

Vertical ridge augmentation with guided bone regeneration and immediate implant placement in mandibular posterior region: A Case Report

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ABSTRACT

Background: Implant placement in the mandibular posterior region requires a comprehensive concern of adequate alveolar bone and gingival biotype. Insufficient support from hard and soft tissues becomes one of the main causes of implant complications. To avoid this problem, treatment planning with guided bone regeneration is indicated for esthetic and functional needs. In this case, we performed implant placement using a guided bone regeneration technique for augmentation of deficient alveolar bone using autogenous bone graft and xenograft along with titanium mesh covered by resorbable collagen membrane. A 40-year-old female patient came to the department with the chief complaint of missing lower right posterior teeth. This case was diagnosed as a soft and hard tissue deformity of the alveolar ridge. GBR and immediate implant placement were planned for the patient. GBR was done by using a combination of autogenous bone graft and xenograft along with titanium mesh followed by placement of resorbable collagen membrane. Hereby, we demonstrate the effectiveness of implant placement using a guided bone regeneration technique for vertical ridge augmentation using autogenous bone graft and xenograft.

Keywords: Ridge augmentation, guided bone regeneration, immediate implant.

INTRODUCTION

Dental implants have been used to replace missing teeth for more than half a century. They are considered to be an important contribution to dentistry as they have revolutionized the way by which missing teeth are replaced with a high success rate.¹ Bone augmentation procedures in

posterior edentulous mandible are often necessary for placement of endosseous dental implants as, at times, available bone height is limited due to ridge resorption and presence of inferior alveolar nerve.² The implant-prosthetic rehabilitation of severe

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atrophy of the posterior mandibular region is a difficult challenge.³⁻⁴

Guided bone regeneration with autologous and alloplastic grafts currently represents the gold standard for the treatment of this type of condition, as it allows the bone volumes required for the correct positioning of the implants to be restored.⁵⁻⁶ The comparison of survival rates over time suggested a trend towards bone augmentation and regular implants possibly having a better long-term survival than short implants.⁷ Guided bone regeneration is an accepted method successfully employed in dental practices to increase the volume of the host bone at sites chosen for implant placement.⁸ Guided bone regeneration (GBR) for the treatment of localized jaw bone defects has been documented to be highly successful.⁹

An experimental histological comparison of the sites that were augmented with autogenous bone blocks and particulate autogenous bone grafts in conjunction with GBR in the same patient revealed a faster bone turnover, a higher degree of bone remodelling, and a higher percentage of vital bone in the specimens of the sites augmented with particulate bone grafts.¹⁰ When the alveolar bone has severe vertical or horizontal bone defects, many clinical studies suggest that titanium mesh shows superior mechanical properties and great osteogenic performance during application.¹¹⁻¹³

Bone augmentation using particular autogenous bone grafts and titanium mesh has achieved good results in bone reconstruction and implant survival.¹⁴ Rocuzzo et al reported a mean (SD) vertical gain of 1.5 mm when using titanium mesh alongside autogenous bone compared with autogenous bone alone.¹⁵

The aim of this case report is to describe vertical ridge augmentation with autogenous + xenograft and titanium mesh and collagen membrane for the guided bone regeneration in the posterior mandible to facilitate placement of the implant.

CASE REPORT

A 39-year-old woman named Patel Sonal ben from Mansa reported to the Department of

Prosthodontics and Crown & Bridge at the Goenka Research Institute of Dental Sciences with the chief complaint of missing teeth and a desire to have them replaced. The patient underwent root canal treatment one year ago for teeth 16 and 17, followed by a fixed partial denture for 16, 17, and 18 (figure 1). She also had root canal treatment on tooth 26 ten months prior, followed by a fixed partial denture for 25, 26, and 27, and a cantilever fixed partial denture for teeth 36, 37, and 38. The patient had an extraction of tooth 47 six months ago under local anesthesia without any complications complication.

Clinical and radiographic examinations (panoramic film and computerized tomography) showed severe vertical mandibular atrophy (Figure 2). Because of bone atrophy, prosthetic space was increased. Vertical ridge augmentation was planned to allow for future implant placement with the help of bone grafting in the mandibular posterior region.

Surgery was performed under local anaesthesia using 4% articaine combined with adrenaline 1:100,000 (Ultracain). A supra-crestal incision was made in the edentulous ridges, and a releasing periosteal incision at the base of the buccal flap was created to ensure a completely tension-free suture (figure 4). The cortical bone plate was perforated at multiple locations with a round bur to allow cells from the bone and bone marrow to access the area of regeneration (figure 5). The titanium mesh was checked by placing it on the ridge and molding it to fit (figure 6). A mixture of xenograft and autogenous bone graft was prepared in a sterile dish (figure 7 & 8). The graft was then placed at the site of interest (figure 9). For graft stabilization and to maintain the desired height for vertical ridge augmentation, titanium mesh was positioned over the graft and covered with a resorbable membrane (figure 10 & 11). The flap was closed using nonabsorbable monofilament sutures (figure 12). Amoxicillin plus clavulanic acid (500/125 mg, three times a day for five days) and ibuprofen (600 mg, three times a day for three days) were administered. Sutures were removed after one week. The postoperative clinical and radiographic examination revealed an increase in the height of the alveolar ridge (figure 14).



Fig 1: Clinical pictures of patient's mandibular arch.



