

Case Report

Clinical evaluation of an acellular dermal matrix graft for root coverage during orthodontic treatment: A case report with 6 months follow up

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Abstract: Different soft tissue defects can be treated by a variety of surgical procedures and most of them need the palatal area as a donor site. An acellular dermal graft has become available and can be substitute for palatal donor tissue. This study reports the case of a 36-year old female patient with chief complaint of esthetic problem who presenting multiple gingival recession defects in anterior mandible during orthodontic treatment. CenoDerm combined with coronal positioned flap was used for management of three teeth with gingival recession. Complete root coverage was achieved in 71.4% of treated site in six months follow-up and the patient was satisfied with the esthetic results. The mean root coverage was 68.0±6.9%. The reduction of recession depth and gain of clinical attachment were 4.1±0.6 mm and 5.2±0.7 mm, respectively. According to our results, CenoDerm can be applied successfully in treatment of multiple gingival recession defects.

Keywords: Acellular dermis, root coverage, gingival recession, CenoDerm.

INTRODUCTION

Gingival recession is defined as exposure of the root surface due to the displacement of gingival margin apical to the cemento-enamel junction [1]. It may be local or general and can be associated with one or more tooth's surfaces. Its etiology is multifactorial and may include plaque induced inflammation, calculus, restorative, iatrogenic factors, trauma from improper oral hygiene practices, tooth malposition, high frenum attachment, and uncontrolled orthodontic movements [2]. The surgical procedures which used for treatment of soft tissue defects can be classified as pedicle soft tissue grafts, free soft tissue grafts (STGs) or a combination of them [3]. The connective tissue grafts (CTGs) with or without coronal advanced flap and with full or partial thickness papillary or lateral pedicle flap are the most commonly used techniques for root coverage. The type of gingival recession and the adaptation to the surgical principles can be affect the success of these procedures and their predictability [4].

Tissue grafting procedures increase the amount and quality of attached keratinized gingival tissue and cover exposed and denuded root surfaces. The beneficial effects of these procedures included the prevention of additional root exposure, decreased or eliminated sensitivity to thermal and other stimuli, decreased susceptibility to root caries, and improved esthetics. Therefore, various surgical techniques were

developed to augment the zone of attached keratinized gingiva. Clinicians have utilized autogenous gingival or connective tissue grafts, freeze-dried skin allografts, and acellular dermal matrix [5,7]. Although, CTGs provides excellent esthetics and predictability, but, the quantity of donor material needed is limited when treating several gingival recessions at once. Likewise, STGs will need another surgical area as a donor site. This area is usually the palate that eventually increases the morbidity to the patients. The number of teeth to be treated using CTGs is limited by the amount of tissue that can be harvested from the patient's palate [8, 9].

STGs requires a donor site and harvesting the tissue induced patient discomfort and increase the complications. An acellular dermal matrix graft (ADMG) has been used as a substitute for the palatal donor sites to increase the width of keratinized tissue around the teeth and implants [10, 11] for the treatment of alveolar ridge deformities [12] and root coverage procedures [13,15]. Processing of the dermis obtained from human donor removes all cells, leaving a structurally intact connective tissue matrix composed of type-I collagen. Harris reported the use of ADMG with coronal positioned flap for the treatment of gingival recession [13]. The ADMG consistently integrated into the host tissue, maintaining structural integrity of the tissue and revascularized via preserved vascular channels. The color match obtained was also reported to

be comparable to that of the connective tissue graft. However, the ADMGs have certain clinical limitations in handling characteristics, surgical technique, and enhancing the quality and quantity of keratinized tissue.

Therefore, the aim of this study was to evaluate the effectiveness of an ADMG (CenoDerm) for root coverage procedures in a patient with history of orthodontic treatment and esthetic problems and to objectively analyze the post-operative esthetics using a visual analogue scale (VAS).

CASE HISTORY

A healthy 36yearsold female referred to the private office in Qazvin, Iran with a chief complaint of unpleasant look in relation to lower anterior due to orthodontic therapy. The teeth 42,41,31 had recession in labial gingival margin(Figure 1A). The patient had no systemic problems and was not smoker. Dental history revealed that she had good oral hygiene and teeth had no caries, restorations or prosthetic treatment. Millers Grade II gingival recession had the recession depth of 7mm in lower left, central right incisors recession depth of 5 mm in lower left lateral incisor pocket probing depth of 2mm in all teeth. Clinical attachment loss 9mm for central incisors and was 7mm for left lateral incisor.

