



THREE-DIMENSIONAL RECONSTRUCTION OF THE ANTERIOR MAXILLA REGION WITH AUTOLOGOUS BONE BLOCK AND TUNNEL APPROACH. SOLUTION TO EXPOSURE WITH DOUBLE PEDICLE FLAP USING CONNECTIVE TISSUE FROM THE PALATE. CLINICAL CASE REPORT

Erick Fernandez Castellano., Katerin Lacruz Cardenas and Ariel Fernandez Castellano

Modular Masters in Clinical Endodontics, Masters in Oral Surgery at the University of Salamanca.
Private practice in Gran Canaria

ARTICLE INFO

Article History:

Received 11th September, 2017
Received in revised form 5th
October, 2017
Accepted 16th November, 2017
Published online 28th December, 2017

Key words:

Alveolar ridge augmentation, Dental implants, Surgical flap, Bone graft, autologous bone.

ABSTRACT

Introduction: Maxillary and mandibular bone defects are quite common. Among the different procedures which can be used to regenerate these defects, we can find Guided Bone Regeneration (GBR), the use of onlay/inlay bone blocks, the use of distraction osteogenesis or split crest technique. The most predictable material for the regeneration of the alveolar process is the autologous bone, which is considered the gold standard.

This case shows regeneration of the autologous cortical bone, as well as a solution to its exposure.

Case description: A male patient, aged 56, with no significant medical history visited the clinic for rehabilitation with implants. After performing a CBCT scan, it was decided to perform autologous block graft surgery and the tunnel approach. After 15 days, when the stitches were removed, the graft was seen to be exposed. At first, an attempt to solve this was made with chlorhexidine and chitosan rinses in search of a secondary epithelialisation. When such closure was not forthcoming, surgery was performed with a flap of bilateral pedicle connective tissue, achieving the closure desired. After 6 months, four implants were placed for implant supported rehabilitation.

Discussion: Although there has been a rise in reconstructive surgical techniques to restore an adequate bone volume, currently the autologous bone graft is still considered the best material to use. Some authors have solved the exposure of these grafts using 1% chlorhexidine gel, achieving in many cases a secondary epithelialisation. On other occasions, they found a solution to the exposed areas by covering them with a connective flap from the palate, coinciding to some extent with our case, but with the exception that we rotated a bilateral pedicle flap of connective tissue without making such waste.

Conclusion: The use of a bilateral pedicle flap of connective tissue from the palate proved to be valuable for covering large exposures of autologous bone grafts without losing them or the need to reduce them.

Copyright © 2017 Katerin Lacruz Cardenas and Ariel Fernandez Castellano. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Currently the partial or full rehabilitation of edentulism using dental implants is considered to be a successful treatment, with a high rate of survival. However, it is often not possible to make a direct insertion of these due to lack of bone on the recipient bed. (1,2)

The maxillary and mandibular bone defects are quite frequent, as a result of different processes, such as loss of teeth leading to an average of between 40% and 60% decrease in the horizontal and vertical dimensions of the alveolar ridge during the first year, periodontal disease, trauma, cysts and tumours. In all these cases, the placement of an implant in the correct three-dimensional position may prove to be impossible. The

same goes for the complete recovery of the patient's function and aesthetics. (1,3,4,5,6)

Although the literature has reported successful results in the long term with the use of short implants in regions with high bone resorption, the best option from a functional point of view is to recreate an adequate bone volume in the lost alveolar process. (1) Among the different procedures which can be used to regenerate these defects, we can find Guided Bone Regeneration (GBR), the use of onlay/inlay bone blocks, the use of distraction osteogenesis or split crest technique. (1,2,6,7)

The most predictable material for the regeneration of the alveolar process is the autologous bone, which is considered the gold standard as a result of its osteoinductive,

osteoconductive and osteogenic potential. (1,4,6,8,9) However, this material requires harvesting from other anatomical sites (intra o extra-orally). The mandibular is one of the most common donor sites in the oral region. Most of the craniofacial bones in the skull and the mandibular are formed by intramembranous ossification. Membranous bone grafts show less resorption than endochondral grafts. (8,10) Therefore, the embryological origin of the donor is an important factor for a successful recovery period. (4,8,9,10,11)

