate patients are described by several authors especially in patients with unilateral cleft [1-7]. In patients with bilateral cleft, results are compromised, since there is a great deficiency of bone and soft tissue in the cleft region, there is a severe anterior projection of the premaxilla, significant deviation of the upper midline, malocclusion due to transverse discrepancy of the maxilla and mobility of the premaxilla. In addition, large buccal fistulas compromise the aesthetic and functional aspect. All these factors limit orthodontic treatment, especially with regard to premaxilla repositioning and future prosthetic rehabilitation.

The ideal age for reconstruction of the alveolar process defects in patients with bilateral cleft varies from 8 to 12 years before the eruption of the permanent upper canines and when 2/3 of the root are formed [2,3,6-8]. The canine is expected to erupt in the grafted bone, inducing bone deposition in the alveolar crest and increasing the vertical height of the maxilla.

Possible bone graft donor areas for cleft palate patients include the iliac crest, costal arch, skullcap, mandibular symphysis, and retromolar mandibular region [8-13]. When possible, the mandible is the donor area preferred [10]. Advantages include easy access, lower morbidity, same embryonic origin, tendency to provide large amounts of bone, and lower postoperative resorption rate compared to endochondral bone graft (iliac crest), although this is not clearly established.

Citation: Carlini JL, Biron C, Strujak G, Romanovoski M. Use of the Iliac Crest Cortex for Premaxilla Fixation in the Reconstruction of Bilateral Cleft Palate Patients. Dentist. 2019; 1(2): 1009.

Publisher Name: Medtext Publications LLC

Manuscript compiled: August 23th, 2019

***Corresponding author:** Joao Luiz Carlini, Department of Stomatology, Federal University of Parana, Brazil, Tel: 5541 999832119; E-mail: joaoluizcarlini@gmail.com

There are different suggested modalities for the treatment of premaxilla in patients with bilateral alveolar process cleft. Some authors have proposed the complete removal of the premaxilla in order to promote better lip closure [14]. Aburezq and Forrest15 reported surgical repositioning of the premaxilla with bone graft, in which they had 4 successful cases in patients with bilateral cleft over an 8-year period [15].

In this study, a surgical technique for repositioning the premaxilla concomitant with bone graft fixed in the fissure region will be discussed using the cortical portion of the iliac crest to trap the particulate medullary bone in the fissure region and at the same time provide the fixation of the premaxilla to the anterior portions of the alveolar process of the maxilla (Figures 1-4).

Patients and Methods

Patients

The study involved a sample of 16 patients with bilateral fissure of the trans-foramen alveolar process, according to the classification proposed by Spina [16]. The patients underwent surgery from April 2005 to November 2006 at the Buccomaxillofacial Surgery Service of the Center for Integral Care of the Cleft Lip and Palate (CAIF), in Curitiba/Brazil.

Figure 1: Premaxilla access.

Figure 2: Premaxilla displacement.

Figure 3: Surgical guide fixation.

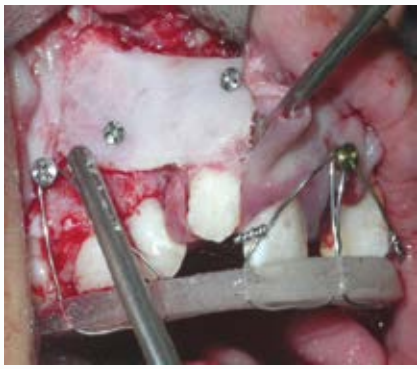

Figure 4: Cortical fixation with screws.

The ideal age for surgery was programmed between 8 and 12 years, determined by the position of the upper canine and in this sample all patients were in this age group.

Methods

The patients underwent an initial orthodontic intervention according to the CAIF protocol. The protocol establishes an evaluation by all areas of dentistry, as well as speech therapy, psychology, nursing, plastic surgery and pediatrics.

