

Restorative Approach to the Severely Resorbed Anterior Maxilla – A Case Report on Augmentation and Implant Placement

Asma Naaz¹, L.V. Sankeerthana², K. Padmavati Bhoomreddy¹, Pranavi Dasari¹, Sri Sushma Yarram³, Harika Peddapally¹

¹Department of Periodontology, Meghna Institute of Dental Sciences, Nizamabad, Telangana, India.

²Department of Periodontist and Implantologist, MVS Dental, Champapet, Hyderabad, Telangana, India.

³Department of Periodontist and Implantologist, National Dental Care, Hyderabad, Telangana, India.

Abstract

The restoration of a substantial alveolar bone defect utilizing collagen membrane and deproteinized bovine bone material is main emphasis of present clinical case. The patient presented significant bone loss in maxillary anterior region, which made implant placement difficult. Therefore, after tooth extraction, alveolar ridge preservation was carried out, which led to horizontal bone regrowth.

Keywords: Cone-beam computed tomography, and alveolar ridge enhancement, Dental implants, Deproteinized bovine bone mineral, Guided bone regeneration, Xenograft.

INTRODUCTION

Esthetics is the primary consideration for any dentist in surgical practice when dealing with bone reconstruction in maxillary anterior region after trauma, infection, neoplasia, or periodontal disease dehiscence or fenestration following immediate implant placement in narrow ridges stabilized for long time may show the complication arising from buccal bone loss.^[1] By prioritizing early or delayed implant placement, clinicians can better manage bone conservation and improve the chances of a successful outcome.^[2]

Bone grafts act as a scaffold and supports blood clot formation, helping to strengthen bone and lower the risk of soft-tissue degradation in bone abnormalities. Studies have shown that bone grafting can be used for various surgical procedures, including socket augmentation before and after implant implantation and alveolar ridge preservation (ARP).^[3,4]

Bio Oss is a xenograft material that is widely used in dental practice. This inorganic bone material is obtained from bovine and is natural, antigen-free, osteoconductive, and highly biocompatible. Its low rate of biodegradation results in minimum tissue reactivity.^[5] Bio Oss Collagen is made up of 10% biodegradable porcine collagen matrix and 90% Bio Oss deproteinized (DBBM) particles. When combined,

it offers superior hemostatic qualities and the benefits of both collagen and bone.^[6] The high porosity of Bio Oss Collagen significantly expands its surface area and creates ideal scaffolding conditions to produce new bone.^[7,8] It is convenient for clinical manipulation because Bio Oss Collagen is simply wet with regular saline for application and offers better stability at the surgical site.^[8]

Bio Oss is often combined with collagen membrane for GTR procedures. This membrane provides strength and support, essential for successful periodontal regeneration. Exogenous collagen is chemotactic for periodontal ligament fibroblasts.

This case report aims to analyze if Bio Oss in conjunction with a resorbable membrane will result in a successful horizontal ridge augmentation procedure that permits implant insertion under typical circumstances.

Address for correspondence: Dr. K.Padmavati Bhoomreddy,
Department of Periodontology, Meghna Institute of Dental Sciences,
Nizamabad, Telangana, India.
Email: epadmavati.reddy@gmail.com

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CASE REPORT

A female patient, age 18, came to Meghna Institute of Dental Sciences complaining of a traumatized anterior maxillary tooth loss and asking for a fixed prosthesis. Implant placement was evaluated considering the patient's age and available treatment alternatives.

A missing maxillary anterior tooth (#11) was discovered during the clinical examination, and cone beam computed tomography (CBCT) showed significant bone loss including buccal plate (Figures 1 and 2). Implant placement was scheduled after ridge augmentation since the patient wanted a fixed prosthesis.

Surgical procedure

To avoid any contamination from extraoral sources, a povidone-iodine solution was used to sterilize the skin surrounding the surgery site following 0.12% chlorhexidine gluconate gargle. Using crestal incision #11, full-thickness flap for primary tension-free closure and a split-thickness flap was raised till mucogingival junction.

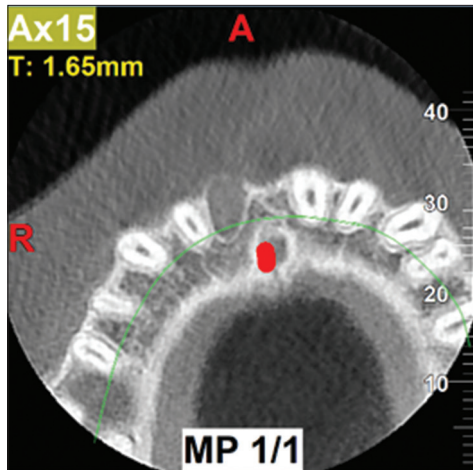


Figure 1: Cone-beam computed tomography showing loss of buccal cortical plate due to trauma irt 11 is seen

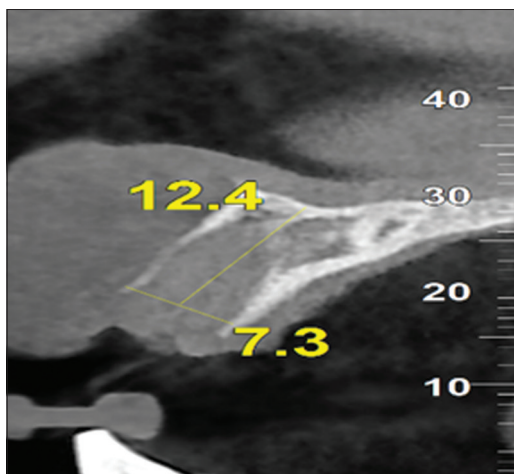


Figure 2: Cone-beam computed tomography showing bone defect of 7.3 mm width and 12.4 mm height irt 11 site

Healiguide, a collagen membrane, was applied over collagenated bovine bone mineral (Bio-Oss®) utilized for grafting the defect.

