

Alveolar Ridge Augmentation with Titanium Mesh and Particulate Allograft – A Case Report

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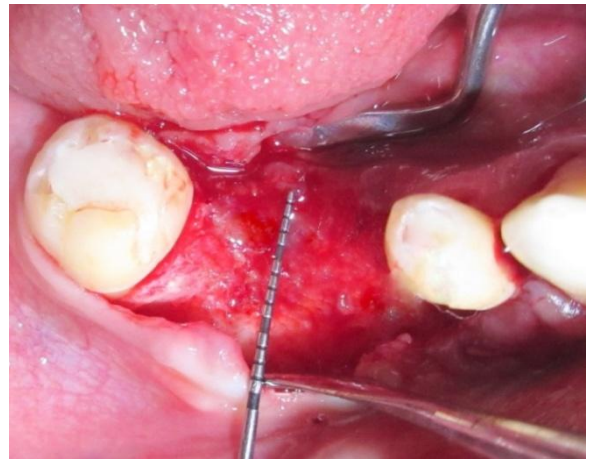
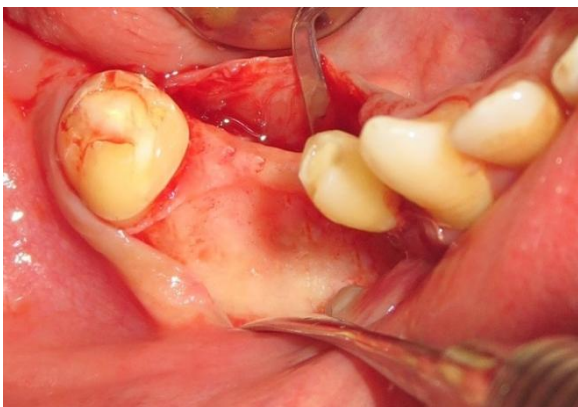
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Abstract: Guided bone regeneration has been used successfully for the regeneration of bone for the placement of oral implants when ridge deformities are present. The present case provides a clinical description of the use of titanium mesh along with bone graft for bone reconstruction. Bone augmentation with titanium mesh and allogenic bone graft is a successful technique and a predictable approach for the regeneration of bone.

Keywords: Allograft, guided bone regeneration, ridge augmentation, titanium mesh

1. Introduction

Alveolar ridge defects are most commonly seen after periodontal infection and tooth extraction. Placement of implants in such defective sites could compromise the function and aesthetics. Therefore, prior to implant placement¹ such cases patients may require reconstructive procedures which includes vertical and horizontal ridge augmentation. The use of barrier membranes along with bone grafts or bone substitutes has been proposed and tested for the partial and full augmentation of the alveolar process prior to fixed dental prosthesis surgery³. The use of titanium mesh for reconstruction of the atrophic alveolus was first introduced by Dr. Philip Boyne et al. in 1985^{4,5}. The use of titanium mesh along with bone grafts has been shown to be successful in both vertical and horizontal bone defects. The combination of rigid osteoconductive scaffold (titanium mesh) along with allogeneous bone grafts would increase the possibility of vertical and horizontal augmentation and esthetic results and decrease the post operative morbidity.



2. Case Report

A 27 year old systemically healthy male patient reported to the Department of Periodontics of Nair hospital dental college, Mumbai with the chief complaint of missing right lower posterior teeth since 6 year.

3. Clinical Examination

Extraorally no abnormality was detected .It was noted that #45 and 46 were missing (Figure 1a) The defect area was measured corresponding to the CEJ of the adjacent tooth using UNC 15 probe(Figure 2).Teeth were extracted 6years ago due to caries. Blood investigations were within limits normal.

4. Radiographic Interpretation

Horizontal bone loss extending till the middle third of root was observed in 45and 46. In order to maximize the amount of available bone for fixed prosthesis, ridge augmentation procedure was considered. There was no relevant medical history. IOPA with respect to 45 46 was advised (Figure 1b).