Circuit breakers were installed in the maxilla to promote correction of maxillary atresia and improve the position of the premaxilla. With this first step completed, the patient is referred to the Buccomaxillofacial Surgery team, where the upper and lower arch moldings are made. From the plaster models, the model surgeries are performed with the correction of the premaxilla position and the making of self-curing acrylic surgical guides for this new position. Orthodontic brackets are installed on the incisors and molars to assist in the fixation of the surgical guide during surgery.

The surgeries are performed under general anesthesia and orotracheal intubation. After anesthetic induction, 2% lidocaine solution with 1:100,000 epinephrine is infiltrated into the region to be surgically manipulated. Scalpel blade 15 is used to vertically incise the cleft margins, extending laterally with intrasulcular incision to 1 or 2 teeth distant from the cleft region, where relaxing incisions are made towards the vestibule bottom. The same procedure is performed on the opposite side, followed by mucoperiosteal flap detachment. Vertical incisions are also made in the premaxilla, followed by detachment of the periosteum in the lateral and palatine portions on both sides. With the aid of a reciprocating saw the bone in the posterior portion of the premaxilla is sectioned. The premaxilla is dislocated anteriorly; the nasal mucosa is separated from the oral mucosa and the nasal floor is closed bilaterally using resorbable suture (Polyglactin 4.0). Once the nasal floor is closed, the palatal mucosa is sutured with the remaining palatal mucosa in the premaxilla, using resorbable thread. Thus, the surgical guide, fixed with steel wire 0 to the brackets, is used to reposition the premaxilla.

In the donor area, the graft is removed from the iliac crest by the orthopedist. The chosen area is the inner (Medial) portion of the crest, the removed block is monocortical and yet, with the use of a bone curette, a large amount of medullary bone is harvested. After bleeding control, the suture is performed by planes. The bone graft block is then prepared. The entire medullary part of the block is removed. The region corresponding to the bilateral fissure is completely filled with the medullary bone, which was harvested through curettage and removed from the bone block. The iliac crest remnant cortical bone plate is then used to fix the premaxilla to the remaining maxillary stumps and provide containment of the particulate medullary bone in the fissure area.

The edges of this cortical plate are fixed at the distal end corresponding to the alveolar process with a 1.5 mm × 7.0 mm screw and at the medial end corresponding to the premaxilla with a 1.5 mm × 7.0 mm screw . All sharp edges that may traumatize the mucosa with low-speed diamond spherical burs are removed.

The entire grafted region is then covered by the mucoperiosteal flap with the aid of relaxing periosteum incisions. The suture is performed without tension on the 4.0 nylon thread flap.

Compressive dressing is applied over the region with the objective of reducing edema and controlling possible active bleeding points, being kept for at least 03 days.

An intravenous cefazolin antibiotic regimen is performed until patient discharge (which occurs on the first day after surgery) and continued orally until the tenth day after surgery. Analgesia is performed with dipyrone and assisted with ketoprofen.

Postoperative care includes strict hygiene in the area of brushing surgery and the use of 0.12% chlorhexidine mouthwashes. Follow-up is done on an outpatient basis and the sutures are removed at 2 weeks.

After 2 months postoperatively the surgical guide is removed and the stability of the premaxilla is verified. The screws used for graft fixation are removed after 6 months of surgery and only after this procedure are patients referred again for orthodontics.

The parameters used to evaluate the success of treatment are based on periapical radiographs taken 6 months after surgery, during

which the filling of the fissure with bone and immobilization of the premaxilla with the clinical examination are observed. After 6 months, the fixation screws are removed under local anesthesia and the patient is referred to resume orthodontic treatment.

Results

We had success in 15 patients operated using this technique, as there was complete closure of the buconasal fistulas and significant improvement of phonation. In one patient there was unilateral loss, which awaits further surgical intervention. Periapical radiographs performed after 6 months of surgery showed complete graft integration.

Discussion

The authors agree that alveolar reconstruction through bone graft, either of the mandible or iliac crest in patients with unilateral cleft, has shown very reasonable success rates [4,9,13].

