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Alveolar bone augmentation using autogenous bone block graft in anterior mandible: A case report

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ABSTRACT

The aim of the present study is to depict a combined vertical and horizontal ridge augmentation with autogenous bone block graft and guided bone regeneration in the anterior of the mandible to increase vertical and horizontal bone for implants placement. A 46-year-old male Hispanic patient referred with a complaint of missing lower anterior teeth. Medical history showed only an allergy to Prochlorperazine. Radiographic examination showed a thin horizontal bone width and loss of vertical height at anterior of mandible. Clinical examination revealed good oral hygiene with poor prognosis of teeth #32 and #42. The proposed treatment was to a traumatically extract teeth #32 and #42 and augments the area with a 2 block grafts harvested from the symphysis of the mandible (Chin block) and after bone block healing implants will be placed to restore the lower anterior area. To conclude, block bone graft is a gold standard procedure to gain vertical and horizontal augmentation of alveolar ridge in the anterior of the mandible.

Keywords: Block bone graft, Autogenous bone graft, Guided Bone Regeneration, Dental Implant.

1. INTRODUCTION

Numerous causes can be related to tooth loss; however, there are limited options to restore said missing teeth (Pjetursson and Heimisdottir, 2018). One of these options is dental implants (Pjetursson and Heimisdottir, 2018). Although substantial improvements have been made related to its safety, in certain situations placing it can be quite difficult in terms of predictability (Do et al., 2020). Multiple factors are needed to ensure optimal function and esthetics related to it (Do et al., 2020). One of these factors is the dimensions of the alveolar bone (Do et al., 2020). If the width of the alveolar bone is narrow or the height is short or the quality is poor then placing an implant cannot be favorable (Do et al., 2020). Furthermore, the soft tissue surrounding the implant is dependent on the amount of alveolar bone (Esposito et al., 2012). Correction of deficiencies related to the alveolar bone will ensure ideal implant placement.

Restoring alveolar bone deficiencies is a complex process (Esposito et al.,

2009). Newly formed bone is derived from the periosteum and bone marrow derived cells which has osteogenic potential (Esposito et al., 2009). When discussing the fundamentals of bone regeneration, there are 3 fundamental components: Presence of blood clot, contact with living tissues and preserved osteoblasts (Esposito et al., 2012). The main limitation related to osseus regeneration is the rapid population of soft tissue cells around osseous wounds due to these cells having the capability of migrating and proliferating at a faster rate than bone cells (Esposito et al., 2009). The outcome of this procedure is the disruption or prevention of osteogenesis or bone formation (Esposito et al., 2009). Different methods and techniques have been described in the literature for bone regeneration or augmentation and what is done in this case report is a procedure called Guided bone regeneration (GBR) (Esposito et al., 2009). GBR can be done to increase the alveolar bone height and width to enhance the outcome of implant placement (Chavda and Levin, 2018; Esposito et al., 2009). Different surgical techniques have been proposed in the literature including type of graft and membrane used as well (Chavda and Levin, 2018; Esposito et al., 2009; Ren et al., 2022). The aim of the present study is to show a joint vertical and horizontal ridge augmentation with autogenous bone block graft and guided bone regeneration in the anterior of the mandible to enable implant placement.

2. CASE REPORT

A 46-year-old male of Hispanic descent, non-smoker referred to the periodontic clinic for management of missing teeth #31, #41. Medically fit with an allergy to Prochlorperazine. Extra-oral findings were within normal and the patient reported brushing twice a day without any other oral hygiene aids. Clinical and radiographic examination revealed alveolar ridge deficiency on area of #31, #41 approximately 3 mm in height and Grade II mobility on teeth #32, #42 (Figure 1) (Figure 2).