Figure 1a

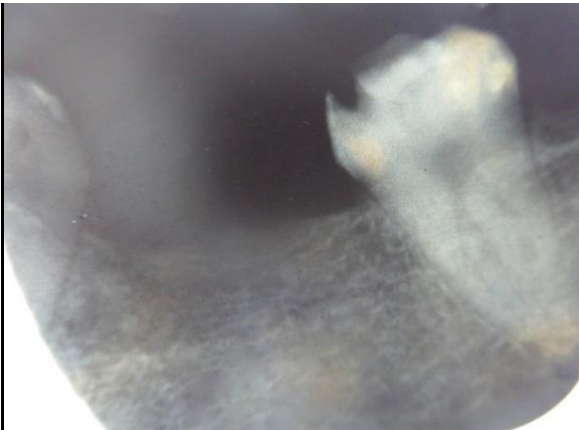


Figure 1b

5. Management

After obtaining both written and oral informed consent, a decision was made to augment the ridge with the previously described Ti-mesh and allograft particulates. Under local anesthesia, a crestal incision was made on the edentulous ridge with 15 no. blade and Bard Parker handle, connecting with an intrasulcular incision at teeth #44 and #47. Full-thickness flap was elevated on both the buccal and lingual sites (Figure. 3a). The buccal flap was released by periosteal scoring at several millimetres from the mucogingival junction. Decortication was done in buccal bone with the round bur (figure 3c). Two tenting screws were placed with the aid of a driver. Ti-mesh was trimmed and stabilized to the lingual plate by fixation screws (figure 4). Demineralized freeze-dried bone allograft (DFDBA) bone graft was placed under the mesh and packed gently (Figure 5); subsequently, the mesh was fixed to the buccal ridge and then covered with resorbable collagen membrane (Figure 6). Flaps were approximated with resorbable sutures (Figure 7) and coe pack periodontal dressing was placed (figure 8). Postoperative instructions and medications, including analgesics and antibiotics, were given to the patient. The healing was uneventful during the healing period.

After obtaining a sufficient emergence profile, impressions were made and the final prosthesis was given.

6. Clinical Outcomes

Six months after the surgery, the soft tissues at the ridge crest had a more even contour. The ridge height increased by 6.33 and 5.59 mm. The bone grafts were integrated with the host bone (Figure. 9). Cbct report showed enough amount of cortical bone.

7. Discussion

The use of barriers made of titanium macro-mesh in combination with bone grafts and bone substitutes has been proposed and tested for the partial and full augmentation of the alveolar process in implant surgery. The regeneration of localized alveolar ridge has been the goal of clinicians and researchers. Bone loss occurs in chronic inflammation, and in post extraction cases where no socket preservation procedure was attempted which results in difficulty for patients wearing a conventional prosthesis or being restored with dental implants. Severe alveolar bone loss can result in malnutrition, poor self-esteem, multipledental visits for failed prosthesis, and jaw fracture.

Vertical and horizontal bone augmentation can be successfully performed to gain bone height and width that is essential for ideal implant positioning and esthetic outcomes using variety of techniques. Titanium mesh has some distinct advantages as a barrier membrane. Its rigidity resists deformation by the overlying soft tissue. Because it is non-resorbable it is present throughout the healing phase of the graft. Last, it causes little soft tissue reaction even when it is exposed. This is important because all membranes can become exposed during healing, and this can be especially common for titanium mesh. A layer of pseudo periosteum is constantly observed under the mesh. Though titanium mesh exposure was reported in 51.11%, the success of bone grafting was not reduced, owing to the success rate of 97.72%⁹.

The titanium mesh can be beneficial only in isolated areas of ridge defects than wide defects. In the present case there was titanium mesh exposure at the end of 5 months and hence the decision to remove the mesh was made.

A clinical and radiographic study demonstrated significant bone regeneration with mean horizontal and vertical augmentation of 4.71 ± 1.24 mm and 3.16 ± 0.59 mm respectively. Histologic studies have demonstrated the presence of woven bone adjacent to lamellar which is indistinguishable from normal bone architecture³.