After taking informed consent, scaling, root planning, and polishing were performed and a non-traumatizing tooth brushing technique, roll method, with a soft toothbrush was instructed to the patient. The patient was taken up for root coverage using ADMG

(CenoDerm) and was explained about the procedure and a return consent obtained.

Surgical Procedure

After injection of local anesthesia, root planning was gently performed for the exposed parts of the roots using a universal curette (McCall 17/18, Hu-Friedy, Chicago, USA) to obtain a hard and smooth root surface followed by a thorough rinse with the sterile normal saline. An intrasulcular incision was induced with number 15 scalpel blade between distal aspects of the mandibular left central incisor to the mesial of right canine with preserve of labial interdental papillae. Two oblique releasing incisions were made at each end of the area, preserving the tips of the papillae. A full thickness flap was elevated to the mucogingival line. Then, an incision was made in the periosteum to create a partial thickness flap and to ensure the tension-free coronal displacement (Figure 1B).

CenoDerm with size of 10×20 mm and 1.4 mm thickness (Tissue Regeneration Corporation, Kish, Iran) was soaked in a dish contained 100 cc sterile saline for 10 minutes. Then, it was trimmed to fit the dimensions of the defects. CenoDerm was placed over the exposed root surfaces, approximately 1 mm coronal to the Cementoenamel junction(CEJ), covering 3 mm of surrounding bone. The defect size was 9mm in central incisors region and 7 mm in right lateral incisor. The graft was fixed with continuous sling suture using a 4-0 resorbable polyglycolate coated suture material (vicryl suture, Hur-Teb, Qazvin, Iran)(Figure 1C and 1D).

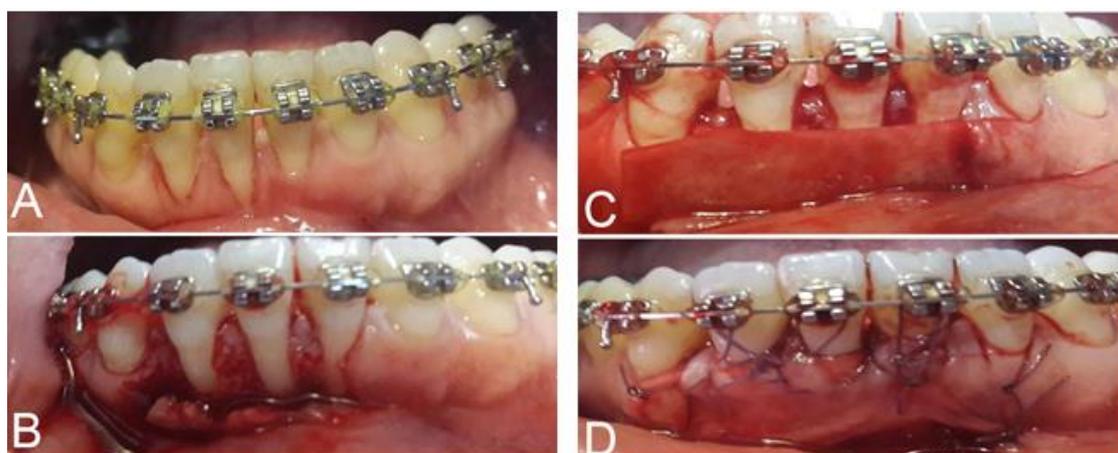


Fig-1: CenoDerm combined with coronal positioned flap in the management of three teeth with gingival recession. A, recession in labial gingival margin of teeth no. 31, 41, and 42; B, induced incision in the periosteum; C, graft placing; D, graft fixation with continuous sling suture.

