CASE REPORT

Sub-epithelial connective tissue graft and enamel matrix derivative in the management of a localized gingival recession defect: A case report

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Abstract Within the past 20 years, clinicians have successfully performed mucogingival surgeries to restore periodontal defects. This article describes the application of enamel matrix derivative (EMD) in combination with connective tissue graft (CTG) for the repair of localized mucogingival defect. The procedure was performed to observe the clinical success of autogenous CTG in the management of moderate facial recession defect combined with the usage of an EMD. The management involved scaling and root planning, root surface conditioning, elevation of full-thickness flap, application of EMD, shaping and application of CTG at the recession site. Eight-month observations showed root coverage of 3 mm (>75%) with attachment level gain of 4 mm and a gingival margin that was harmonious with adjacent teeth. From a clinical observation, it emerges that root coverage and soft tissue attachment is possible with the use of autogenous CTG in combination with EMD in the management of moderate gingival recession defects.

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1. Introduction

Defects in the form, extent, and position of gingiva (mucogingival defects), can be corrected by different plastic surgery procedures collectively called mucogingival surgeries.1 Indications for root coverage procedures include root sensitivity, poor esthetics, prevention of root caries and cervical abrasions due to gingival recession.2,3 In addition to soft tissue deficiency, mucogingival defects may also involve destruction of hard tissues resulting in major functional, esthetic and biological
Multiple methods are used for root coverage which include pedicle grafts, free gingival grafts, connective tissue grafts (CTG), membrane barrier guided tissue regeneration technique, and acellular dermal matrix allografts. Miller determined the level of root coverage achievable with free gingival graft in the form of a classification which evaluated both soft and hard tissue defects, dividing the recession categories (Table 1).

Sub-epithelial CTG procedures have been employed in the management of muco-gingival defects with varying success. Palatal donor sites are commonly utilized for CTG harvesting, due to quality and quantity of tissue available, low esthetic cost and uneventful healing. Studies have reported benefits of CTG including increase in keratinized tissue width, clinical attachment level gain; thus successful outcome of gingival recession repairs. Studies by Tozum et al. and Jahnke et al. reported a greater percentage of root coverage with better outcome as a result of CTG procedure for gingival recession defects. In a recent consensus report by Tatakis et al., procedures like acellular dermal matrix graft or EMD in conjunction with a coronally advanced flap (CAF) and subepithelial CTG techniques were identified as effective repair options. The authors concluded that subepithelial CTG offers the best outcome in the treatment of Miller Class I and II gingival recession defects.

Advancements in periodontal repair procedures have led to the development and clinical application of enamel matrix derivative (EMD), showing significant improvements in clinical attachment levels in both animal and human subjects. EMD contains 90% of amelogenins, proline-rich non-amelogenins, tuftelin, tuft protein and serum proteins, extracted from young embryonic piglet tooth germs. The purpose of EMD is to develop a layer of new cementum to treat periodontal defects by mimicking the development of root structure. Application of EMD is convenient and provides good clinical outcomes especially where periodontal support is of prime importance. Pilloni et al. in their study reported topical application of EMD as a successful treatment approach in terms of root coverage, attachment level gain and width of keratinized tissue. A review study provided evidence of complete root coverage and long-term stability following treatment of gingival recessions using CAF in combination with either SCG or EMD. Recent results from case series indicate that use of modified coronally advanced tunnel technique combined with EMD and CTG may appear to lead to predictable outcome in terms of root coverage of isolated mandibular Miller Class I and II recession defects.

The aim of this case report was to clinically evaluate the healing following the application of EMD and sub-epithelial CTG in the treatment of localized gingival recession defect in an attempt to achieve better clinical outcomes in terms of soft tissue root coverage and gain of clinical attachment.

