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Ridge Augmentation With Titanium Mesh And Nova Bone Putty: A 12 Month Follow Up

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Abstract:

Background: Dental implant placement in the maxillary anterior segment is a constant challenge in periodontal surgery due to insufficient bone volume. Several techniques have been suggested to reconstruct deficient alveolar ridges and to facilitate dental implant placement. These techniques include Guided bone regeneration (GBR), bone splitting osteotomy, distraction osteogenesis, inlay and onlay bone grafting. GBR is a promising technique that increases the bone volume with the help of a subperiosteal barrier. This case report describes ridge augmentation in the upper anterior region and rehabilitation with a cement retained crown prosthesis using rigid titanium occlusive screwed barrier with nova bone putty and might be a reliable technique for alveolar ridge reconstruction. This approach achieves excellent final esthetic outcomes of implant-supported restorations.

Keywords: Alveolar ridge augmentation, Titanium mesh, Nova bone putty

I. INTRODUCTION

With insufficient bone volume for dental implant placement in the maxillary anterior segment leads to functional and esthetic problems and can be difficult to solve. Implant placement is a viable option in the treatment of partial and full edentulous. (1) However, the placement of implants in alveolar deficiencies may lead to adverse angulations, mechanical overload, and esthetic dissatisfaction. When minimum dimensions for implant placement are not present in the alveolar process, it is necessary to augment the size of the ridge. (2)

Several techniques have been suggested to reconstruct deficient alveolar ridges and to facilitate dental implant placement. These techniques include bone splitting osteotomy, distraction osteogenesis, autogenous block bone graft, guided bone regeneration with Particulate graft. Guided bone regeneration (GBR) is also a promising alternative that increases bone volume by the use of a subperiosteal barrier. (3) The use of titanium mesh was first introduced by Boyne in 1969, for the reconstruction of large osseous defects. Hence, the creation and the maintenance of space for graft placement could prevent the collapse of the biomaterial and provide GBR. (4)

This case report describes horizontal alveolar ridge augmentation in the upper anterior region and rehabilitation with a cement-retained crown prosthesis using rigid titanium occlusive screwed barrier with nova bone putty and might be a reliable technique for alveolar ridge reconstruction. This approach achieves excellent final esthetic outcomes of implant-supported restorations.

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II. CASE REPORT

A 17-year-old male patient referred from the department of orthodontic reported to the department of Periodontology, Pondicherry for implant placement in the maxillary anterior region. The patient was referred from the department of orthodontics at the stage of completing orthodontic Management. The patient reported a history of trauma and extracted the fractured segment before 7 years. On clinical examination the following observations were made: Decreased interocclusal space (Fig 1, 2), Deficient alveolar ridge width (Fig 3) (Seibert Class I Deficient Ridge), Crestal width of 2mm, spacing (2mm) between 13, 14 and missing 11, 12, 22 (Fig 1, 2). All the treatment options were explained to him and he opted for implant-supported restorations on 11, 12 and 22.

Figure 1: Pre-treatment photograph

Figure 2: OPG

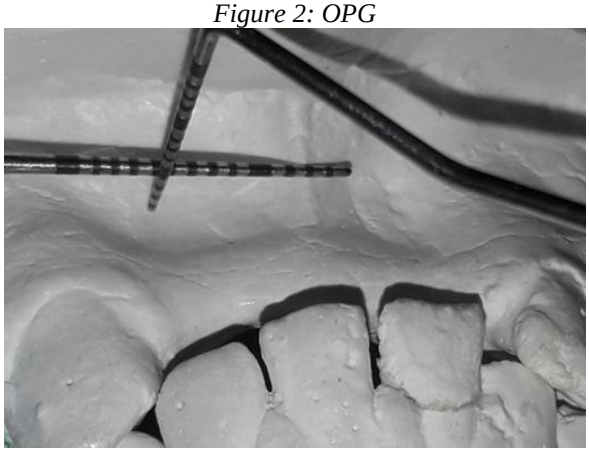

Figure 3: Pre-treatment diagnostic model

Clinical examination revealed that the alveolar ridge height was adequate, but there was inadequate ridge width (Fig 1, 3). Horizontal bone augmentation was required before implant placement. It was decided to augment the ridge deficiency with titanium mesh and nova bone putty. Pre-operative photographs and diagnostic casts were prepared. The patient was healthy and had no systemic contraindications for intraoral surgery and implant placement.

III. SURGICAL PROCEDURE

A successful phase I therapy (Oral prophylaxis) was performed surgical procedures were carried out as an outpatient procedure under local anesthesia (2% Lignocaine hydrochloride with epinephrine 1:2, 00,000). Sufficient premedication was given to the patient and the surgical site was disinfected with povidone-iodine and Remote incision was given (Fig 4) followed by a vertical incision was performed at the line angle of adjacent teeth (13 and 22). A full-thickness mucoperiosteal flap was raised to expose and visualize the size of the defect, and the surface of the bone was released from the remaining muscle and periosteal fibers (Fig 4). Next, the Bucco-palatal width and height of the alveolar bone were measured. The alveolar bone height was more than 10 mm and the crestal width of the alveolar bone was about 2 mm. Decortication was done using a 702 straight fissure bur (Fig 5). A rigid titanium occlusive barrier was trimmed and contoured to the desired shape of the future alveolar ridge, then secured with titanium mini-screw (Fig 6). PRF was taken and mixed with nova bone putty (osteoconductive) and placed under the barrier (Fig 7). The flap was coronally repositioned and sutured with simple interrupted suture (Vicryl) 4.0 (Fig 8).