To accomplish primary closure, flap was moved toward coronal surface and single interrupted suture was made using 5/0 Vicryl post-operative medications (500 mg of amoxycillin twice daily for 5 days) which were provided, along with 0.2% chlorhexidine mouthwash to avoid formation of plaque until the suture removal. Two weeks later, all the sutures were taken out, and the patient displayed no signs of infection or edema. One month following surgery, the patient was sent to the prosthetics department to have a temporary prosthesis made in operating room.

CBCT verified that the width was about 5 mm following 8 months of normal healing, enabling the implantation of an implant with a 3.3 mm diameter. In the maxillary anterior teeth, a full-thickness flap was raised. In accordance with the manufacturer's instructions, Noris implants measuring 3.3×10 mm were positioned at site #11. The major stability of the implants was 30 N.

Ten days following surgery, all the sutures were taken out, and the patient showed no symptoms of infection or edema. An implant-supported crown was used to successfully repair the implants after 3 months. The patient did not report any negative side effects, including pain, aberrant sensory responses, or foreign body reactions.

Five years post-operative examination revealed a healthy peri-implant tissue, free of inflammatory symptoms including rash, edema, or suppuration. The implant restoration satisfied the patient.

DISCUSSION

According to a systematic review,^[9] a 5-year follow-up revealed no clinical signs, such as bleeding on probing, an increase in pocket depth, suppuration, or bone loss surrounding the implant. According to Benic and Hammerle Classification of bone defect, the present case had a Class IV defect, endangering initial stabilization of the implant. In these situations, it is frequently preferable to utilize a phased strategy for implant placement and bone regeneration that includes the use of bone grafts before to implant placement.^[9] This method has a high success rate when used to correct major bone abnormalities. This process, called ARP, entails applying a membrane and bone graft material as soon as possible following trauma or tooth extraction. The absorbable membrane utilized for this technique quickly breaks down when it encounters the mouth cavity. Therefore, a primary closure, akin to a guided bone regeneration treatment, should be carried out to optimize the absorbable membrane's longevity.

CBCT imaging showed radiopacity in both the bone regeneration area and the surrounding immaculate bone. In addition, the toughness of the regenerated bone portion was comparable to that of the nearby immaculate bone. In addition,

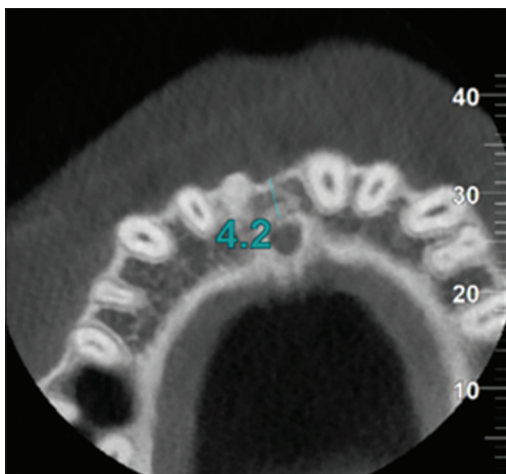


Figure 3: Cone-beam computed tomography showing buccal bone fill of 4.2 mm width in the 11 regions after 1 year

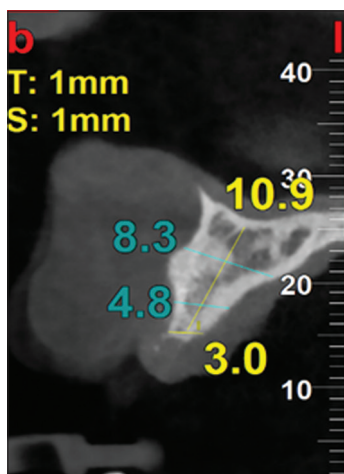


Figure 4: Cone-beam computed tomography showing bone fill of 4.8 mm buccopalatally

because they had sufficient bucco-palatal widths, implant insertion was possible at #11 (Figures 3 and 4).

A recent analysis on bone augmentation^[10] found that there is no significant difference in implant survival rates between autologous bone blocks and bone grafts. Furthermore, the literature has documented successful ridge augmentation procedures employing collagen membranes and DBBM, as in this instance for the implantation of an esthetic implant in the front maxilla.^[11]

According to clinical and histological research, bone regeneration treatments require 7–10 months when using DBBM without autologous bone.^[11,12] Nine to ten months passed between the augmentation and implant placement in this trial. When there is a significant loss of buccal bone, the bone augmentation technique is recommended over ARP. A prior study^[11] employed same kind of membrane and DBBM, a recovery duration of 9–10 months was chosen.



Figure 5: Clinical picture after the placement of implant and prosthesis

The bioresorbable collagen membrane used in this study was selected to lower the possibility of membrane exposure, which may have effect on bone regeneration. The best time for bone augmentation depends on patient's unique requirements and the type of defect. Oral practitioners can guarantee the best results and the best long-term oral health by taking a patient-centered treatment approach and adjusting the period of bone augmentation based on the unique requirements and circumstances of each patient.

Maintaining a proper gap between the bone crest and the prosthesis's contact point^[13] is essential to addressing these issues. This permits the interdental papilla to potentially recover. Other feasible options for improving the overall results include soft-tissue augmentation^[14] and using a prosthesis to mimic the gums form.^[15] Although the general form and function outcomes are very excellent, the esthetics may use some work (Figure 5).

CONCLUSION

Horizontal ridge augmentation in conjunction with DBBM and a collagen membrane in the front maxillary arch before implant insertion during with a 6–10 month healing period is a successful option for rehabilitation. However, pink esthetics and high smile line remain an unaddressed challenge in this case.

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