After that, the overlying flap was positioned coronally, completely covering the CenoDerm, and sutured without tension using sling suture with the same suture material and anchored to the labial brackets(Figure 1D). Patient was instructed to discontinue tooth brushing for 21 days around surgical site, but rinse with 0.12% chlorhexidine solution twice a day. Systemic antibiotics (Amoxicillin 500 mg) were

administered with analgesics (Gelofen 400 mg) for 5 days. Patient was recalled after one week and checked for healing. The surgical site was repacked and she was recalled every two weeks. Sutures were removed after two weeks when the grafted site was healed and no need to have sutures. Patient was asked to avoid mechanical plaque control of surgical site for one month and then return to normal tooth cleaning using

roll technique with a soft toothbrush and was visited at two-week intervals(Figure2).



Fig-2: The healing process at 1 (A), 3 (B) and 6 (C) months after treatment with CenoDerm.

The post-operative measurements were taken by the same examiner at the end of 1st, 3rd and 6th months at the mid-buccal point of the involved tooth. These included probing pocket depth (PPD), gingival recession (GR), clinical attachment level (CAL) and attached gingiva (AG). In order to determine the color match, the examiner fixed a 0-10 scale criteria, in that 0 score was no color match and 10 score was absolute color match. The scoring was performed at the end of 3 and 6 months for the patients. In order to reduce observer bias, all scorings were made by a second independent periodontist. Patient was given personal satisfaction with the color match after treatment with CenoDerm. The healing process at 1, 3 and 6 months after treatment with CenoDerm are presented in Figure 2A, 2B, and 2C, respectively. The data were expressed as mean and SD and analyzed using SPSS version 18.0. The one way analysis of variance (ANOVA) and paired t-test were used to compare the mean root coverage and the color match.

RESULTS

Comparison of the PPD, GR, CAL and AG between three different times is presented in Figure 3. At the base line, mean of PPD, GR, CAL and AG were 2.0 ±0.4, 6.31±1.1, 8.30±1.1, and 1.10±0.7 mm, respectively. At the end of 3rd months, the PPD, GR, and CAL were reduced to 1.20 ± 0.2, 2.0 ± 0.0, and 3.0 ± 0.0 mm, respectively, but, the AG was increased to 5.85±1.0 mm. These value were 1.20 ± 0.2, 2.0 ± 0.0, 2.41 ± 0.1, and 6.12±0.4 mm at the end of 6th months for PPD, GR, CAL, and AG, respectively. As demonstrated in Figure 3 and according to Wilcoxon signed ranks test, reduction in GR, CAL and AG after 3rd and 6th months were statistical significant in comparison to the base line (P<0.05), but there was no statistical significance improvement between 3rd and 6th months. The clinical measurements of GR at baseline and final visit are also were compared. Of the three teeth treated, two teeth showed complete root coverage (71.4%).

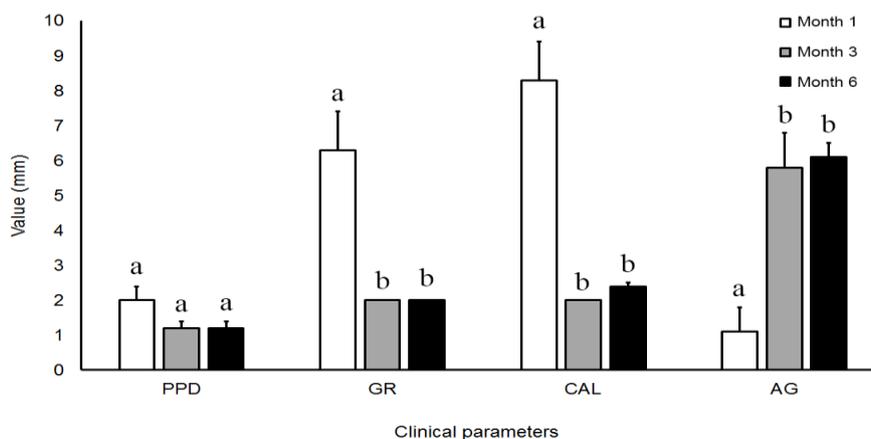


Fig-3: Comparison of the probing pocket depth (PPD), gingival recession (GR), clinical attachment level (CAL) and attached gingiva (AG) between three different times after recession. Significant differences are demonstrated by different superscript letter (P<0.05).

The color match of surgical site was examined at the end of 3rd and 6th months using the VAS. A score of 8 and 9 was obtained by the periodontist at the end of 3rd and 6th months, respectively. Although, a statistically significant improvement was seen between the 3rd and 6th month's scores in comparison to the base line ($P < 0.05$), but, here was no significant difference between the 3rd and 6th month's scores ($P > 0.05$).