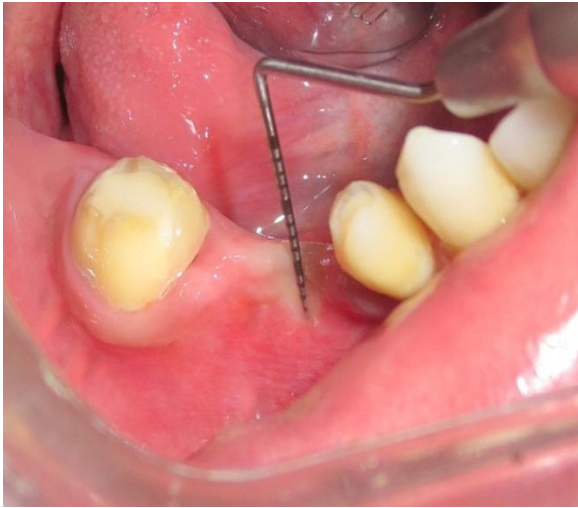


Figure 2a

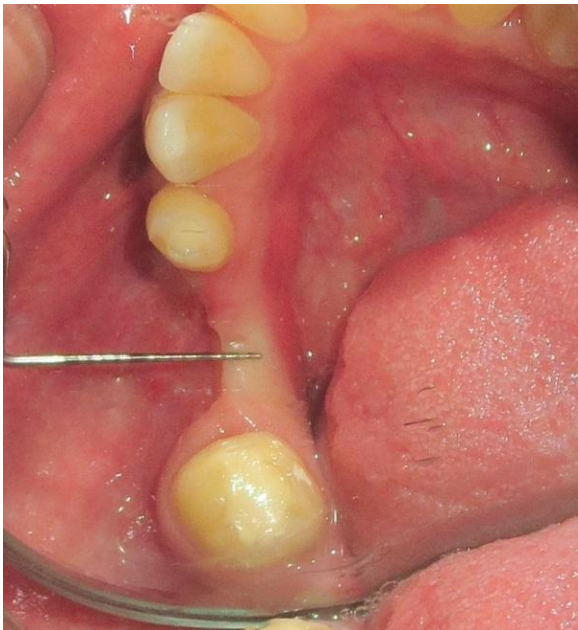


Figure 2b

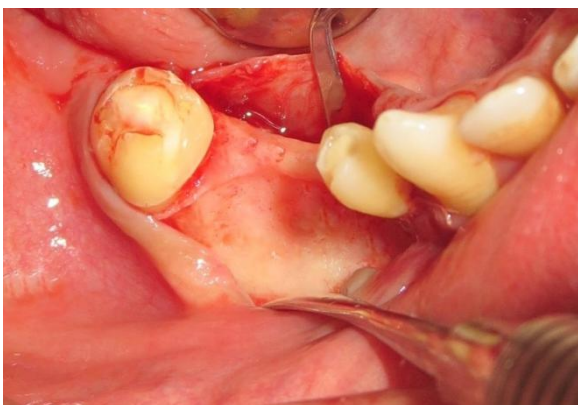


Figure 3a

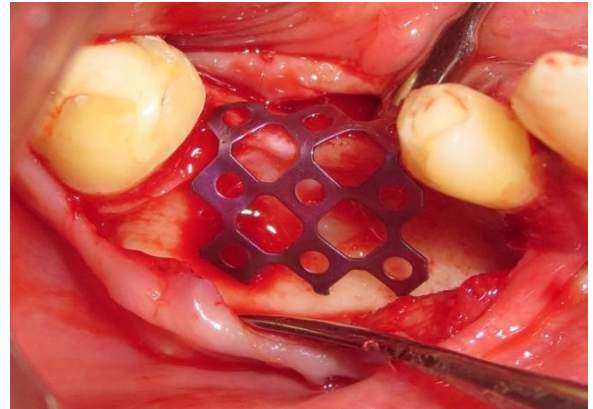