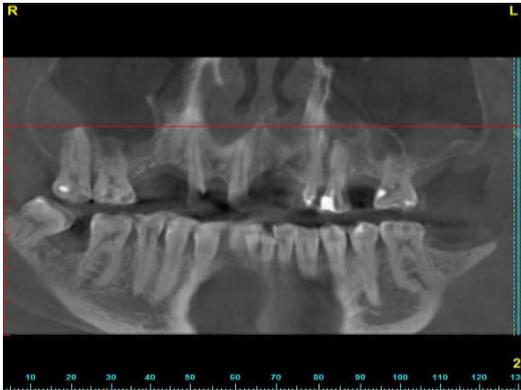


Figure 1a Initial panoramic x-ray

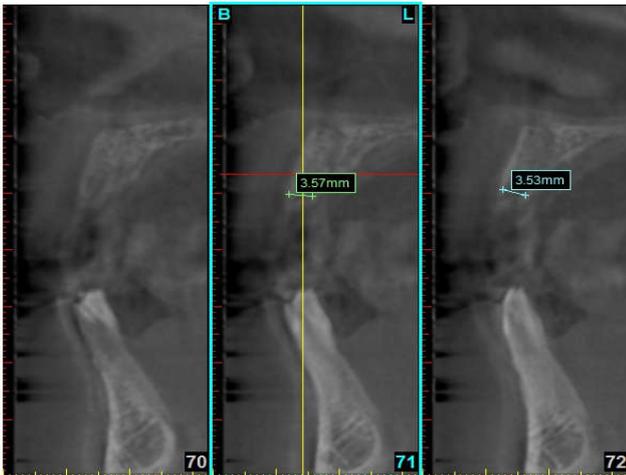


Figure 1b Cross-section

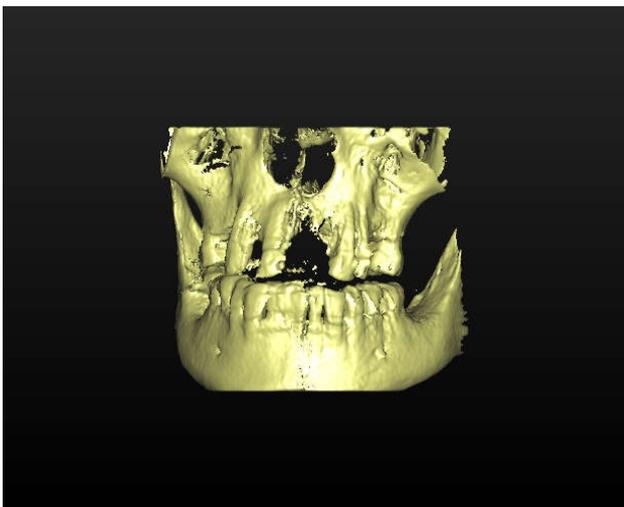


Figure 1c 3D image.

The aim of this case is to present a three-dimensional regeneration with autologous cortical bone obtained from the retromolar region of the mandibular, as well as a solution to its exposure.



Figure 1d Initial tissue



Figure 2a Cuts of the block in fragments approximately 1 mm thick.



Figure 2b Tunnel of autologous bone.

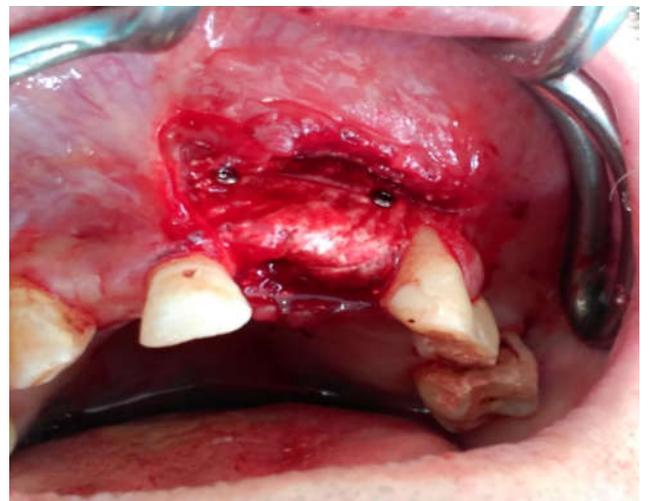


Figure 2c Covering of the graft with collagen membrane.



