

Implant Installation With Bone Augmentation and Transmucosal Healing With Demineralized Human Cortical Bone in the Maxillary Anterior Region: Report of 3 Cases

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It is well known that a decrease in vertical height and in horizontal width is seen after tooth extraction. Immediate implant placement, originally thought to prevent buccal wall resorption, showed little or no evident decrease of the resorption rate or pattern in animal experiments or clinical studies. Thus, the need for bone augmentation with immediate implantation has been suggested. However, until recently, simultaneous bone augmentation with immediate implant placement was thought to be possible only in a submerged environment. In this report, the harmony of soft and hard tissue was achieved in 3 patients by immediate implant placement and bone augmentation with transmucosal healing in esthetically challenging situations. Further evaluation is needed to monitor hard- and soft-tissue changes on a long-term basis. Implant placement and bone augmentation with transmucosal healing using demineralized bone matrix may be an option in the treatment of the loss of anterior teeth.

Key Words: *implant, anterior, bone augmentation, transmucosal healing*

INTRODUCTION

It is well known that a decrease is seen in vertical height and in horizontal width after tooth extraction.¹ Immediate implant placement, originally thought to prevent buccal wall resorption, resulted in little or no evident decrease of the resorption rate or pattern in animal experiments or clinical studies.² Thus, the need for bone augmentation with immediate implantation has been suggested. However, until recently, simultaneous bone augmentation with immediate implant placement was thought to be possible only in a submerged environment.³

In this report, the harmony of soft and hard

tissue was achieved in 3 cases by immediate implant placement and bone augmentation with transmucosal healing in esthetically challenging situations.

CASE DESCRIPTION

Case 1

A 21-year-old male patient was referred to the dental clinic for evaluation of the upper anterior region. The patient did not have any medical conditions associated with a compromised healing response. Clinical and radiographic examination indicated that the upper left lateral incisor had a vertically fractured tooth with an unfavorable prognosis (Figure 1a). The patient was referred to the Department of Prosthodontics for further evaluation and creation of a treatment plan. The patient was given a detailed explanation concerning the present state, alternative treatment plans, and

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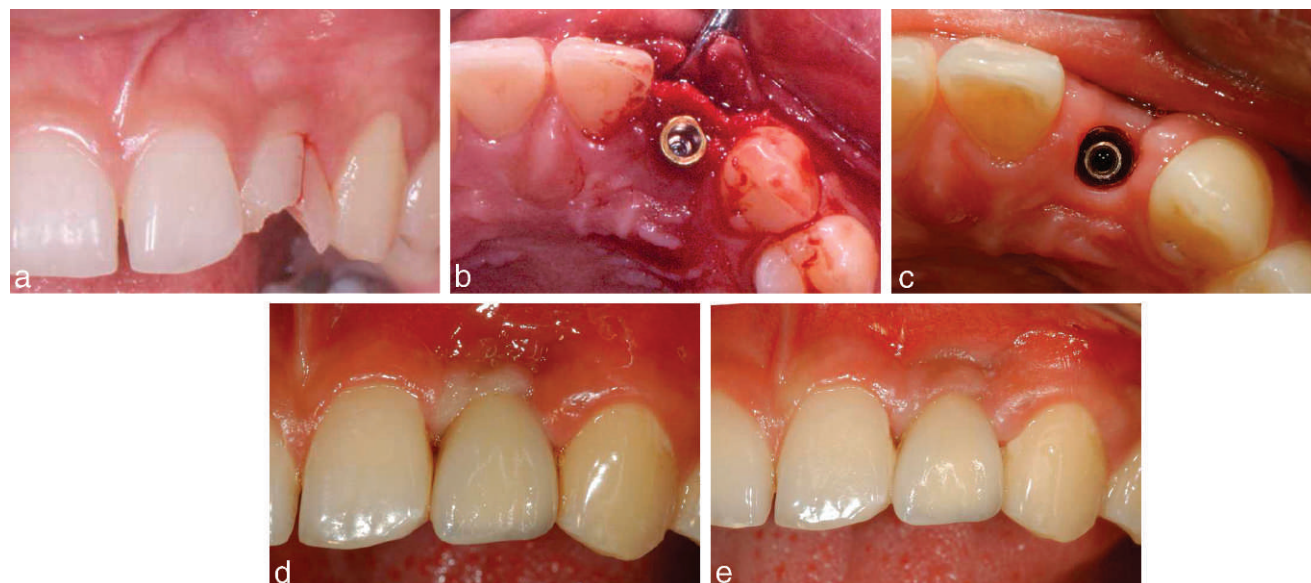