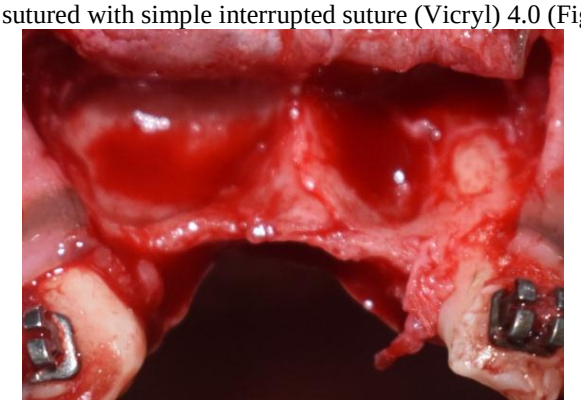

Figure 4: Remote and vertical incision were made to exposing a horizontal defect

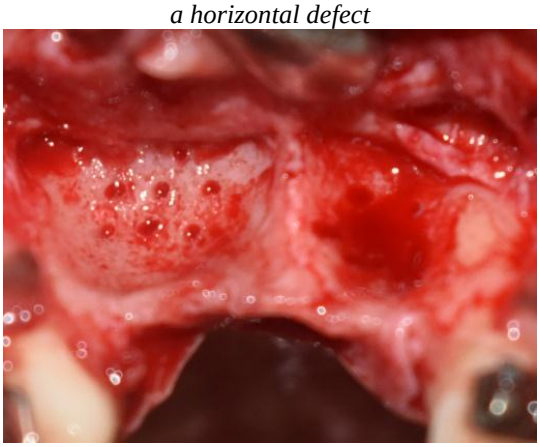

Figure 5: Decortication of the buccal plate to expose the bone marrow

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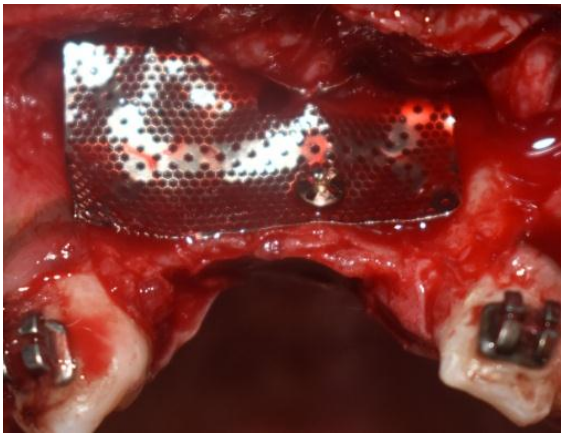

Figure 6: A rigid titanium occlusive barrier was trimmed and contoured to the desired shape of the future alveolar ridge then secured with tenting screws

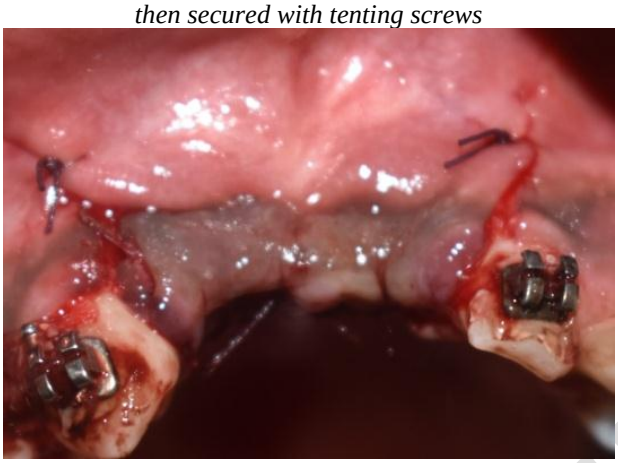

Figure 8: Flap approximated with simple interrupted suture

IV. POSTOPERATIVE CARE

The postoperative medication such as amoxicillin 500 mg orally 3 times daily for 7 days and an analgesic was advised and the patient was instructed to rinse with chlorhexidine 0. 12% twice daily for 2 weeks. Sutures were removed after 10 days. The exposure of the titanium mesh occurred in this case at 3-month follow-up visit and exposed mesh was trimmed and secured with simple interrupted suture (Fig 9). This exposure did not affect the successful regenerative outcomes. The patient recalled 8 months after healing, the augmented site was reopened using a crestal incision. The rigid barrier was removed and a 6-7 mm crestal width transversal bone was observed (10). At the same time, a fixture (3.5*14 mm, 3.5 * 10 mm CSM bioactive implant) was placed with good primary stability (Fig 11). After 6 months periapical radiographs showed that osseointegration had been completed successfully (Fig 12), second-stage surgery was performed for castable abutment placement followed by (Fig 13) and implant-supported porcelain fused to metal crowns was delivered. The following review after 6 months and 12 months showed through healing with sufficient bone density.