Figure 2d Exposure of the graft by crestal approach.



Figure 2e Rotation and suture of the bilateral connective tissue



Figure 3a Image three months after the connective graft surgery.

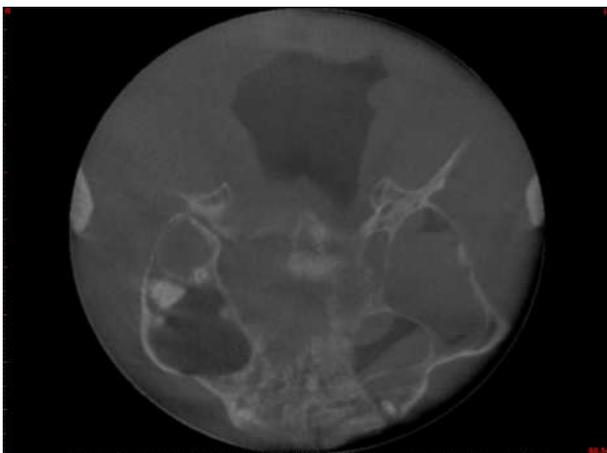


Figure 3b Axial section after six months.

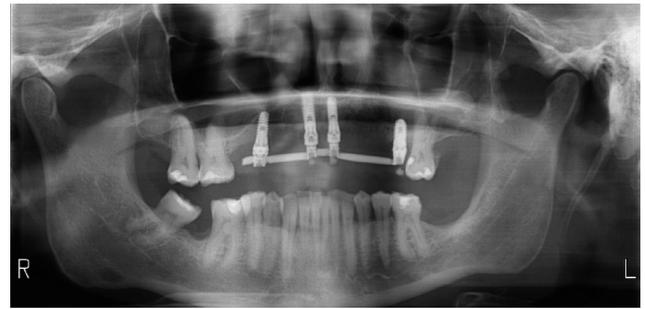


Figure 3c Panoramic x-ray after a year and a half of the restoration.

Clinical Case

A male patient, aged 56, with no significant medical history visited the clinic for rehabilitation with implants. After observing a lack of sufficient width and height in the CBCT scan, autologous graft surgery was decided upon. See figures 1a, 1b, 1c, 1d. After the informed consent was signed, the treatment started with an anaesthetic infiltration of 1.8 ml of lidocaine with epinephrine 1:80,000. Surgery began with a crestal incision in the edentulous region slightly towards the palatine, together with two release incisions in the vestibular mucosa, at the level of the mesial ends of the teeth 11 and 23 in oblique form, to obtain a trapezoidal flap of full thickness. To harvest the blocks, an infiltrative block was made in the third quadrant and a bayonet incision was made from the vestibular sulcus of the first molar extending up to the retromolar region and the ascending branch, with an additional release. A mucoperiosteal flap was raised up to expose the mandibular branch and the external oblique ridge. The line of osteotomy was determined with drill holes using a small round bur. This line was further opened using the PIEZOSURGERY® (Mectron, Germany) and a thin chisel and hammer were used to extract the block, taking care not to break the graft. The bone block was carefully lifted to ensure that the dental nerve did not get trapped inside the graft. The donor region was filled with particles of Bio-Oss xenograft and covered again with the Bio-Gide collagen membrane. The preparation of the recipient site included small perforations with a round bur and hand piece with abundant irrigation, to encourage revascularisation of the grafts and a better adaptation. The blocks were cut and stabilised in a tunnel shape and then were fixed to the residual ridge with 1.6 x 8 mm self-tightening micro-screws (Klockner). See figures 2a,2b. The sharp angles and edges were softly rounded off to avoid perforations in the soft tissues and the unwanted exposure of the grafts. The area around the periphery of the blocks was filled with bone dust harvested using the (ACM Neobiotech) from the donor region mixed with particles of Bio-Oss xenograft (Geistlich Pharma AG, Wolhusen, Switzerland; granulometry 1 mm-2 mm) and covered again with Bio-Gide collagen membrane (Geistlich Pharma AG, Wolhusen, Switzerland of 25 x 25). See figure 2c. The flap was repositioned without tension using the Rehrmann technique and sutured with Supramid 4-0 (LaboratorioAragó, S.L., Spain) with simple and mattress stitches. The patient was administered amoxicillin + clavulanic acid 875 mg/125 mg three times a day for 7 days, ibuprofen 600 mg every 8 hours for 4 days, omeprazole 20 mg one tablet per day for 7 days and fortectortin 4 mg, 1 every 12 hours for 2 days. The patient was also given a mouthwash with 0.2% chlorhexidine with chitosan three times a day for two weeks and the patient was told not to use dental prosthesis. The sutures were removed