For patients with bilateral clefts, it is observed that the treatment forms are discordant: The proposal for some authors was the removal of the premaxilla [14]. Another group of authors states that the best treatment for patients with bilateral cleft should be divided into two surgical times, grafting first one side and then the other [17,18]. However, the vast majority of authors advocate previous orthodontic-orthopedic preparation, promoting maxillary expansion and improving premaxilla positioning, thereby facilitating and making the bone grafting surgical procedure more favorable [5,6,11,12].

Premaxilla repositioning and nasal fossa floor reconstruction were proposed in this study, with the aim of making viable the completion of orthodontic treatment and prosthetic rehabilitation, improving functional aspects such as phonation and swallowing, and promoting important aesthetic gains. For the fixation of the segments of the maxilla remnant with the premaxilla, the cortical laminae of the iliac crest fixed to the bone were used with 1.5 mm × 7 mm titanium monocortical screws and the alveolar defects were filled. particulate bone marrow.

Regarding the donor area used, the present study confirms previous reports that recommend the iliac crest as an excellent treatment option due to the large quantity and quality of the bone [9,19]. The authors still agree that, regardless of the donor area, correct manipulation is essential of the graft during the surgical procedure, providing good graft adaptation and stability in the recipient area, eliminating any area that may function as a focus of infection, such as teeth with roots exposed in the fissure area, promoting proper manipulation of soft tissues, which should be sutured without tension to prevent graft dehiscence and contamination and to remove any area that may traumatize and expose the graft as bone spicules, especially in the cortical bone plate used for graft fixation [9,19].

In the sample studied, as well as in the literature reports, the follow-up of the operated patients was performed through periapical radiographs and clinical examination [20]. Periapical radiographic analysis, besides being a more technically accessible method, offers higher fidelity in images (Figures 5-8).

The results showed success in 15 operated patients, one patient presented unilateral graft loss due to infection, and was at an unfavorable age (26 years old) [21].

It is concluded that the fixation method with the cortical bone plate, used for graft fixation in the fissure area, presents excellent efficiency, since it promotes good adaptation and stability of the particulate medullary graft, besides making the procedure more efficient. financially viable.

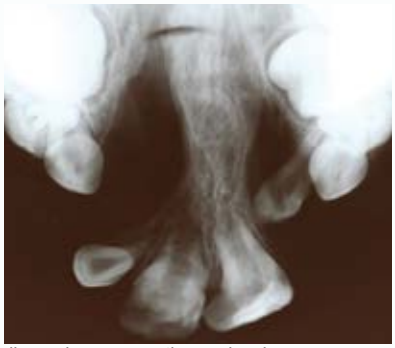

Figure 5: Radiography preoperative occlusal.

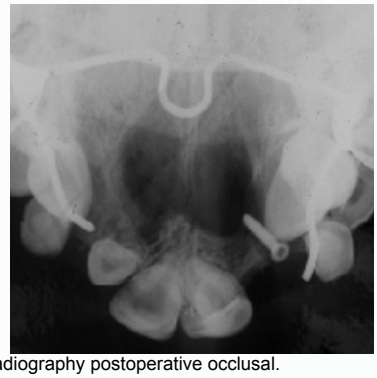

Figure 6: Radiography postoperative occlusal.

Figure 7: Preoperative profile occlusion.

Figure 8: Postoperative profile occlusion.

References

1. Boyne PJ, Autogenous Cancellous Bone Marrow Tranplants. Clin Orthop Relat Res. 1970;73:199-209.

2. Boyne PJ, Sands NR. Secondary bone grafting of residual alveolar and palatal clefts. J Oral Surg. 1972:30(2):87-92.

3. Abyholm FE, Bergland O, Semb G. Secondary bone grafting of alveolar clefts. Scand J Plast Reconstr Surg. 1981;15(2):127-40.

4. Bertz JE. Bone grafting of alveolar clefts. J Oral Surg. 1981;39(11):874-7.

5. Bergland O, Semb G, Abyholm FE. Elimination of the residual alveolar cleft by secondary bone grafting and subsequent orthodontic treatment. Cleft Palate J. 1986;23(3):175-205.