2. Case report

2.1. Clinical case presentation

A 24-year-old female was referred to the department of restorative dentistry with complaint of long and un-esthetic mandibular incisor tooth (tooth 31). In addition, patient also suffered from sensitivity to hot and cold stimulus from approximately 18 months at a similar site. Clinical evaluation revealed gingival recession on the labial surface of tooth 31 extending 3 mm apical to the cemento-enamel junction (CEJ) and a narrow zone of attached gingiva (approximately 1 mm) (Fig. 1). The pocket depth on 31 was not more than 2 mm with slight sensitivity associated with cold revealed by vitality testing. There was no papillary height loss on the distal aspect of the incisor and mild loss of papillary height on the mesial aspect. Plaque control and oral hygiene was good with no apparent staining on teeth. There was no evidence of interdental bone loss (i.e. the distance between the crestal bone and CEJ was not greater than 2 mm). The patient was a non-smoker and

<table>
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<th>Table 1</th>
<th>Miller’s classification of gingival recession defects.</th>
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<tr>
<td>Class I</td>
<td>Marginal tissue recession which does not extend to mucogingival junction (MGJ) and is not associated with alveolar bone loss in the interdental area. Complete root coverage is obtainable</td>
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<tr>
<td>Class II</td>
<td>Marginal tissue recession which extends to or beyond the MGJ and is not associated with alveolar bone loss in the interdental area. Complete root coverage is obtainable</td>
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<tr>
<td>Class III</td>
<td>Marginal tissue recession which extends to or beyond the MGJ and is associated with alveolar bone loss in the interdental area. Partial root coverage is obtainable</td>
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<tr>
<td>Class IV</td>
<td>Marginal tissue recession which extends to or beyond the MGJ and is associated with gross alveolar bone loss in the interdental area with exposure of more than one proximal root surface. No root coverage</td>
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Figure 1 Gingival recession on the labial surface extending 3 mm apical to the CEJ and a narrow zone of attached gingiva.
taking no medication with the absence of any systemic condition or periodontal pockets associated with the gingival recession. The case was diagnosed to be sensitivity associated with Class II Miller recession associated with traumatic tooth brushing. The goal of the treatment was to restore the appearance of the gingiva by covering the root surface to normal anatomic contours and to increase the zone of attached gingiva.

2.2. Connective tissue graft (CTG)

Following local anesthesia application (2% lidocaine, epinephrine 1:100,000), the exposed root surface was thoroughly planed and scaled with the use of hand instruments to remove plaque, accretions and root surface irregularities. Root surface was then conditioned with saturated solution of tetracycline-HCl for 2 min (100 mg tetracycline-HCl/1 ml of sterile distilled water). A sulcular incision was made at the site of recession, which was extended horizontally into the adjacent interdental areas slightly coronal to the tooth’s CEJ. The horizontal incisions were connected to vertical releasing incisions both mesially and distally involving adjacent teeth. A full thickness flap was elevated in an apical direction exposing the alveolar plate of bone until the mucogingival junction (MGJ). The periosteum was released and blunt dissection into the vestibular lining mucosa was performed to eliminate tension to help re-position the flap coronal at the level of CEJ. The interdental papillae of the adjacent teeth were not involved (Fig. 2).

The donor site for the sub-epithelial connective tissue graft was palatal to the bicuspid region of the same subject. Donor palatal tissue was harvested as follows: a horizontal incision was placed in the palate 3 mm from the free gingival margin, and two parallel internal vertical incisions, one superficial and one deep, were made and connected mesially and distally. The underlying connective tissue of a thickness of 1–1.5 mm and a length of 3 mm was released at its base and removed. The CTG was soaked in for 5 min in EMD while the wound was closed with simple interrupted 3-0 silk sutures. The exposed root surface was conditioned with 24% ethylenediaminetetraacetic acid (EDTA) gel solution for 2 min following the manufacturer’s instructions and thoroughly rinsed with saline. The root surface was dried and EMD was applied. The graft was shaped to fit the recipient site and secured to the wound bed (Fig. 3) with a continuous sling suture using 5-0 vicryl to the papilla on either side of the graft (Fig. 4). Silk sutures were removed after 14 days; visible portions of the vicryl suture were removed after 3 weeks. To reduce the risk of plaque induced inflammation the donor site was covered with a removable acrylic plate. The donor site healed by primary intention two weeks after suture removal.