after 12 days and a large exposure of the block placed by crestal was observed. See figure 2d. Faced with this, together with the inability to pull the tissue due to the scarce vestibular depth, it was decided to maintain the patient more time with the same mouthwash to see if a secondary epithelialisation of the exposed area was possible. The patient returned in a month and it was seen that the exposure had not closed. Therefore, it was decided to rotate the two pedicle flaps of connective tissue from the palate. These flaps needed to have enough length and width to reach the depth of the vestibular bottom and cover the bone graft. So we shaped two long horizontal incisions on the palate with a vertical distance of 4 mm from the scalloped gingival line which extended from the first molar region to the central incisors. For this, a surgical scalpel blade 15 was used to separate the connective tissue of the epithelium overlap. This dissection continued towards the midline, with great care taken to avoid perforating or thinning the overlapping mucosa. The most distal parts of the flaps were rotated and taken to the vestibular region next to the midline and were sutured without any tension to the bottom of the vestibular with nylon monofilament suture 6.0. See figure 2e. After 15 days, the stitches were removed and an almost complete covering of the bone graft was observed. This was confirmed three months after the surgery. See figure 3a. After a healing period of six months, clinical and x-ray studies were carried out and four Ziacom implants were placed for implant-supported prosthetic hybrid rehabilitation, conserving the molars, as teeth 23 and 24 which had previously received endodontic treatment showed fistulas, periapical points and mobility. See figure 3b and 3c.

DISCUSSION

Although there has been a rise in reconstructive surgical techniques to restore an adequate bone volume, currently the autologous bone graft is still considered the best material to use in the bone augmentation procedures. (1,4,6,8,9)

The sites of intraoral harvesting are preferable due to their proximity to the recipient site and because they show less of the scarring which usually results. Between these sites, the mandibular symphysis and retromolar region can be found, which stand out due to the membranous bone which usually has less resorption than endochondral grafts. (8,10,11) Wilkes *et al*, demonstrated in their study that the membranous bone survived twice as much as the endochondral bone, given that the former retains its bone mass more than the endochondral bone, which shows a fibrous replacement tissue. (11)

Hislop *et al*, proved that the autografts are highly effective in bone formation, coming to the conclusion that the endochondral bones, such as the ribs, iliac bone and tibia show greater osteoclastic bone resorption than membranous bones, such as the mandibular symphysis and the ascending branch. (8)

However, the use of autologous grafts has several disadvantages, such as the need for an additional surgical site, the quantitative limits of the bone which can be obtained from the donor site and the unstitching of the wound at the point of suture with the subsequent exposure of the bone graft as in the present case. (1,5,7,8,12) DoğanDolanmaz *et al*, in their retrospective study, observed a minimum exposure of the block graft, with the average rate of complications of 30%. They solved this problem reducing the exposed block with a round bur, along with abundant irrigations with a saline solution. This led to a secondary epithelialisation without any

symptoms of infection after a few weeks. (10) The exposures of the graft in these patients were registered in the second week after surgery, coinciding with the present case. However, they were not resolved in the same way, as it was not possible to have a secondary epithelialisation due to the large size of the exposure.

Amin *et al*, used bone graft from the iliac crest to reconstruct a large defect in the anterior maxilla region. They were able to cover it and prevent exposure, using a bilateral pedicle flap of connective tissue from the palate. (13) In our case, a similar approach was taken, the only difference being that it was palliative rather than preventative.