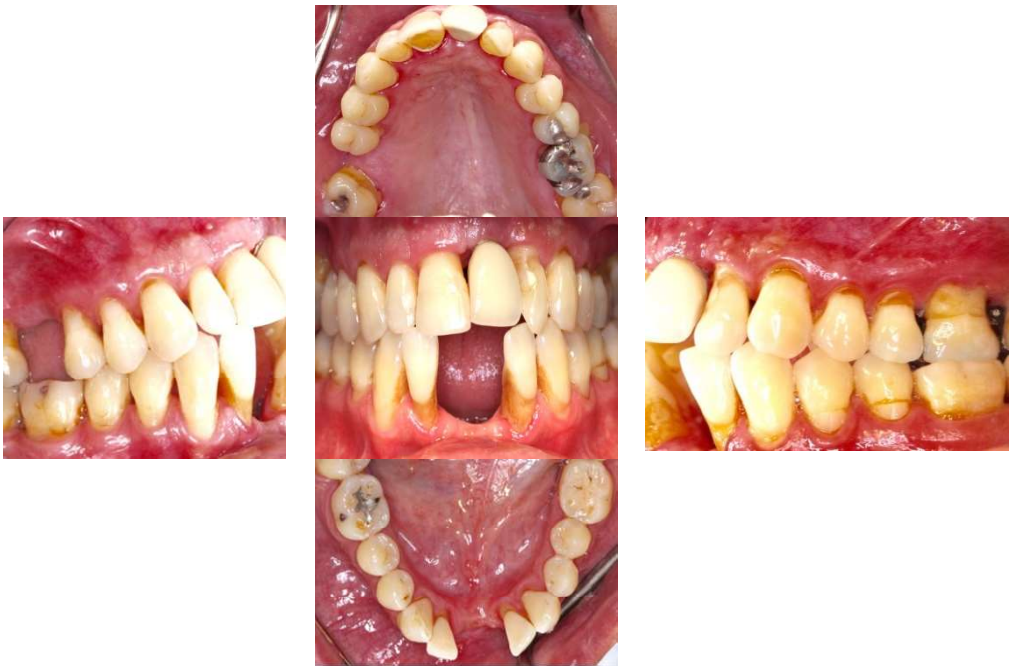

Figure 1 Intra oral clinical pre-operative photos

The proposed treatment involved extracting teeth #32, #42 and augmenting the area with autogenous bone block grant from the symphysis of the mandible to facilitate better placement of implants in the area. The procedure was done under local anesthetic injection of 2% lidocaine with epinephrine 1:100000 (Xylocaine, Astrazeneca) was injected on the labial and lingual aspect of the concerned area. Sulcular incision was done on teeth #33-#43 with Para-crestal incision on area of the missing #31, #41. A vertical releasing incision was done from #43-#44. A full mucoperiosteal flap was raised and after a traumatically extracting #32, #42, Minor intramembranous perforations were done around the atrophic ridge. The autogenous bone block grants were harvested from the symphysis of the mandible using piezotome (Piezosurgery, Mectron) and the blocks were fixated on the top of the atrophic ridge by mini screws (Bone Fixation Screw, Biohorizons) and finally a allograft (Bone Allograft, Biohorizons) was introduced as well to fill spaces between blocks for better bone augmentation (Figure 3).

A non-resorbable membrane (cytoplast, Biohorizons) was placed to prevent tissue integration into the grated site. After releasing incision to ensuring a tension free flap surgical site was closed with 4-0 white monofilament non-resorbable PTFE sutures (cytoplast, Osteogenic) using horizontal mattress and simple interrupted techniques. Patient received tab Augmentin 625 mg mg/ 8

h for 7 days, PRUFEN 400mg/PRN and chlorhexidine mouthwash 0.2% twice per day for two weeks. Patient seen after 14 days for follow up healing was uneventfully, no pain, no swelling and no signs of inflammation. After 4 months clinical and radiographic examination showed good healing and a vertical and horizontal bone gain on the concerned area and two straumann implants (BLT roxolid SLA, Straumann) were placed to replace the missing teeth as an implant supported bridge restoring (#32, #31, #41 and #42) (Figure 4).