Fig 2: Pre-operative Radiographic image showing vertical mandibular atrophy.



Fig 3: A) bone graft, B) collagen membrane & C) titanium mesh.



Fig 4: Third molar extraction and flap reflection

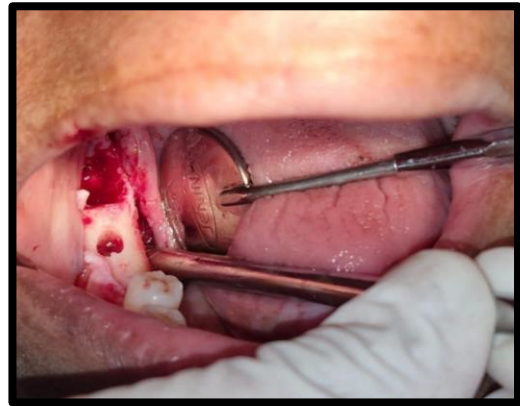


Fig 5: Bed preparation.

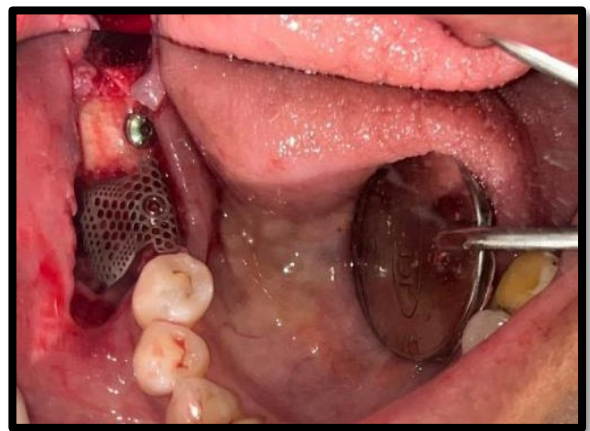


Fig 6: Checking and molding of titanium mesh according to the ridge.



Fig 7: Autograft + xenograft in sterile dish.



Fig 8: Xenograft and autograft mixed with blood PRF.



Fig 9: Bone graft placed (autogenous + xenograft).

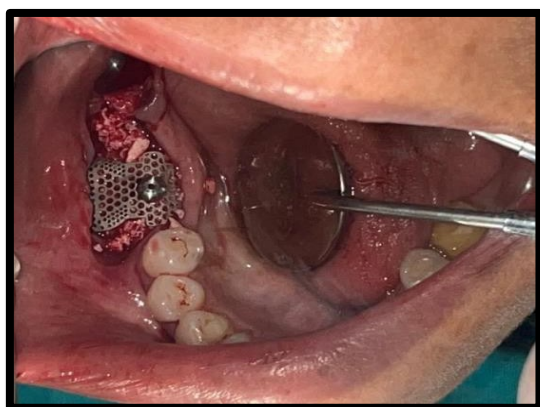


Fig 10: Titanium mesh placed.

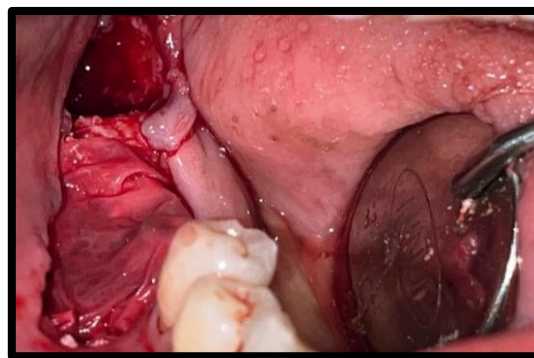


Fig 11: Resorbable collagen membrane placed.



Fig 12: Sutures are placed.

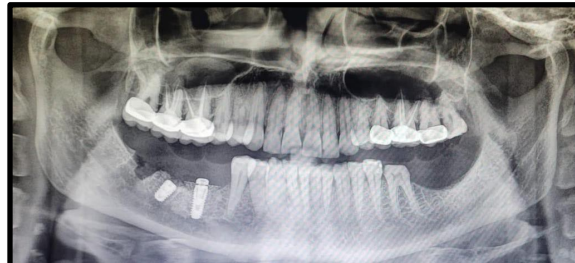


Fig 13: Post operative OPG.



Fig 14: Six month post OPG.

DISCUSSION

The aim was to vertically increase the posterior mandibular ridge to permit implant placement. Augmentation was performed successfully.

Implants were loaded successfully. The implant bed was perforated to increase the blood supply. This issue is controversial in the literature. Some studies have demonstrated that perforations increase hard-tissue formation at the interface between graft and bed preparation,⁶ but others have found no differences between perforated and nonperforated sites in bone formation at the interface.

Autogenous Grafts were harvested from the freshly extracted socket. Which is mixed with xenograft. Guided bone regeneration requires that the potential space beneath the membrane be maintained to gain a predictable quantity of bone in the dimension needed. For that titanium mesh is used. In any case, resorption is always present and can be reduced by covering the graft. collagen membrane was used to protect the graft. Collagen membranes have the advantage of lower exposure rates than polytetrafluoroethylene membranes.

A clinical case report is presented that describes vertical ridge augmentation of the posterior segments of the mandible to allow dental implants. Good clinical results and implant success were achieved. In this case bone grafting along with G.B.R & titanium mesh was a feasible option to vertically augment the alveolar ridge in posterior mandible.

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