DISCUSSION

This case report identified the effects of ADMG for root coverage procedures in a patient with history of orthodontic treatment and esthetic problems. Gingival augmentation is frequently accomplished with autografts harvested from the palate or an edentulous ridge. In patients with palatal exostoses, a shallow palate or thin palatal tissue, it is difficult to harvest a sufficient amount of autograft material [16]. Moreover, many patients are reluctant to have a second wound at the donor site. Under these circumstances, a STGs is a reasonable alternative approach. CenoDerm is a bioactive STGs material that is processed to remove the epidermis and all antigenic cells in the dermis, yielding an acellular matrix comprising proteoglycans, collagen, elastin and blood vessel channels that facilitate revascularisation, cell ingrowth and repopulation. There are no reports in which diseases were transmitted from a donor to a recipient using this ADMGs product [17,18].

Various studies have been done to obtain predictable root coverage in patients with gingival recession defects, subpedicle ADMGs and autogenous CTGs in the treatment of gingival recession [19]. Mehlbauer and Greenwel studied the complete root coverage at multiple sites using an acellular dermal matrix allograft [20]. Also, Griffin and colleagues reconstructed amalgam tattoo surgically, using ADMG. This graft was used as an alternative source to donor tissue site in this type of surgery [16]. De Queiroz Cortes studied the use of coronal positioned flap with or without ADMG in the treatment of class I gingival recessions in a randomized controlled clinical study. They aimed to clinically evaluate the outcome of the treatment of class I gingival recession by coronal positioned flap procedure with or without ADMG and concluded that both techniques can provide significant root coverage in class I gingival recessions; however, a greater keratinized tissue thickness might be expected with ADMG [21]. Douglas used an acellular dermal allograft and a tunnel technique in the treatment of multiple gingival recession sites in the esthetic zone. It showed that multiple gingival recession defects in the esthetic zone can be treated successfully using mucogingival tunnel techniques and acellular dermal matrices in one visit [22].

It is generally accepted that attached keratinized tissue is an integral part of the periodontium, and serves to function as an effective

barrier by facilitating resistance to tissue damage from traumatic insults. These observations were amplified in a recent study by Nevins *et al.* [23]. Their investigation was conducted to assess the efficacy of an extracellular membrane (DynaMatrix, Keystone Dental, Burlington, MA, USA) in augmenting keratinized tissue. The results suggested that the membrane may present a viable substitute for the autogenous gingival graft when the objective is to increase the dimension of the keratinized attached gingiva. Their study compared treatment utilizing a free gingival graft versus an extracellular matrix (DynaMatrix) and determined that both techniques produced a significant increase in the amount of keratinized gingival tissue. In addition, the matrix-generated tissue was comparable histologically to the tissue derived from the autograft. The study concluded that the DynaMatrix extracellular matrix blended well with surrounding tissue, and it produced superior esthetic outcomes when compared to the autogenous graft. Finally, the report suggested that the extracellular matrix be considered in the treatment for patients with gingival recession. ADMGs have been highly successful in the treatment of gingival recession and allow for the treatment of multiple teeth in a single visit [17,18,24].

The application of CenoDerm as a barrier membrane for graft tissue regeneration (GTR)/graft bone regeneration (GBR) procedures have been suggested by the manufacturer and the first report regarding applicability of CenoDerm for root coverage procedures was used by Moslemi and colleagues. According to the results obtained in their study, CenoDerm can be applied successfully in treatment of multiple gingival recession defects. Complete root coverage was achieved in 66.6% of treated sites in one-year follow-up and the patient was satisfied with the esthetic result [25]. However, our finding is approximately similar to their report and root coverage was 74.1%. In this study we used 1.4mm thickness of the CenoDerm and complete root coverage in this case also did not show.

In conclusion, root coverage can be obtained by a variety of surgical procedures. All of the techniques have advantages and disadvantages. The proposed technique can be a new alternative for root coverage, and it should be part of the periodontal plastic surgery armamentarium. However, it is clear that additional long-term cases and long-term comparative studies are needed to determine the predictability and longevity of this technique.

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