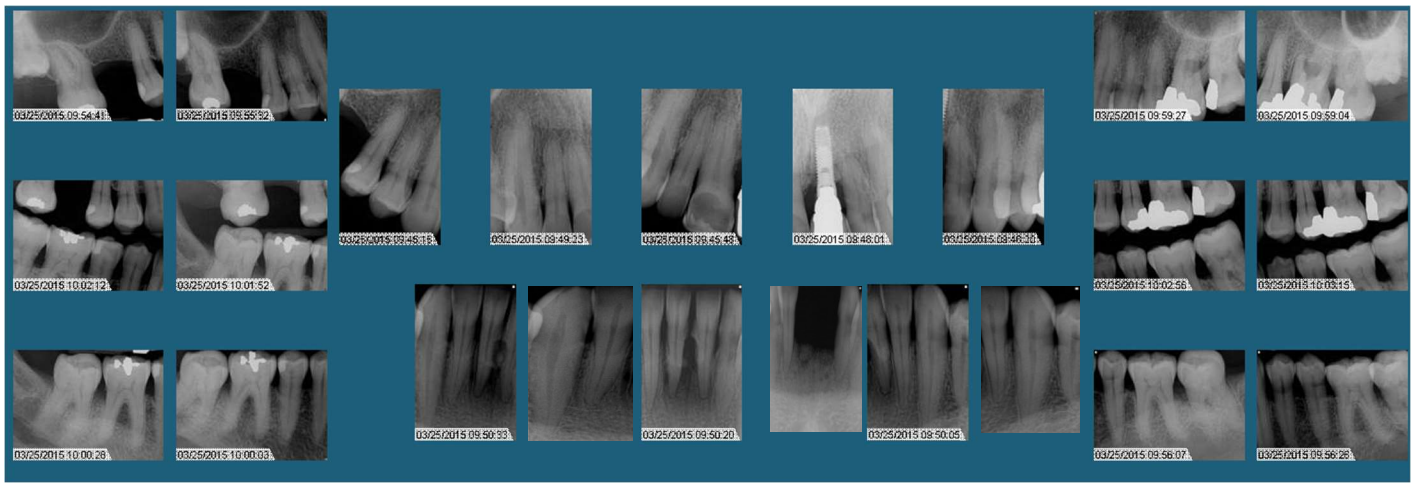

Figure 2 20 Complete mouth survey of the patient

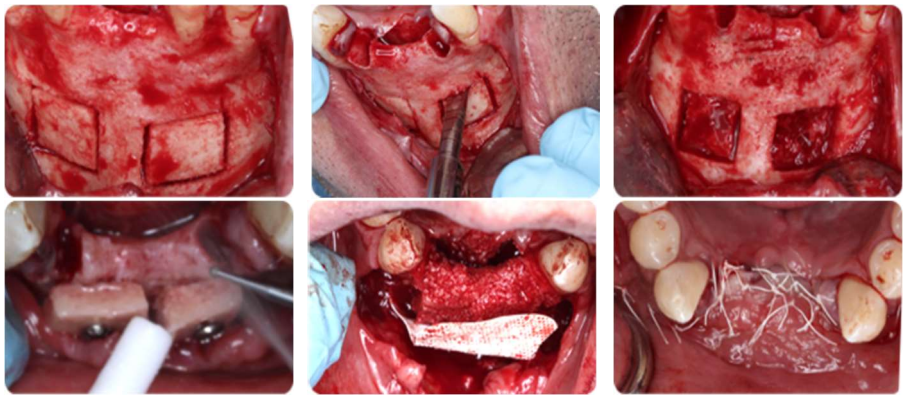

Figure 3 Vertical and horizontal augmentation surgery

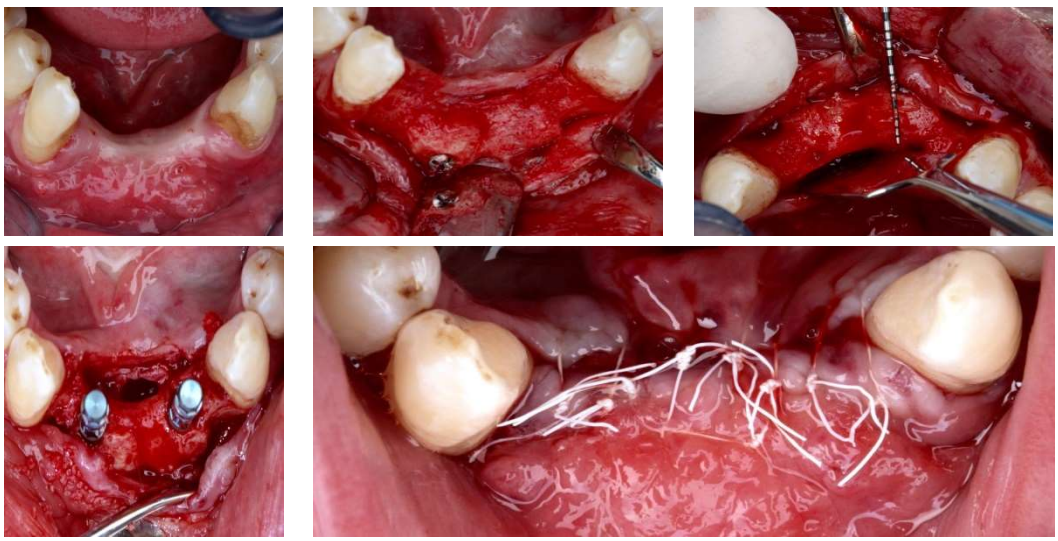

Figure 4 Implant placement

3. DISCUSSION

The aim was to augment the anterior of the mandible vertically and horizontally to enable implant placement. The procedure was successfully done with no complications during or after treatment. It is preferred to ideally place an implant in terms of location and angulation (Bassir et al., 2019). The concern is it might lead to complications such as an exposure of implant threads due to inadequate alveolar bone width and/or height (Bassir et al., 2019). To prevent and minimize these complications, a form of bone augmentation procedure such as GPR is usually required (Esposito et al., 2009). GBR can be done before or even during implant placement. In a study by Buser et al., (1990), they saw 1.5-5.5 mm of horizontal bone gain in human population which confirms the predictability of the procedure when done correctly. Nevertheless, the literature shows some variation of success and complication rate which can be attributed to difference in materials and technique (Kohal and Hürzeler, 2002).

Autogenous bone grafts are still considered the golden standard of bone graft materials for its osteogenic and osteoinductive and osteoconductive properties (Chavda and Levin, 2018). The main issue with it is the limitation in the source of it, not to mention the risk of morbidity and effect on quality of life due to the creation of a donor site (Chavda and Levin, 2018). Other bone graft materials namely as Demineralized Freeze-Dried Bone Allograft (DFDBA) are available to address this matter (Chavda and Levin, 2018). The drawback of DFDBA is its low mechanical stiffness and rapid resorption rate (Chavda and Levin, 2018). In this clinical case report, we combined two bone grafts to get the best features related to both and assist is in achieving the desired gain in width and height of alveolar bone in the anterior of the mandible.

4. CONCLUSION

The stated is a clinical case report describing a vertical and horizontal alveolar ridge augmentation in the anterior of the mandible using part of the symphysis of the lower jaw to facilitate implant treatment. Successful results were achieved with no significant complications during or after the treatment. In this case report a chin block bone graft with guided bone regeneration was a feasible option to augment the alveolar ridge vertically and horizontally in anterior mandible.

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Author Contributions

All the authors contributed equally to the case report.

Informed Consent

Written informed consent form was obtained from the patient who participated in the study.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data collected during this study are available upon reasonable request from the corresponding author.

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