Figure 3b

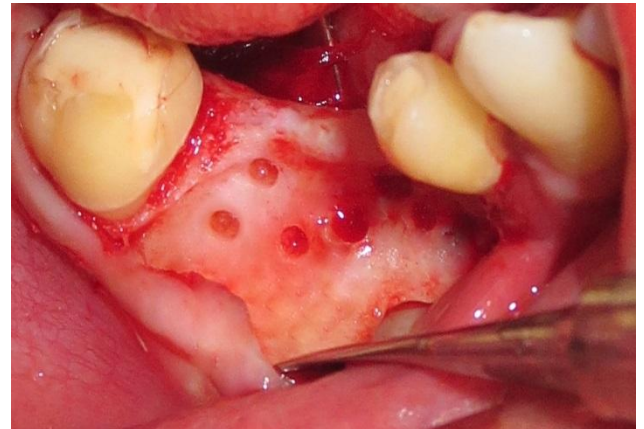


Figure 3c

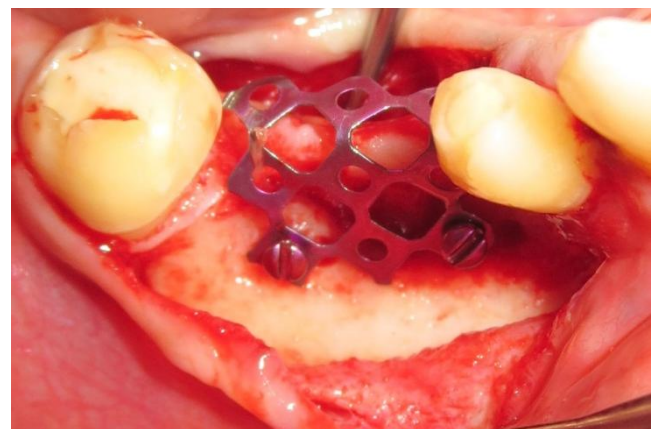


Figure 4



Figure 5

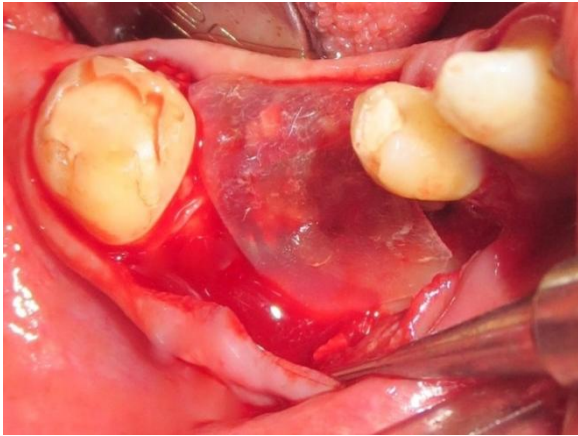
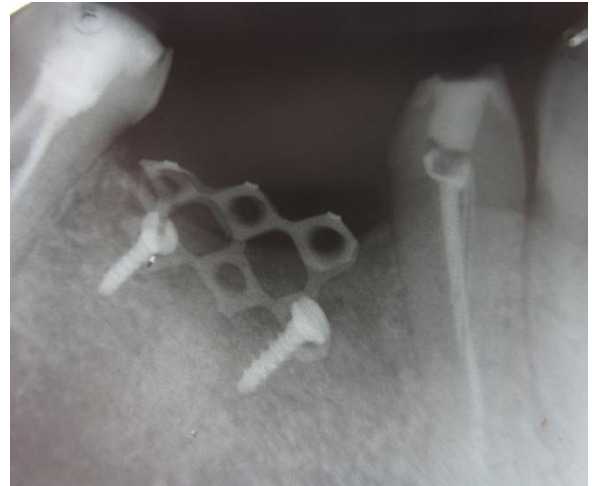


