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Augmentation of Keratinized Tissue around Implants using Acellular Dermal Matrix Allograft: A Case Report

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Ravichandra Juluri[1], Dharmarajan Gopalakrishnan[2]*, Nalabothu Prasad[3], Susan M. Chialastri[4], Ashok Balasundaram[5], and Santosh Martande[2]

[1]Periodontist and Oral implantologist, Faculty OSF hospital GPR program, Peoria Illinois, USA
[2]Department of Periodontology, Dr. D Y Patil Dental College, Dr. D Y Patil Vidyapeeth, Pimpri, Pune, Maharashtra, India
[3]Department of orthodontics and Pediatric Dentistry, University dental centre Basel, Basel, Switzerland
[4]Department of Periodontology and Oral Implantology, Temple university Kornberg school of dentistry, Philadelphia, PA
[5]Department of Diagnostic Sciences, #1079, West Virginia University, School of Dentistry, Robert.C. Byrd Health Sciences Center, Morgantown, WV 26506-9400, USA

Abstract

Several soft tissue grafting procedures are currently in use to increase the width of keratinized tissue and for recession coverage around natural teeth and implants. The major disadvantage in use of soft tissue palatal grafts is additional surgical site and patient discomfort that warrants for alternative methods. The use of acellular dermal matrix allograft (ADM) avoids the additional surgical site and discomfort from the large wound at the donor site, also minimizes the morbidity from the additional surgical site. In this reported case, surgical procedure was performed to augment keratinized tissue around implants using ADM allograft. The parameter measured was the width of attached gingiva on the Labial and buccal surface of edentulous area at baseline (before surgical procedure) and 2 months follow-up. Two months after surgical procedure, the dense connective tissue around implants was noticed and the vestibular depth was significantly increased. The epithelial tissue around the implant collar was well established.

Current case provides an evidence of successful gain of keratinized tissue around implants using ADM allograft.

Keywords: Keratinized Tissue, Vestibular Depth, Acellular Dermal Matrix Allograft

Introduction

Reconstruction of alveolar ridge defects remains the most important procedure for successful surgical placement of dental implants. Various procedures employed to achieve this reconstruction include Guided Bone Regeneration (GBR), Vascularized free bone grafts. Adequate width of keratinized tissue is required for both functional and esthetic success of implant supported prosthesis [1]. Soft tissue ridge augmentation using autogenous palatal grafts is one of the most commonly used techniques in the management of alveolar ridge defects [2,3]. The major drawbacks involved in the use of autogenous palatal grafts is the requirement of additional wound site, limited amount of soft tissue graft procured by this procedure and patient discomfort. Recently, an Acellular Dermal Matrix (ADM) allograft has been considered as a substitute for autogenous grafts [4]. ADM allograft is obtained from human or mammal skin which is surgically processed by removal of epidermis and cellular components [5]. ADM allograft have been widely used in the treatment of gingival recession [6]. The use of ADM allograft avoids the additional surgical site and discomfort from the large wound at the donor site, also minimizing the morbidity from the additional surgical site. In a study by Agarwal, et al. ADMA resulted in sufficient increase in width of attached gingiva although lesser than FGG. Considering the disadvantages of FGG, it can be concluded that ADM allograft can be used as an alternative to FGG in increasing width of attached gingival in certain clinical situations [7]. In randomized controlled trial by Novaes Jr, et al. ADMA was found to have comparable results with sub-epithelial connective tissue graft proving it as worthy substitute to SCTG [8]. In another study by Puisys, et al. ADMA has been used successfully for vertical soft tissue augmentation during submerged implant placement [9].

Current case report highlights the successful gain in keratinized tissue at implant site using ADMA as a substitute for other soft tissue grafting procedures.

Case Report

Patient presented with missing keratinized tissue in the inter-foraminal region, the sites for the A, B, C, D and E implant positions for implant supported overdenture. The

***Corresponding Author:** Dharmarajan Gopalakrishnan, Department of Periodontology, Dr. D Y Patil Dental College, Dr. D Y Patil Vidyapeeth, Pimpri, Pune, Maharashtra, India, Tel: +91 9822046667; Email: drgopal@dpu.edu.in

total site measured 30mm to 40mm and a large free gingival graft would have been required, which will involve a large donor site on the palate increasing patient discomfort and morbidity. Thus ADMA as a substitute for free gingival graft for augmentation of keratinized tissue was used in the current case. Informed Consent approval was obtained from the patient prior to the surgical procedure.

