

Implant Placement with Simultaneous Guided Bone Regeneration Using Connective Tissue as a Barrier: Re-entry Evaluation

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Abstract

Connective tissue is an autogenous tissue which has shown successful results as a barrier due to its mesenchymal cells with osteogenic capacity. In this case the defect around the dental implant was treated simultaneously with demineralized freeze-dried bone and connective tissue as a membrane. Re-entry was done to evaluate the site in 6 months. Restoration was completely functional in the one-year period of follow-up after loading, with no signs of inflammation, pocket probing depth and gingival recession.

Key words: Connective tissue, implant, guided bone regeneration, demineralized freeze-dried bone allografts.

Introduction

Localized bone defects in implant patients are common clinical situations, and the clinician has the choice to use Guided Bone Regeneration (GBR) procedure with either a simultaneous or a staged approach in the treatment of these defects. Considering the treatment objectives, implant placement simultaneously with GBR procedure is preferred whenever possible in order to limit the number of surgical interventions to one surgery. Due to the disadvantage of non-bioabsorbable membranes because of the necessity of their removal at a second surgery, an increased tendency for the use of bio-absorbable membranes has taken place. In addition, because of the cost and possibility of immunologic reactions,^{1,2} the use of autogenous membranes seems to be justified.¹⁻³ Palatal connective tissue graft is one of the autogenous membranes that has shown successful results in

different studies.³⁻⁶ Furthermore, it has been shown that connective tissue graft has mesenchymal cells with osteogenic potential.⁷⁻⁹ The question is whether connective tissue has the ability to act as a membrane in treating the defects simultaneously with implant placement and to see whether bone fill will take place or not. In this case the defect around the dental implant was treated simultaneously with DFDBA and palatal connective tissue as a membrane.

Case Report

A 35-year-old woman was referred from the Department of Endodontics, Islamic Azad University (Esfahan Branch) to the Department of Periodontics with the diagnosis of vertical root fracture in maxillary left central incisor. Periodontal clinical and radiographic examinations confirmed the diagnosis. The tooth had a pocket probing depth of 8 mm in the mesial aspect

and a fistula in the apical half of the gingiva in the buccal aspect (Figure 1, A). The patient was in good health and under no medication. She was referred to the Department of Prosthodontics for further evaluation and treatment planning. The patient was given a detailed explanation concerning the present state, alternative treatment plans and the procedure, and informed consent was obtained. It was planned to place the dental implant immediately after extraction of the fractured tooth and simultaneously augment the defect around it.

Premedication was prescribed including Amoxicillin/Clavulanate (Augmentin), 2.0 g orally two hours prior to surgery and rinsing the oral cavity with 0.2% chlorhexidine digluconate for 1 minute immediately before the procedure. Following anesthesia with 2% Lidocaine with 1:80,000 epinephrine, a sulcular incision was made. Then the flap was reflected and all the granulation tissues were removed and the tooth was extracted atraumatically (Figure 1, B to D). At the extraction site, a 4.5-mm diameter and 14-mm long implant (Superline, Dentium, Korea Trade Tower 159, Samsung-dong, Gangnam-gu, Seoul, Korea) was placed with 35N insertion torque after preparation a 2-mm deep insertion in the apicopalatal part of the socket. No buccal table was available at the time of implant insertion and the primary stability was achieved just by the palatal wall and the apical part of the socket (Figure 2, A). Demineralized freeze-dried bone allografts (cortico-cancellous particles 150-1000 microns, Kish Tissue Bank, Kish, Iran) were used to augment the surface of the implant (Figure 2, B). In the palate, within the distance of the first premolar to the first molar, a horizontal incision was made 3 mm far from the gingival margin and two vertical incisions at two ends of the first incision. After reflection of the epithelial tissue layer, connective tissue with a 1-mm thickness with no periosteal elevation was excised by sharp incision in order to cover the defect and 3 mm of the bone adjacent to it. Horizontal cross mattress suture was used to fix the graft (Figure 2, C to D).

