Implant Installation With Simultaneous Ridge Augmentation: Report of Three Cases

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The anatomic limitations of the residual alveolar bone may cause problems for the insertion of dental implants because implant placement requires an adequate quantity and quality of bone. Ridge augmentation has been performed to reconstruct alveolar ridges as support for the placement of dental implants with a high success rate. However, a staged approach requires multiple surgeries and more treatment time. In this report, the patients were treated with dental implantation with simultaneous ridge augmentation in both submerged and nonsubmerged cases. The prostheses were well in function without any probing depth or gingival inflammation up to final evaluation. It may be suggested that dental implantation with simultaneous bone grafting may be an option when the graft material can be well stabilized around the implants. Further evaluations over long periods of time are needed to monitor the clinical results.

Key Words: ridge augmentation, dental implant, simultaneous approach

INTRODUCTION

The anatomic limitations of the residual alveolar bone may cause problems for the insertion of dental implants because implant placement requires an adequate quantity and quality of bone. Ridge augmentation has been performed to reconstruct alveolar ridges to support for the placement of dental implants with a high success rate. Many clinical studies have been performed with bone graft plus membrane or graft material alone. However, a staged approach requires multiple surgeries and more treatment time.

Case Report

Case 1

A 51-year-old male patient presented for evaluation of the lower left molar area. The patient had a noncontributory medical history. Clinical and radiographic examination indicated that the mandibular second premolar and the first and second molars were missing. Insufficient healing around the extraction socket was noticed (Figure 1). Referral was made to the Department of
Prosthetics for further evaluation and establishment of a treatment plan. A detailed explanation concerning the present state, alternative treatment plans, and the procedure was given to the patient, and informed consent was obtained from the patient. Dental implantation with simultaneous bone graft was planned after consultation.

The patient rinsed for 2 minutes with a 0.12% chlorhexidine digluconate solution (Hexamedine, Bukwang, Seoul, Korea) immediately before the operation. Following an injection of 2% lidocaine with 1:100 000 epinephrine local anesthetic, a crestal incision with mesial and vertical releasing incisions was made. Three implants (3.8 × 10 mm, 3.8 × 12 mm, and 3.8 × 12 mm; Implantium, Dentium, Seoul, Korea) were placed (Figure 2). There was a 5.5 mm (buccolingual) × 6.0 mm (apicocoronal) defect between the mesial 2 implants. The defect area was packed with deproteinized bovine bone (0.25–1.0 mm cancellous particle, Bio-Oss, Geistlich Pharm AG, Wolhusen, Switzerland) (Figure 3). The wound was closed, and the patient was placed on amoxicillin, 500 mg, 3 times a day for 5 days; mafenamic acid, 500 mg initially, and then...
mefenamic acid 250 mg, 4 times a day for 5 days; and chlorhexidine digluconate, 0.12%, 2 times a day for 4 weeks. Postoperative instructions were given to the patient. The patient reported no specific symptoms, and he did not show any adverse clinical signs (Figure 4). A 6-week postoperative photograph showed exposure of the cover screw (Figure 5). The cover screws were removed, and healing abutments were placed (Figure 6). The radiograph taken 6 weeks postoperatively showed that the
graft material was well stabilized around the defect area (Figure 7). Maturation of the soft tissue was achieved afterwards (Figure 8). The prosthesis was delivered 6 months after surgery (Figure 9), and no resorption around the implants was noticed radiographically (Figure 10). The prosthesis was functioning well without any probing depth or gingival inflammation up to final evaluation 3 months after surgery (Figures 11 and 12).

**Case 2**

A 49-year-old male patient came to the dental clinic seeking periodontal evaluation and treatment. The patient did not have any contributory medical history. The clinical and radiographic examination revealed that the lower first and second molars were missing (Figures 13 and 14). The patient was referred to the Department of Prosthetics for further evaluation. Dental implantation with simultaneous bone grafting was planned after completion of periodontal treatment.