Surgical Procedure

Patient was premedicated with Amoxicillin 500 mg prior to surgery and Ibuprofen 600 mg prior to start of surgery. Patient rinsed with Peridex 0.12% prior to surgery. The procedure was done under local anesthesia with 2% Xylocaine with 1:100,000 epinephrine (Figure 1). Incision was placed 1mm to 2mm lingual to the A, B, C, D and E implants in the mandible and 2mm to 4 mm distal to the posterior most implants (Figure 2) and vertical release incision given 2mm to 4 mm distal to the posterior most implants the A and E implants (Figure 3). Partial thickness flap was elevated and the mucosa was moved apically. Continuous sutures were placed at the mucosal margin at the apical portion with 4-0 chromic gut to prevent the tissue from moving coronally (Figure 4). Two pieces of ADMA measuring 1cm X 2cm were used for grafting to achieve keratinized tissue around implants. The ADMA graft was soaked in sterile water to hydrate and rinsed in a second container of sterile water. ADMA sutured to the lingual mucosa and to the underlying periosteum on the apical region with 4-0 Vicryl (Figure 5). ADMA graft tissue was tacked to the periosteum with sling sutures over the graft to the underlying periosteum in the apical region with 4-0 Vicryl (Figure 6).

Post-operative instructions were given and Amoxicillin 500mg, 3 times a day for 10 days and Ibuprofen 600mg, 4 to 6 hrs for pain were prescribed. Patient was seen for a one week post-operative evaluation and 4 weeks post-operative evaluation.

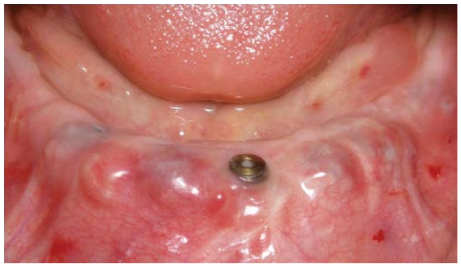

Figure 1: Pre-Operative surgical site after administration of local anesthesia to the surgical site with 2% Xylocaine with 1:100,000 epinephrine.

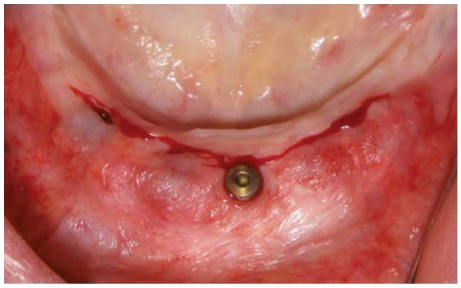

Figure 2: Initial line of incision was placed 1mm to 2mm lingual to the A, B, C, D and E implants in the mandible and 2mm to 4 mm distal to the posterior most implants.

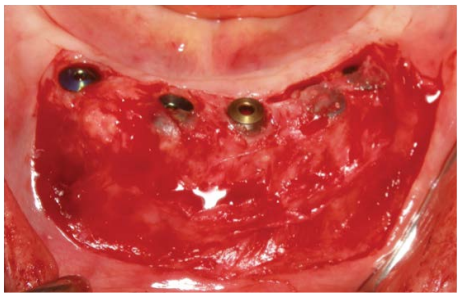

Figure 3: Vertical releasing incisions given 2mm to 4 mm distal to the posterior most implants the A and E implants and removal of band of mucosa.

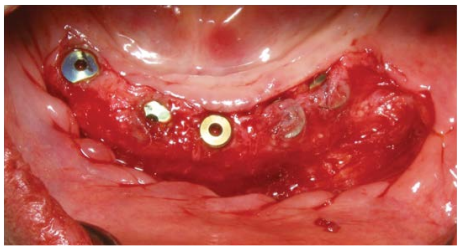

Figure 4: Continuous sutures were placed at the mucosal margin at the apical portion with 4-0 chromic gut suture to prevent the tissue from moving coronally.