Figure 6



IOPA - Post surgery view

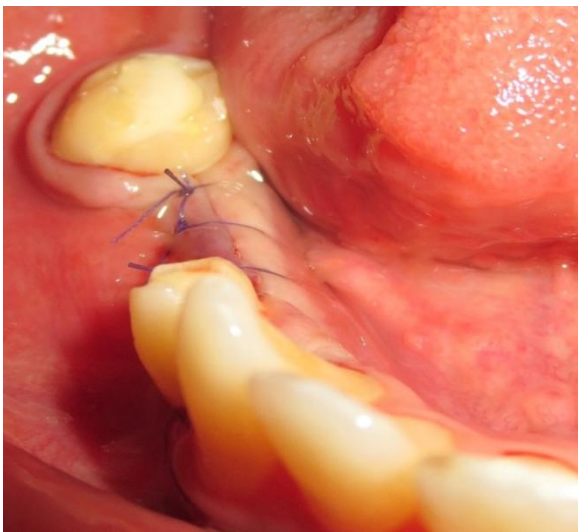


Figure 7

Surgical Re-Entry after 6 Months



Figure 9a

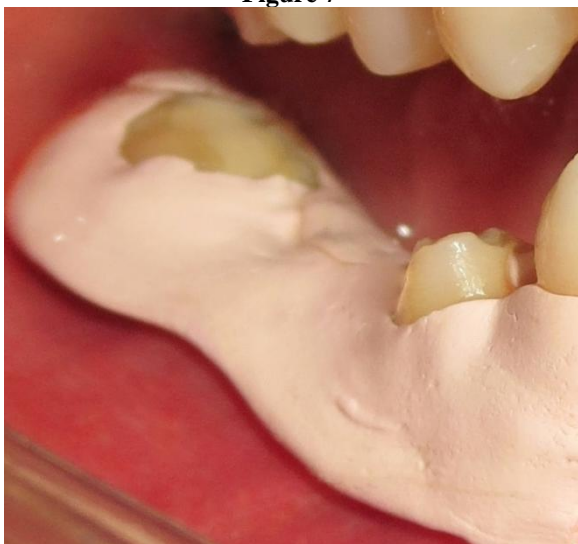


Figure 8

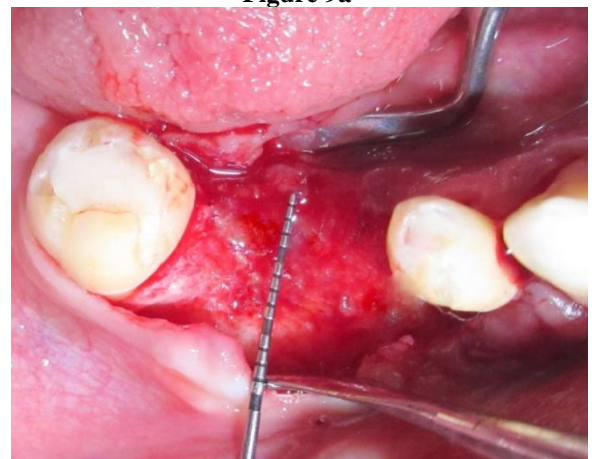


Figure 9b



Figure 9c



Figure 10b



Figure 9d



IOPA- Post Surgery 6months

CBCT Report after 6 Months

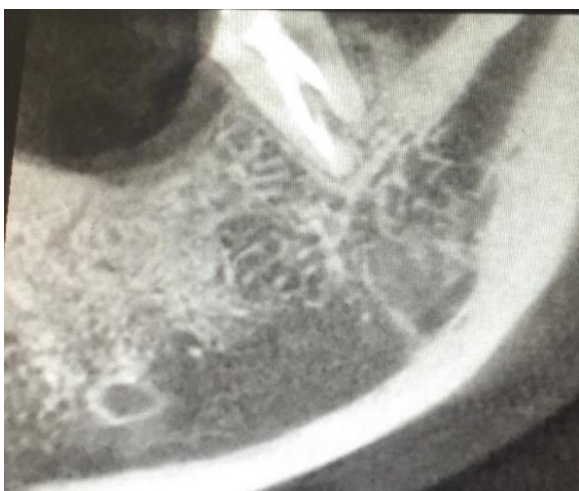


Figure 10a



8. Conclusion

The case report illustrated the successful combined surgical approach for three dimensional augmentation of alveolar ridge using allogeneous bone graft and titanium mesh to implant placement.

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