2.3. Follow up and maintenance

Oral hygiene instructions were provided to the patient. Patient was instructed not to brush teeth in the surgical area and to use chlorhexidine gluconate mouthrinse (0.12%) for 60 s twice daily for 10 days. Patient was instructed to avoid muscle traction and trauma to the treated area for the first 3 weeks. After three weeks, a modified brushing technique was advised in order to minimize apically directed trauma to the soft tissue around the surgical site. Throughout the treatment, recall visits for prophylaxis treatment were arranged at 1, 3, 5, 8, 12, 16 and 32 weeks.

Healing was uneventful. At 5th week, the gingiva at the surgical site was still edematous (Fig. 5). Only erythema could be observed along the border of attached gingiva which improved at 8th week of follow-up. At 4 months and 8 months postoperatively, the amount of attached gingiva was approximately 3 mm, and the gingiva was firmly attached. Probing depth at the mid buccal site was less than 1 mm and attachment level gain of 4 mm with free gingival margin which was located less than 1 mm apically to the apical border of the CEJ (Fig. 6).

3. Discussion

The aim of this case report was to present a predictable procedure by using EMD along with subepithelial CTG for the treatment of Class II Miller recession caused by tooth-brush trauma. Multiple causes have been proposed for localized
gingival recession including, orthodontic treatment, calculus, high frenal attachment and poor restorations. Tooth brush trauma has been associated with gingival recession in particular with the use of a stiff brush and brushing frequency of 3 or more per day. In order to prevent further soft and hard tissue defects, the patient in this case report was instructed to brush twice daily, using a soft brush. Overall management was aimed to minimize risk during the surgical procedure and to ensure uneventful healing along with patient comfort. The case showed coverage of the root surface and a gain in clinical periodontal attachment in response to the application of EMD with CTG. The purpose of CTG in this case was two folds. Firstly, to regain apico-coronal attachment loss and secondly, to overcome the narrow zone of attached gingiva.

Procedures involving connective tissue grafts are successful when they attain adequate vascularization from the neighboring blood vessels through which the grafted tissue gets its nourishment. Therefore in this clinical case report, the main idea was to preserve the blood supply of the connective tissue graft as much as possible. In addition, successful grafting and root surface coverage is critically affected by the quality of root surface. A desired root surface can be achieved by eliminating the heavy smear layer, which is essential to provide access for collagen attachment around the available root surface before applying EMD. Therefore, in the presented case report, 24% EDTA gel solution was used for 2 min to condition the root surface prior to surgical procedure.

Application of EMD was utilized in order to achieve regeneration of cementum and clinical attachment gains in the presented case report. In a study by Mellonig, a mucogingival defect was repaired using a CTG with and without the use of Emdogain, with surgical site presentation at 2 and 4 weeks follow-up. The graft tissue was harvested from the palate and gave acceptable results with reduction in probing pocket depth and gain in attachment loss. In addition, application of EMD alone resulted in periodontal regeneration involving new bone deposition, cementum formation, and periodontal ligament regeneration. Similarly, Heijl reported that recession defect when treated with EMD alone forms a new cementum layer with collagen fibers covering more than half of the defect area around the root surface. Moreover, in a study by Silvestri the histology of a 6 mm gingival recession defect revealed 3 mm gain in keratinized tissue as well as 2 mm gain in clinical attachment. The treatment regime in the study by Silvestri was also a combination of subepithelial CTG with the application of EMD and demonstrated the formation of a new layer of cementum, new bone and periodontal ligament attachment tethered into the newly formed cementum. Besides having the advantage of forming a new layer of cementum around the root surface, EMD also serves to produce keratinization of the tissues around the surgical wound. These clinical gains of EMD, support the clinical outcome achieved in the presented case report, further cementing the efficacy of CTG in combination with EMD in the treatment of recession defects.
Although EMD was utilized with CTG in the present case report procedures involving subepithelial connective tissue graft in combination with the use of enamel matrix derivatives is a predictable treatment procedure for the achievement of soft tissue root coverage and gain of clinical attachment in facial recession defects.

Conflict of interest

No conflict of interest.

Acknowledgment

None.

References

34. Pilloni A, Paolantonio M, Camargo PM. Root coverage with a coronally positioned flap used in combination with enamel matrix