Antibiotics (Amoxicillin 500 mg, every 8 hours for 7 days), 0.12% chlorhexidine mouthrinse (every 12 hours for 14 days), and oral analgesics (Ibuprofen 400 mg, every 4 hours if needed) were prescribed. Sutures were removed after 10 days and the patient was examined every 2 weeks during the first month and during this period professional care was administered and oral hygiene was monitored. Then evaluation continued monthly for 6 months (Figure 3, A). After 6 months, the re-entry surgery was carried out to place healing abutment and to evaluate the aug-

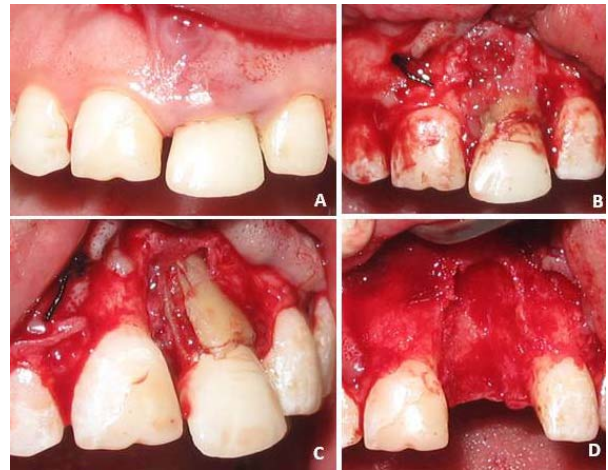


Figure 1. Clinical photograph at the initial visit (A). Reflection of the flap (B). Removal of the granulation tissue (C). Socket view after tooth extraction (D).

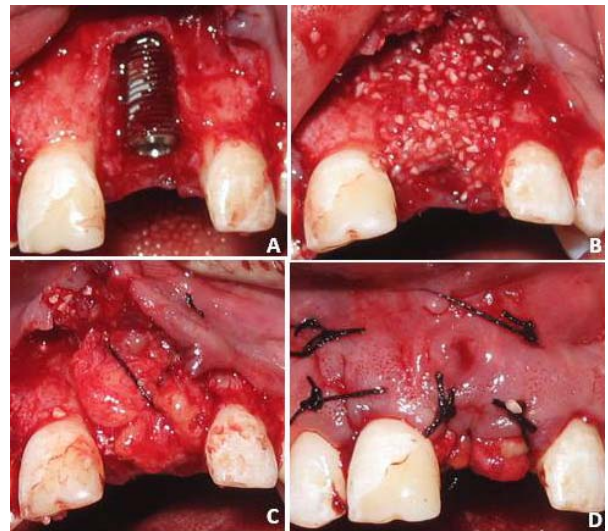


Figure 2. Implant placement (A). DFDBA placed against the implant surface (B). Fixing the palatal connective tissue over the grafted site (C & D).



Figure 3 Reevaluation after 6 months (A). Bone formation in re-entry after 6 month (B). Additional augmentation with DFDBA (C). Final restoration (D).

mented area. New bone formation had occurred around the dental implant (Figure 3, B); however, in order to increase the thickness of the thin newly formed bone in the mid-area and decrease the risk of further resorption and also to improve the soft tissue profile another augmentation was performed with DFDBA particles and connective tissue graft subepithelially (Figure 3, C). The healing abutment was placed at this second-stage surgery. After two months the patient referred to the prosthodontist for taking impression and the final restoration was delivered two months after the second surgery (Figure 3, D). No resorption was noticed radiographically. The prosthesis was well in function during the 1-year follow-up without any probing depth or gingival inflammation.

Discussion

GTR is based on the use of a membrane as a barrier to prevent the migration of epithelial and connective tissue cells to the wound site during the healing period, providing a chance for periodontal ligament cells to accumulate, which are considered principle cells in periodontal regeneration.¹⁰⁻¹² Due to the disadvantage of non-bioabsorbable membranes because of the necessity of their removal at the second-stage surgery and also the possible risk of infection, it was decided to use palatal connective tissue as a biological membrane to evaluate any differences in the results regarding new bone formation. In addition, because of the cost and possibility of immunologic reactions,^{1,2} the use of autogenous membranes seems to be justified. The use of connective tissue as a membrane has been studied in the treatment of intrabony defects,^{4,5,13} but to date there have been no reports on its use as a membrane for GBR around dental implants. However, in a case series by Chung using subepithelial connective tissue graft simultaneously with implant placement in extraction socket, favorable success rates and peri-implant tissue responses were observed.¹⁴ In this case report, DFDBA was applied solely against the implant surface, and palatal connective tissue was placed over the allografts as a membrane. In a case series by Park, DFDBA was used for GBR simultaneously with implant placement and harmony of hard and soft tissues around the dental implant was reported.¹⁵ Preoperative antibiotic was used in this patient for maximum reduction of infectious complications and the risk for implant failure.¹⁶ Chlorhexidine was applied before and after implant placement to achieve beneficial results of reducing the implant failure rate.

According to the results of this report use of palatal

connective tissue as a membrane in conjunction with DFDBA showed promising results in the treatment of defects around dental implants. However, long-term evaluation and larger samples are needed for a better judgment regarding the efficacy of connective tissue graft as a membrane.

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