Prior to surgery, the patient rinsed with 0.12% chlorhexidine mouth rinse (Hexamedine). Following a 2% lidocaine with 1:100 000 epinephrine local anesthetic injection, a crestal incision was made and mesiobuccal and distobuccal vertical releasing incisions were made, extending beyond the mucogingival junction. The 4.1 × 14 mm and 4.1 × 12 mm implants (Neoplant, Neobiotech, Seoul, Korea) were placed with the insertion torque of 40 Ncm (Figure 15). A graft of bovine hydroxyapatite (Bio-Oss) was introduced and carefully packed without excessive pressure into the remaining defect around the most distal implant. The wound was closed with sutures, and the patient was placed on the same medication as the patient in Case 1. The soft tissue healing was uneventful (Figure 16), and the periapical radiograph taken 3 months after surgery shows that the graft material was stable in place (Figure 17).

The clinical photograph at 3 months reveals good healing with the maturation of
the soft tissue (Figure 18), and no resorption of the graft material is noticed radiographically (Figure 19). The prosthesis was delivered 4 months after surgery (Figure 20). The prosthesis was well in function up to the final follow-up evaluation (Figure 21).

**Case 3**

A 49-year-old male patient visited the dental clinic. The patient did not have any medical conditions and was not taking any medications associated with a compromised soft healing response. The examination revealed...
that the upper right premolars and molars were missing (Figures 22 and 23). Treatment with implant installation and simultaneous bone augmentation was planned.

Following local anesthetic injection, full-thickness flap was elevated. There was a bony defect of 7.0 × 6.5 mm in the canine area (Figure 24). Three implants (3.8 ×
15 mm, 3.8 × 15 mm, and 4.3 × 15 mm; Implantium) were placed. The remaining defect was grafted with deproteinized bovine bone (Bio-Oss) (Figure 25). The dimension of the ridge was well maintained with the maturation of the soft tissue (Figure 26). The final implant-supported crowns for upper-right area were inserted 7 months after implant installation (Figure 27), and the prosthesis was well in function up to the final follow-up evaluation (Figure 28).

**DISCUSSION**

In this report, the patients were treated with dental implantation with simultaneous bone...
grafting both in submerged and nonsubmerged cases. The defects were located either around the implants or between the implants.

Implants installed into alveolar bone sites previously augmented with graft material have been associated with a high success rate.\(^1\)\(^7\) However, multiple surgeries with more time is needed for the staged approach. Limited studies show that predictable treatment outcomes were achieved for dental implant installation with simultaneous bone augmentation.\(^6\)

Nonbioresorbable expanded polytetrafluoroethylene membrane (ePTFE) has been used in bone augmentation procedures to provide space and prevent the penetration of soft tissue.\(^8\)\(^9\) ePTFE membrane may give higher yield of lamellated bone,\(^10\) but there is a risk of membrane exposure resulting in compromised bone regeneration.\(^11\) A second surgery is needed to remove the membrane, and this may lead to additional bone resorption around the implants.\(^12\) Thus, bone graft material was used alone, without a membrane in this case, to avoid a second surgical intervention and to lessen the treatment period.

The cover screws were replaced with the healing abutments when the exposure was

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**Figures 26–28.**

**Figure 26.** The buccal view showing well-maintained ridge with the maturation of the soft tissue. **Figure 27.** The final implant-supported crowns for the upper right area were inserted 7 months after implant installation. **Figure 28.** The final radiograph showing the prosthesis in function.
noticed. The authors suggest that the placement of healing abutments and meticulous plaque control may limit bone loss around submerged implants when implants are partially exposed. Meticulous oral hygiene for each patient was reinforced at every visit.

All the prostheses treated in this report were well in function without any probing depth or gingival inflammation up to final evaluation. It may be suggested that dental implantation with simultaneous bone grafting may be an option in both submerged and nonsubmerged cases when the graft material can be well stabilized around the implants. Further evaluations over longer periods of time are needed to monitor the clinical results.

**Abbreviations**

ePTFE: expanded polytetrafluoroethylene membrane

**References**