Figure 9: Mesh exposure at 3 months

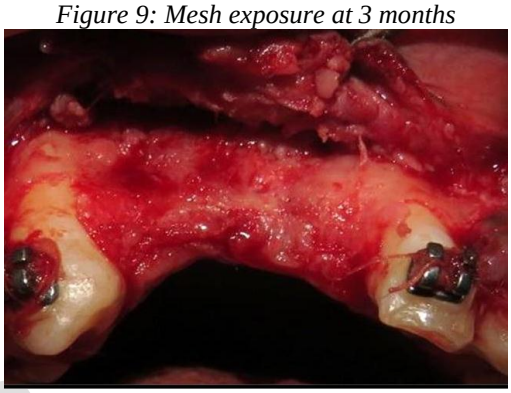

Figure 10: Re-entry after 8 months, we removed the titanium mesh, and fixing the screw increase in bone volume is observed

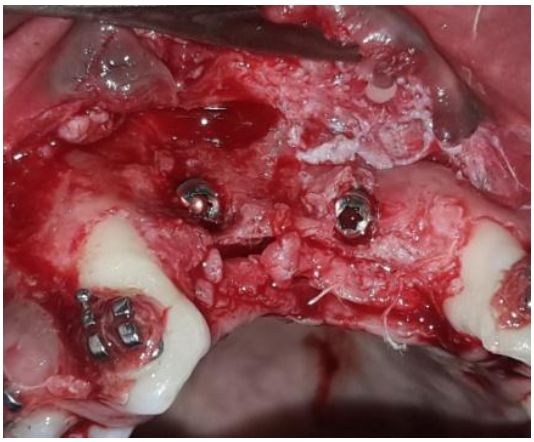

Figure 11: Implants were placed with good primary stability

Fig 12-At 6 Months later periapical radiographs shows Good osseointegration

Fig 13-Six months later, we start the second stage surgery was performed

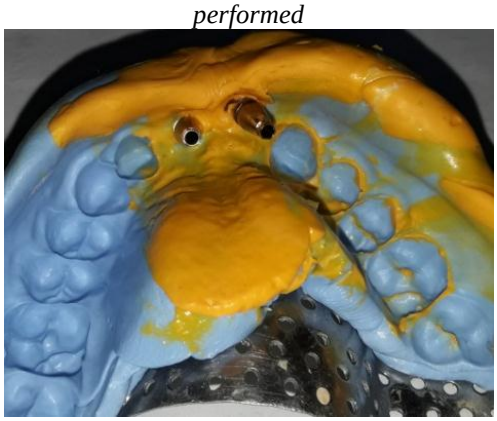

Figure 14: Putty Impression was made

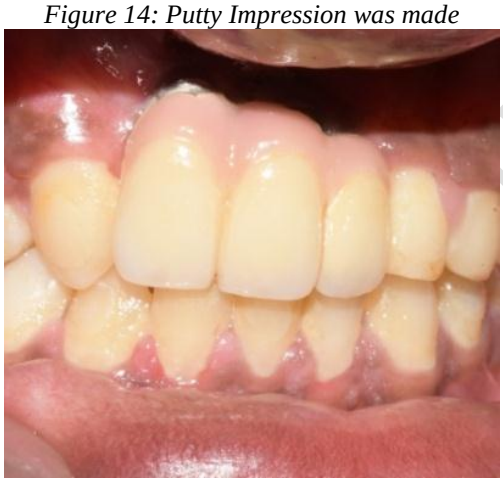

Figure 15: The definitive Prosthesis is cemented six months later with the good esthetic result

Figure 16: Follow up at 1year

Figure 17: X-ray at 1 year

V. DISCUSSION

Esthetic and functional compromise in implant restorations can be prevented by ridge augmentation procedures, which results in enhanced emergence of profile for an implant-supported restoration. [5]

This case report showed successful horizontal ridge augmentation using titanium mesh along with nova bone putty which is a bioactive synthetic graft with osteostimulative and osteoconductive property. Its consistency makes it easy to manipulate and adapt well to defects. Spaces between particles permit rapid vascularization and bone ingrowth. So it is a viable alternative for Autogenous bone graft. [6, 7]

Titanium micromesh - Good space maintainer & its macroporosity (in the millimeter range) plays a role in maintaining blood supply and allowing diffusion of extracellular nutrients across the membrane. Choukrons PRF, an autologous source of growth factors prepared by simple technique releases various growth factors that help to increase the healing rate of the grafted bone. [8, 9]

VI. CONCLUSION

The use of a rigid titanium occlusive barrier with putty bone graft is a reliable technique for alveolar ridge reconstruction. This technique offers a predictable alternative for avoiding patient morbidity such as a second surgical site for autogenous grafting. This approach achieves an excellent final esthetic outcome as it facilitates implant-supported restoration.

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