6. Bergland O, Semb G, Abyholm FE, Borchgrevink H, Eskeland G. Secondary bone grafting and orthodontic treatment in patients with bilateral complete clefts of the lip and palate. Ann Plast Surg. 1986;17(6):460-74.

7. Shafer DM. Secondary bone grafting for unilateral alveolar clefts a review of surgical techniques. Atlas Oral Maxillofac Surg Clin North Am. 1995;3(1):29-42.

8. Aburezq H, Daskalogiannakis J, Forrest C. Management of the prominent premaxilla in bilateral cleft lip and palate. Cleft Palate Craniofac J. 2006;43(1):92-5.

9. Sindet- Pedersen S, Enemark H. Mandibular bone grafts for reconstruction of alveolar clefts. J Oral Maxillofac Surg. 1988;46(7):533-7.

10. Koole R, Bosker H, Noorman van der Dussen F. Late secondary autogenous bone grafting in cleft patients comparing mandibular (ectomesenchymal) and iliac crest (mesenchymal) grafts. Presentation, 4th Hamburg Int. Symp. Craniofacial Anomalies and Clefts of lip, Alveolus and Palate Sept. 1987.

11. Koole R, Bosker H, Noorman van der Dussen F. Late secondary autogenous bone grafting in cleft patients comparing mandibular (ectomesenchymal) and iliac crest (mesenchymal) grafts. J Craniomaxillofac Surg. 1989;17(1):28-30.

12. Freihofer HPM, Kuijpers-Jagtman AM. Osteoplasty in the mixed-dentition combined with pre- and/ or postsurgical orthodontic treatment. Presentation 4th Hamburg Int. Symp Craniofacial Anomalies and Cleft of the lip, Alveolus and Palate.1987.

13. Freihofer HPM, Kuijpers-Jagtman AM, Early secondary osteoplastic closure of the residual alveolar cleft in combination with orthodontic treatment. J Craniomaxillofac Surg. 1989;17(l):1:26-7.

14. Borstlap WA, Heidhuchel KL, Freihofer HP, Kuijpers-Jagtman AM. Early secondary bone grafting of alveolar cleft defects. A comparison between chin and rib grafts. J Craniomaxillofac Surg. 1990;18(5):201-5.

15. Motohashi N, Pruzansky S. Long-term effects of premaxillary excision in patients with complete bilateral cleft lips and palate. Cleft Palate J. 1981;18(3):177-87.

16. Aburezq H, Daskalogiannakis J, Forrest C. Management of the prominent premaxilla in bilateral cleft lip and palate. The Cleft Palate J. 2006;43(1):92-5.

17. Spina V. A proposed modification for the classification of cleft lip and palate. Cleft Palate J. 1973;10(3):251-2.

18. Akita S, Hirano A. Usefulness of simultaneous pre-maxillary osteotomy and bone grafting in the bilateral clefts. J Craniofac Surg. 2006;17(2):291-6.

19. Kim MJ, Lee JH, Choi JY, Kang N, Lee JH, Choi WJ. Two-stage reconstruction of bilateral alveolar cleft using Y-shaped anterior-based tongue flap and iliac bone graft. Cleft Palate Craniofac J. 2001;38(5):432-7.

20. Sindet-Pedersen S, Enemark H. Reconstruction of alveolar clefts with mandibular or iliac crest bone grafts: a comparative study. J Oral Maxillofac Surg. 1990:48(6):554-8.

21. Akesson L, Håkansson J, Rohlin M. Comparison of Panoramic and Intraoral Radiography and pocket probing for the measurement of the marginal bone level. J Clin Periodontal. 1992;19(5):326-32.

22. Paulin G, Astrand P, Rosenquist JB, Bartholdson L. Intermediate Bone Grafting of Alveolar Clefts. J Craniomaxfac Surg. 1988;16(1):2-7.