FIGURE 1. (a) Clinical photograph at the initial visit. (b) The occlusal view after installation of the implant. (c) The occlusal photograph showing uneventful healing. (d) The buccal view after the delivery of the permanent restoration. (e) The clinical view showing the prosthesis good in function.

the procedure, and informed consent was obtained from the patient. Immediate placement of a dental implant with bone augmentation and transmucosal healing was planned after consultation.

Immediately before the procedure, the patient rinsed for 2 minutes with a 0.12% chlorhexidine digluconate solution (Hexamedine, Bukwang, Seoul, Korea). Following an injection of 2% lidocaine with 1:100 000 epinephrine local anesthetic, the crown portion and the residual root were atraumatically removed. The extraction socket was thoroughly debrided and degranulated to remove all tissue. A surgical template was used to locate the desired implant position, and the site was prepared to accept a 4.0- × 13-mm implant (USII, Osstem, Seoul, Korea). Marginal voids of about 1 to 2 mm in width were noted between the implant surface and the buccal cortex (Figure 1b). The abutment was connected and the buccal surface and marginal voids were grafted with demineralized, freeze-dried human cortical bone (MTF, Musculoskeletal Transplant Foundation, Edison, NJ). The wound was closed by means of single sutures (Ethicon, Johnson and Johnson Medical Inc, Arlington, Tex) without tension. The patient was placed on amoxicillin 500 mg 3 times/d for 5 days, mefenamic acid 500 mg initially, and then mefenamic acid 250 mg 4 times/d for 5 days and chlorhexidine digluconate 0.12% 3 times/d for 4 weeks. He was asked not to chew on

or brush the surgical area for the first 4 weeks postoperation. The patient reported no specific symptoms, and healing was uneventful (Figure 1c). After 6 months, a permanent restoration was delivered to the patient (Figure 1d). The prosthesis was functioning well up to the final evaluation (Figure 1e). The width of the ridge was well maintained, and the postoperative width of the keratinized tissue on the buccal side was 2 to 3 mm. Symmetry of the gingival margin was achieved with a complete fill of the interdental spaces.

Case 2

A 22-year-old male patient came seeking treatment of an upper anterior tooth. The clinical and radiographic examination revealed that the maxillary right central incisor was missing (Figure 2a). Installation of a dental implant with simultaneous bone grafting was planned.

Prior to surgery, the patient rinsed with a 0.12% chlorhexidine mouth rinse (Hexamedine), and a crestal incision was placed and mesiobuccal and distobuccal vertical releasing incisions followed a local anesthetic injection (Figure 2b). A 4.0- × 15-mm implant (USII, Osstem) was placed (Figure 2c), and the abutment was connected. An allograft (MTF) was then introduced and carefully packed without excessive pressure into the gap and the defect around the implant (Figure 2d). The wound was closed with