Eugénio Pereira *et al*, in their study on 22 patients observed exposure of blocks in four cases, three of them occurring in the first three weeks of healing, just as in our case. (3) Some of these exposures were treated with 1% chlorhexidine gel on the exposed areas for 14 days. In the other cases, surgical intervention was necessary to smooth the exposed areas and cover them with a graft of connective tissue of the palatal mucosa, coinciding in part with our case, with the exception that we rotated a bilateral pedicle flap of connective tissue from the palate without such erosion. Therein lies the peculiarity of our case as the literature consulted does not offer a similar resolution for treating a large graft exposure.

CONCLUSION

The autologous mandibular bone block grafts offer satisfactory results in cases of bone deficiencies and show great resistance to resorption. The use of a bilateral pedicle flap of connective tissue from the palate, as in this case, proved to be valuable for covering large exposures of grafts without the need to reduce them, thanks to its large vascular supply.

Bibliography

1. Luongo F, Mangano FG, Macchi A, Luongo G, Mangano C. Custom-Made Synthetic Scaffolds for Bone Reconstruction: A Retrospective, Multicenter Clinical Study on 15 Patients. *Biomed Res Int*. 2016;1-12.
2. Thoma DS, Cha J, Jung U. Treatment concepts for the posterior maxilla and mandible: short implants versus long implants in augmented bone. *J Periodontol Implant Sci*. 2017;47(1):2-12.
3. Pereira E, Messias A, Dias R, Judas F, Salvoni A, Guerra F. Horizontal Resorption of Fresh-Frozen Corticocancellous Bone Blocks in the Reconstruction of the Atrophic Maxilla at 5 Months. *Clin Implant Dent Relat Res*. 2015;17(2):444-58.
4. Avila ED, Filho JS, Toledo L, Ramalho DO, Francisco M, Gabrielli R. Alveolar ridge augmentation with the perforated and nonperforated bone grafts. *J Periodontol Implant Sci*. 2014;44:33-8.
5. Aimetti M, Manavella V, Cricenti L, Romano F, Presentation C. Case Report A Novel Procedure for the Immediate Reconstruction of Severely Resorbed Alveolar Sockets for Advanced Periodontal Disease. *Case Rep Dent*. 2017;1-5.
6. Gultekin BA, Bedeloglu E, Kose TE, Mijiritsky E. Comparison of Bone Resorption Rates after Intraoral Block Bone and Guided Bone Regeneration Augmentation for the Reconstruction of Horizontally Deficient Maxillary Alveolar Ridges. *Biomed Res Int*. 2016;1-9.

7. Lee EA. Subperiosteal Minimally Invasive Aesthetic Ridge Augmentation Technique (SMART): A New Standard for Bone Reconstruction of the Jaws. *Int J Periodontics Restorative Dent.* 2017;17(2):165-73.
8. Yang J, Park H, Yoo K, Chung K, Jung S, Oh H, *et al.* A comparison study between periosteum and resorbable collagen membrane on iliac block bone graft resorption in the rabbit calvarium. *Head Face Med.* 2014;10(1):1-11.
9. Sakkas A, Ioannis K, Winter K, Schramm A, Wilde F. Clinical results of autologous bone augmentation harvested from the mandibular ramus prior to implant placement . An analysis of 104 cases. *GMS Interdiscip Plast Reconstr Surg.* 2016;5:1-9.
10. Dolanmaz D, Esen A, Yıldıırım G, İnan Ö. The use of autogeneous mandibular bone block grafts for reconstruction of alveolar defects. *Ann Maxillofac Surg.* 5(1):71-6.
11. Rai R, , Prashant A Punde, Harshal Suryavanshi SS. Exposed Dental Implant ? Local Autograft A Saviour ! *J Int Oral Heal.* 2015;7(2):85-8.
12. Fariña R, Alister JP, Uribe F, Olate S. Indications of Free Grafts in Mandibular Reconstruction, after Removing Benign Tumors: Treatment Algorithm. *Pediatric/Craniofacial.* 2012;1-7.
13. Rahpeyma A, Ahmadi S, Hosseini VR, Azimi H. A Bilateral Pediculated Palatal Periosteal Connective Tissue Flap for Coverage of Large Bone Grafts in the Anterior Maxillary Region. *Iran J Otorhinolaryngol.* 2012;24(3):143-6.
