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CASE REPORT

Feasibility of using allograft bone with resorbable collagen membrane for alveolar ridge vertical defect augmentation for dental implant placement: A case report

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KEYWORDS

Guided bone regeneration;
Bone graft;
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Abstract *Purpose:* This case report demonstrates the feasibility of using allograft bone with a resorbable collagen membrane to correct an alveolar ridge defect and achieve a highly esthetic restoration.

Case presentation: A 30-year-old woman with advanced periodontal vertical bone loss and periodontally hopeless upper left right premolar required a fixed restoration. A staged surgical strategy was devised. First, a resorbable collagen membrane and allograft bone grafts were used to guide bone regeneration in the vertical alveolar defect. After 6 months, complete bone regeneration was achieved and the dental implants were submerged in the bone. Three months later, the implants were exposed and subsequently restored with a crown.

Conclusion: The vertical guided bone regeneration strategy of using allograft bone and a resorbable collagen membrane has the potential to eliminate the need for additional procedures, which are required with non-resorbable membranes, sinus lift procedures, and extensive block graft procedures.

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1. Introduction

The long-term success of dental implant therapy requires adequate bone volume at the site of implant placement (Lekholm et al. 1986). It is therefore crucial that any bone loss or defect is treated prior to or during implant placement. Bone loss in alveolar bone can result from vertical or horizontal bone loss or a combination of both. Several surgical techniques such as bone grafting including sinus lift, distraction osteogenesis, bone splitting, guided tissue regeneration (GTR), and guided

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bone regeneration (GBR) have been used to correct alveolar bone defects (Buser et al. 1993; Oda et al. 2000; Cordaro et al. 2002; Donos et al. 2002, Hammerle and Karring, 2000). In particular, GBR has shown efficacy in treating vertical resorption of the alveolar ridge by regenerating significant amounts of supracrestal bone in conjunction with autogenous particulated bone graft (Tinti et al. 1996) or allograft material (Simion et al. 1998). GBR permits both a simultaneous or staged approach for bone regeneration and implant placement, with several clinical studies showing an excellent long-term outcomes using a staged approach of placing implants in regenerated bone (Buser et al. 1996; Nevins et al. 1998).

This clinical case report describes and demonstrates the feasibility of using an allograft bone with a resorbable collagen membrane to correct vertical alveolar ridge defect, along with implant installation in the upper left first premolar to achieve a highly esthetic restoration without requiring sinus lift or non-resorbable membrane.

2. Case report

2.1. Patient profile

2.1.1. Case presentation

A 30-year-old female patient presented for periodontal evaluation. Informed consent was obtained from the patient. The patient was diagnosed with aggressive periodontitis based on the presence of multiple deep pockets ranging from 4 mm to 7 mm and increased mobility in multiple teeth. In particular, the upper left first premolar (tooth #24) had periodontal probing depths of up to 10 mm and mobility grade III, and a history of root canal treatment, crown application, and dentoalveolar infection. Radiographic examination revealed advanced periodontal bone loss with a predominantly vertical bone defect in both the mesial and distal aspect (Fig. 1A). As the patient desired a fixed restoration, a staged surgical strategy was devised to first regenerate the vertical alveolar defect and reconstruct form and esthetics, followed by implant placement.

2.1.2. Surgical procedure

After an oral rinse with 0.12% chlorhexidine for 1 min, atraumatic extraction was performed for tooth #24. To gain adequate surgical access, a divergent vertical incision was made at the mesial line angle of tooth #25 and distal line angle of tooth #23. Next, a full-thickness flap was reflected beyond the mucogingival junction and at least 5 mm beyond the bone defect using periosteal elevators (Fig. 1B). A 20 × 30 mm collagen membrane (BioMend Extend, Zimmer, Carlsbad, CA, USA) was trimmed to correspond to the defect dimension and anticipated graft volume. First, the membrane was fixated on the buccal side using 5-mm tacking pins (TruTACK, Brockton, MA, USA). After placing approximately 2 cc of the bone graft (Puros Cortical-Cancellous Particulate Allograft, Zimmer, Carlsbad, CA, USA) within the space and appositionally on the vertical alveolar defect, the membrane was folded over onto the palatal alveolus (Fig. 1C and D). Next, the flap was closed in two layers using horizontal mattress and single interrupted absorbable 5/0 sutures (Vicryl, Ethicon, Boston, MA, USA) (Fig. 1E and F).

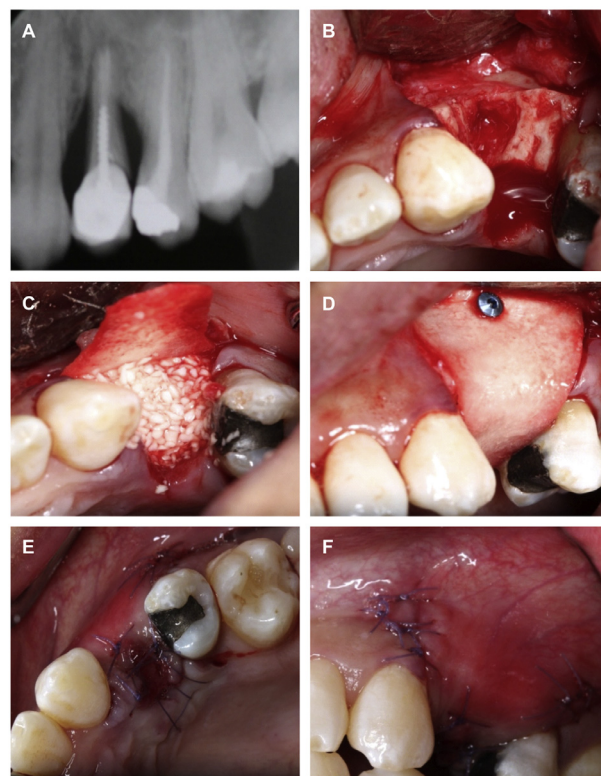


Fig. 1 A, Preoperative periapical radiograph showing a significant vertical defect corresponding to tooth #24, B-F, Intraoperative images. B, The bone defect visualized after flap reflection. C, The membrane was fixed on the buccal side by tacking pins and the defect was filled with Cortical-Cancellous Particulate Allograft. D, The membrane was adapted over the graft. E, Occlusal view after suturing the flap. F, Buccal view after suturing the flap.

Postoperative management was comprised of oral antibiotics (Amoxicillin, 500 mg, thrice daily for 1 week) and an anti-inflammatory medication (Ibuprofen, 400 mg thrice daily for 1 week). Oral rinsing with a 0.12% chlorhexidine solution was performed daily from 24 h post-surgery until the time of suture removal for chemical plaque control. Postoperative swelling was most prominent at 48 h postoperatively and gradually subsided thereafter, disappearing completely after 1 week. There was mild postoperative discomfort from the swelling and negligible pain during the postsurgical period.

After 6 months of healing (Fig. 2A), the repair area was accessed through the same full-thickness flap to reveal bone growth (Fig. 2B). Complete vertical bone regeneration was observed radiographically and intrasurgically after removal of the TruTACK pins, and the defect also demonstrated complete bone fill. About 2 mm of the previously denuded root surface of tooth #25 was also in intimate contact with bone. The dental implants (Straumann Bone Level NC, 3.3-mm diameter Roxolid implant material, Straumann, Andover, MA, USA) were next placed in accordance with the manufacturer's protocol (Fig. 2C and D). The implants were submerged in the bone (Fig. 3A) through a 2-stage technique for 3 months and then uncovered (Fig. 3B), increasing the zone of attached gingiva with free gingival graft (FGG), and

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