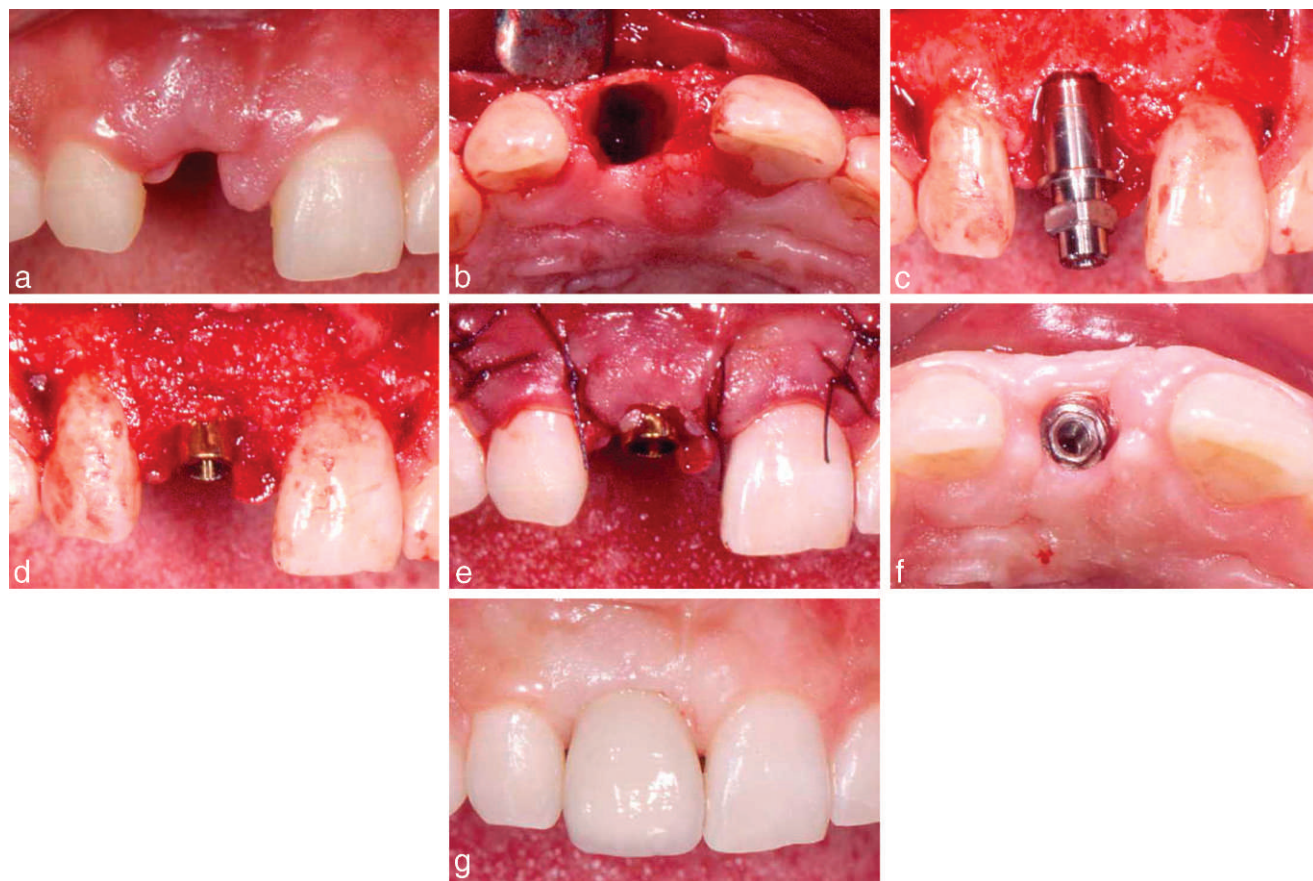


FIGURE 2. (a) Clinical photograph at the initial visit showing a missing upper central incisor. (b) Buccal view after the flap reflection. (c) Clinical view after installation of the implant. (d) The defect around the implant was restored with an allograft. (e) Buccal view after wound closure. (f) The buccal view at 2 months postoperation revealed good healing with the maturation of the soft tissue. (g) The buccal view of the prosthesis at the final follow-up evaluation.

sutures, and the patient was placed on the same medication as the patient in case 1 (Figure 2e). The soft-tissue healing was uneventful, and the clinical photograph at 2 months postoperation revealed good healing with the maturation of the soft tissue (Figure 2f). The prosthesis was delivered 4 months after surgery, and the prosthesis was good in function until the final follow-up evaluation (Figure 2g).

Case 3

A 21-year-old male patient visited the dental clinic for the evaluation of the upper anterior region. The patient did not have any medical conditions and was not taking any medications associated with a compromised hard and soft healing response. The examination revealed that the upper right central incisor was missing and the upper left central incisor had a crown fracture (Figure 3a). Treatment with an implant installation and simultaneous bone augmentation was planned.

Following local anesthetic injection, a full-thickness flap was elevated. There was a bony defect of 5.0×4.0 mm in size in the buccal area (Figure 3b). A 4.0×15 implant (USII, Osstem) was placed, and the healing abutment was connected. The remaining defects were grafted with human cortical bone (MTF; Figure 3c). The dimension of the ridge was well maintained with the maturation of the soft tissue at 2 months postoperation (Figure 3d). The final implant-supported crown for the upper right area was inserted 4 months after implant installation, and the prosthesis was good in function until the final follow-up evaluation (Figure 3e).