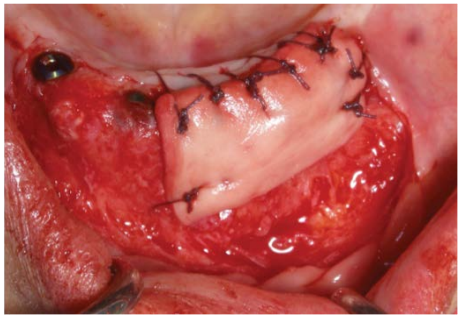

Figure 5: ADMA sutured to the lingual mucosa and to the underlying periosteum on the apical region with 4-0 Vicrylsuture.

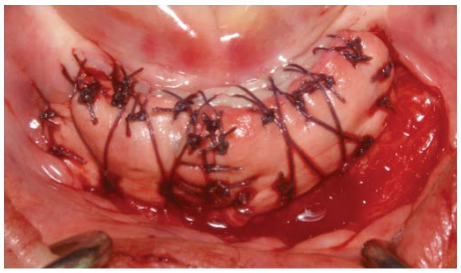

Figure 6: ADMA graft tissue tacked to the periosteum with sling sutures over the graft to the underlying periosteum in the apical region with 4-0 Vicrylsuture for close adaptation to the periosteum and for stability.

At baseline the width of attached gingiva was measured from alveolar ridge crest to mucogingival junction before the surgical procedure and from the epithelial cuff around the implant neck to mucogingival junction at post-operative evaluation.

Results

The soft tissue healing was uneventful without any post-operative complications except for mild pain and swelling. At one week follow-up the graft healed well (Figure 7), and new vascularization could be found in subsequent healing period (Figure 8,9). Dense connective tissue was observed around implants and there was significant increase in the vestibular depth two months after surgical procedure (Figure 10). The epithelial tissue around the implant collar was well established. The width of keratinized tissue was 0.5 mm at baseline which was increased to 3.0 mm at 2 months. The gain in keratinized tissue width from baseline to 2 months (2 months – Baseline) was 2.5 mm (3.0 mm - 0.5 mm). The gain in keratinized tissue width was consistent at further 3 and 6 months follow-up visits.

There was not significant bone loss at 2 months follow-up (Figure 11) when compared to the radiograph after immediate placement of implants (Figure 12).

Discussion

Adequate width of attached tissue at the tooth and implant soft tissue interface is pre-requisite for healthy prosthesis and correlates with maintenance of teeth and implant supported prosthesis. Long-term success and stability in function and esthetics necessitates healthy and adequate keratinized tissue. It has been established that the presence of keratinized tissue was significantly associated with good mucosal health and inadequate keratinized tissue lead to 2 mm or greater bone loss [10].

The width of keratinized tissue was 0.6 mm at baseline which was increased to 3.0 mm at 2 months. The gain in keratinized tissue width from baseline to 2 months (2 months – Baseline) was 2.5 mm (3.0 mm-0.5 mm). The gain in keratinized tissue width was consistent at further 3 and 6 months follow-up visits. These results were in accordance to study by Han et al who successfully evaluated the efficacy of free soft tissue grafts to augment keratinized gingiva around implants [11].

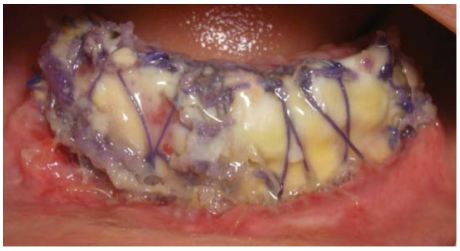

Figure 7: Healed surgical site at one week post-operative visit.

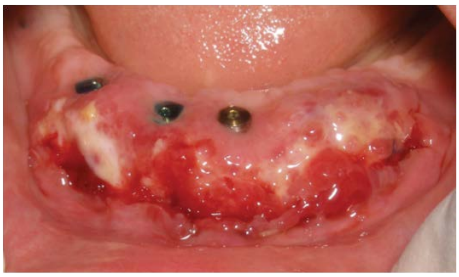

Figure 8: Two Weeks post-operative surgical site post suture removal with new vascularized tissue.

