Immediate implantation combined with hard and soft tissue grafting has been suggested because it may preclude dramatic postextraction bone loss and may decrease overall discomfort with reduction in the number of surgeries and in treatment time. In this case report, the acellular dermal matrix was used as a membrane for immediate implantation via a bone augmentation procedure in an esthetically challenging situation. The author suggests that this surgical technique provides the clinician with an option for an immediate implant therapy when primary closure is not intended. Additional randomized controlled trials conducted over long periods are necessary to establish whether this procedure offers long-term benefit to patients.

**Key Words:** immediate, implant, ridge augmentation, anterior, acellular dermal matrix, deproteinized bovine bone

**INTRODUCTION**

Achieving an esthetic and functional implant-supported restoration in the maxillary anterior segment can be challenging. Traditional guidelines suggested delaying dental implant placement for 2–3 months after tooth extraction to allow for adequate alveolar ridge remodeling; loss of the labial alveolar bone plate following tooth extraction in the maxillary anterior may lead to esthetic complications. Immediate placement of dental implants, combined with hard and soft tissue grafting, has been suggested, because it may preclude dramatic postextraction bone loss, while decreasing overall operative discomfort and reducing the number of surgeries and the length of treatment time.

Acellular dermal matrix (ADM) has been utilized in a wide range of dental applications such as increasing keratinized tissue, performing soft tissue augmentation, or providing root coverage and as a barrier membrane. However, few reports have described the use of ADM for immediate implant placement in bone grafting procedures.

In this case report, the ADM was used as a membrane in immediate implantation via a bone augmentation procedure in an esthetically challenging situation.

**CASE REPORT**

A 22-year-old male patient presented to the dental clinic for evaluation of the maxillary anterior region. The patient’s medical history
was negative, and he was not taking any medications that were associated with a compromised healing response. Clinical and radiographic examination indicated a fractured upper right central incisor (Figure 1a). Emergency treatment was provided, and the patient was sent back to the clinic at his troop for further treatment.

Eight months later, the patient was referred to the Department of Periodontology for evaluation of the maxillary anterior region because of an unfavorable prognosis. The upper right central incisor was mobile with a probing depth of 10 mm (Figure 1b). The patient was given a detailed explanation concerning his present state, alternative
treatment plans, and the procedure, and informed consent was obtained from the patient. Treatment consisting of immediate placement of a dental implant with bone graft was planned after consultation.

Before surgery was performed, 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 roots wereatraumatically removed. The extraction socket was thoroughly debrided and degranulated to remove all tissue. The site was prepared to accept a 3.8 × 13 mm implant (AVANA, Osstem, Seoul, Korea), and the implant was placed (Figure 2a). The buccal dehiscence measured 9.5 mm apicocoronally and 7 mm mesiodistally. The buccal surface and marginal voids were grafted with bovine anorganic hydroxyapatite (Bio-Oss, Geistlich AG, Wolhusen, Switzerland) (Figure 2b) and were covered with an ADM graft (Alloderm, Life Cell Corp, The Woodlands, Tex) such that the membrane extended at least 3 mm onto healthy bone and covered the occlusal surface completely. The full-thickness flap was repositioned, and the wound was closed by means of single sutures (Ethicon, Johnson and Johnson Medical Inc, Arlington, Tex) (Figure 2c). The central portion of the ADM graft was left intentionally exposed (Figure 2d).

The patient was given amoxicillin 500 mg 3/d for 5 days, mefenamic acid 500 mg initially then mefenamic acid 250 mg 4/d for 5 days, and chlorhexidine digluconate 0.12% 3/d for 4 weeks. He was asked to refraining from chewing on or brushing the surgical area for the first 4 weeks postoperatively. The patient showed up 2 months after the operation because of his military operations and reported exfoliation of the allograft around 3 weeks after surgery was performed. Granulation tissue had healed between the implant and the surgical site, and it was in part intermingled with deproteinized bovine bone. The abutment was connected and the provisional prosthesis was fabricated at the chairside.

Soft tissue maturation was achieved 3 months after delivery of the provisional restoration (Figure 3a). The width of keratinized tissue on the labial side is 6 mm, and the width of ridge is well preserved (Figure 3b). A permanent cemented restoration was delivered 5 months after surgery. The prosthesis was functioning well up to the time of final evaluation with no probing depth and no alveolar bone resorption (Figure 4a and b).

**DISCUSSION**

This report describes successful treatment with immediate implantation and bone augmentation using ADM. Combining therapies for hard and soft tissue grafting with implant placement resulted in decreased numbers of appointments and reduced treatment time. Immediate implant placement and provisionalization may serve as good treatment options for the loss of anterior teeth; this approach is recommended when there is no need for a bone augmentation procedure. In this case, bone deficiencies with a vertical and a horizontal component were evident after tooth extraction was performed. The submerged dental implant approach was used because successful bone augmentation requires primary stability.

ADM was used as the barrier for bone augmentation to treat the implant dehiscence defect. The addition of ADM compared with bone graft alone enhanced the gain in thickness of bone. According to several authors, some surgical sites encountered 2–4 mm of membrane exposure after 2 weeks of healing time, but all sites were completely covered at 3 months. ADM was applied to extraction sockets exposed to the oral cavity, and it was reported that ADM-covered sites resulted in the presence of more
vital bone than was seen at expanded polytetrafluoroethylene membrane–covered sites.\textsuperscript{14}

Even though the exposed portion of the ADM material may have exfoliated, esthetic results were achieved. This may have been possible because of the maturation time of soft tissue. The central portion of the ADM was left exposed following suture; this may have contributed to the increased width of keratinized tissue.\textsuperscript{10}

This case report describes an esthetic and functional implant-supported restoration in the maxillary anterior when the ADM was used as a membrane for immediate implantation via a bone augmentation procedure performed in an esthetically challenging situation. The author suggests that this surgical technique provides the clinician with an option for an immediate implant therapy when primary closure is not intended. Additional randomized controlled trials conducted over long periods are necessary to establish whether this procedure offers long-term benefit to patients.

\textbf{ABBREVIATIONS}

ADM: acellular dermal matrix

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