DISCUSSION

In this report, successful results were achieved in 3 patients with implant installation and bone augmentation with transmucosal healing. Demineral-

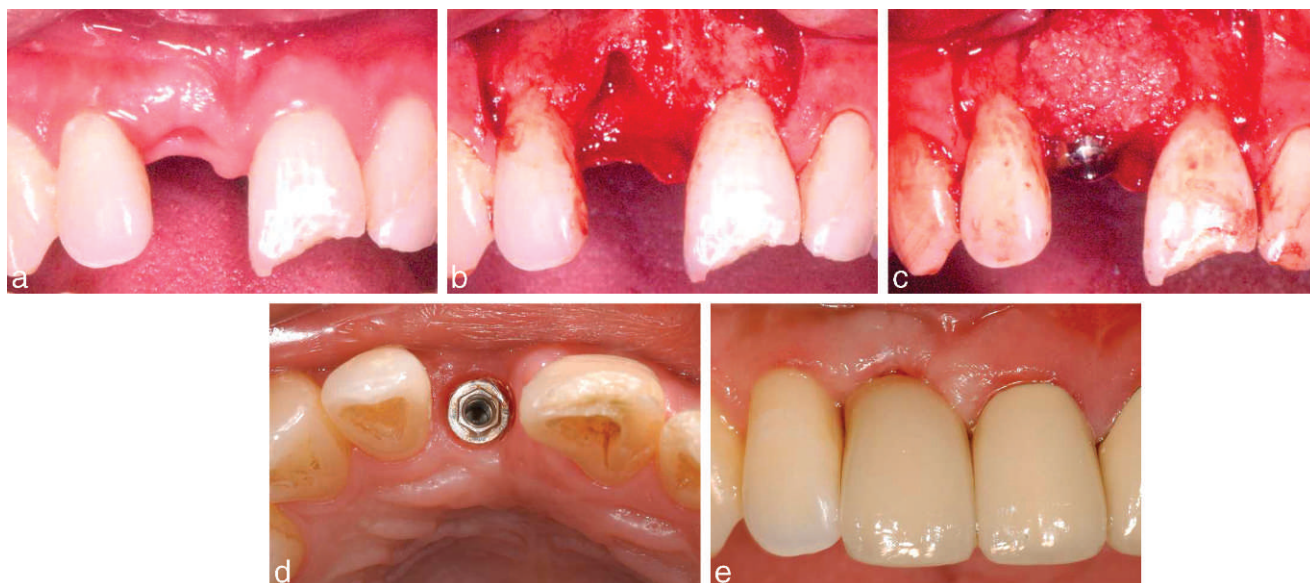


FIGURE 3. (a) Initial clinical view. (b) Occlusal view after the reflection of the full-thickness flap, revealing a bony defect of 5.0 × 4.0 mm in size. (c) The remaining defects after implant installation were grafted with human cortical bone. (d) The occlusal view showing a well-maintained ridge and the maturation of the soft tissue. (e) The final photograph showing the prosthesis in function.

ized, freeze-dried bone allograft, also called demineralized bone matrix, provides an osteoconductive matrix and, if properly processed from a suitable host, can be osteoinductive.⁴ The ability of demineralized freeze-dried bone allografts to induce new bone formation is suggested to be age dependent.⁵ It has been mixed with a variety of carriers to adjust to different forms of handling for a variety of applications, and the patient's blood was used as a vehicle in which to mix the bone powder to enhance the handling properties.⁶ The placement of an implant in the fresh extraction site has been reported to fail to prevent the remodeling that occurred in the walls of the socket.⁷ If the extraction socket is ≥ 1 mm larger than the implant, applying guided bone regeneration has been suggested.³ Thus, bone grafting was performed simultaneously with implant installation in both the extraction socket and the buccal plate area.

The presence of peri-implant keratinized tissue is regarded as beneficial in avoiding bone resorption and maintaining better oral hygiene.^{8,9} Soft-tissue closure over the abutment minimized the coronal advancement of the buccal flap, and this allowed the harmony of the gingiva to the adjacent contour.

CONCLUSION

In this report, the harmony of soft and hard tissue was achieved in 3 patients with immediate implant placement and bone augmentation with transmucosal healing in the upper anterior area. Further evaluation is needed to monitor hard- and soft-tissue changes on a long-term basis. Implant placement and bone augmentation with transmucosal healing using demineralized bone matrix may be an option in the treatment of the loss of anterior teeth.

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