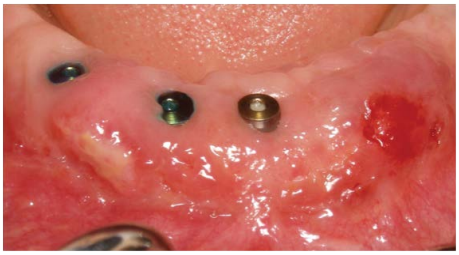

Figure 9: Four weeks post-operative surgical site with improvised vascularized tissue.

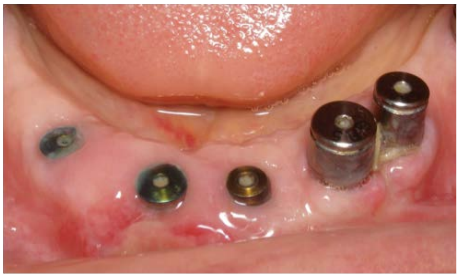

Figure 10: Eight weeks post-operative surgical site wherein the dense connective tissue around implants was noticed and the vestibular depth was significantly increased with a well establishedepithelial tissue around the implant collar.

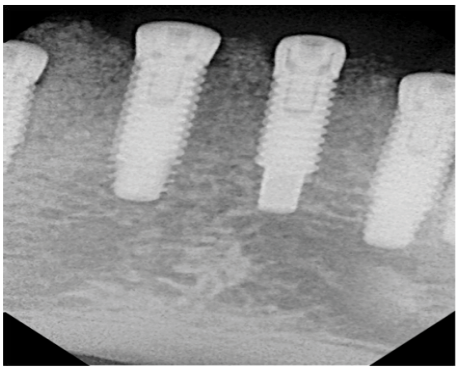

Figure 11: Radiograph after immediate placement of implants.

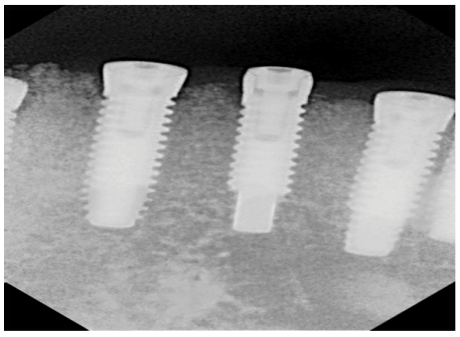

Figure 12: Radiograph at two months post implants placement with a significant amount of bone formation around the implant collar.

Soft tissue ridge augmentation is the direct outcome of necessity to maintain adequate keratinized tissue for a successful prosthesis. The fact that mucosal thickness and the width of keratinized mucosa are of significance particularly in the esthetic zone, where narrow and thin gingival biotype may result in greater gingival recession, have warranted surgical procedures for soft-tissue augmentation around dental implants [12]. Free gingival grafts, autogenous palatal grafts and subepithelial connective tissue grafts are few of the surgical options available to increase the width of keratinized tissue. The major drawbacks involved in the use of autogenous palatal grafts is the requirement of additional wound site that may cause certain degree of discomfort and increase the risk of postoperative complications such as pain and haemorrage, limited amount of soft tissue graft procured by this procedure especially when the range of the keratinized tissue defect is large.

Many alternatives like Acellular dermal matrix grafts are currently evaluated to avoid disadvantages related to free gingival grafts like second surgical site for harvesting the autogenous tissue graft from the palate, to reduce potential morbidity, and to treat a wider array of defects. ADM allograft serves as scaffold tissue for normal tissue remodelling. ADM allograft has all the structural and biochemical properties for tissue revascularization and remodelling. The extracellular matrix of ADM allograft constitutes collagen, proteoglycans and elastin for cell repopulation, revascularization and tissue reconstruction [13]. ADM allograft has been used for a variety of purposes including correction of gingival recession [14]. ADM allograft has been found to show comparable results to FGG [7] and SCTG [8] in previous studies.

Recently Acellular Dermal Matrix Allograft (ADMA) has also been used to increase the width of keratinized tissue around dental implants. Comparing to the autogenous tissue, ADMA is easy to obtain, and the amount of graft is unlimited and the patient discomfort is reduced due to single surgical site.

Conclusion

Acellular dermal matrix graft could be used to increase the attached gingiva around dental implants in patients with alveolar ridge defects and can be considered as a safe substitute for free gingival grafts and other soft tissue graft procedures.

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