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CASE STUDY

Acellular dermal matrix for the treatment of multiple gingival recession defects associated with carious and previously restored cervical lesions: A case report with 10 years of follow-up

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Abstract

Background: Limited evidence exists on the outcome of the modified coronally advanced tunnel (MCAT) with acellular dermal matrix (ADM) for the treatment of gingival recession defects (GRD) especially when complicated by restored cervical lesions. Therefore, the aim of this case report was to assess the short- and long-term clinical outcomes of maxillary Type 1 recession defects (RT1) associated with restored cervical lesions treated with MCAT with ADM.

Methods and Results: A 43-year-old female patient, presented with multiple adjacent RT1 recessions in the left maxilla, previously treated with overhanging cervical resin restorations. The case was approached with a careful evaluation of the diagnostic determinants of root coverage, removal of the aberrant resin restorations, treatment with MCAT with ADM, and periodical evaluation over a follow-up of 10 years.

The treatment was followed by complete root coverage, improvement of gingival phenotype, and perfect root coverage esthetic score. Outcomes were periodically assessed and were maintained over 10 years of follow-up.

Conclusion: MCAT with ADM is an effective technique for the treatment of multiple GRD complicated by cervical restorations. Complete root coverage and excellent esthetic outcomes were obtained and maintained in the long term.

KEYWORDS

acellular dermal matrix, connective tissue, dental, esthetics, follow-up studies, gingival recession, treatment outcome

INTRODUCTION

Gingival recession defects (GRD) are highly-prevalent mucogingival conditions defined as the apical shift of the gingival margin until the exposure of part of the root surface to the oral cavity.[1] Approximately 50% of GRD are associated with carious or non-carious cervical lesion,[2] and their etiology has been reported being multifactorial.[1,3–5] Patients seek periodontal treatment of GRD for esthetic reasons, to prevent further progression of the gingival recession and of the cervical abrasion, and because of the increased sensitivity from the exposed root structure.

Cervical restorations as treatment of GRD are very common in general dentistry settings, especially when cervical lesions are present. However cervical restoration present drawbacks such as high index of loss of retention, marginal excess, and secondary caries.[6] Failure of the restorative treatment has been studies and attributed to moisture,[7] contamination of the bonding protocol, improper access to the sub-gingival space[8] and due to the presence of sclerotic dentin which has suboptimal bonding properties when compared to the physiological dentin.[9] Improper use of cervical restorations may also alter the resident microflora and compromise the periodontal health by inducing further attachment loss.[10] In addition, the use of composite

restorations as a sole treatment of GRD with cervical lesions often lead to disappointing esthetic results as the appearance of the clinical crown is significantly elongated. As the goal is to enhance esthetics, reconstruct the lost gingival tissue and prevent disease progression, periodontal plastic surgery techniques are indicated.[11–13]

Acellular dermal matrix (ADM) has been used for more than two decades as a connective graft substitute for the treatment of gingival recession in combination to a variety of flap designs.[14,15] Among all, the modified coronally advanced tunneling (MCAT) presents the ideal features of mini-invasivity, favorable flap relaxation, and the opportunity to stabilize the graft close to the gingival margin.[16] Allen and Winter (2011) used ADM and tunneling for the treatment gingival recession associated with cervical lesions.[17] However, to our knowledge, no authors reported the use of ADM for the treatment of GRD with previously restored cervical lesions. Therefore, this case report presented short- and long-term outcomes of multiple adjacent GRD associated with previous restoration treated with ADM and tunneling.

MATERIALS AND METHODS

Clinical presentation

In 2012, a systemically healthy, 43-year-old, non-smoker female patient was referred for periodontal evaluation because of her chief complain of poor esthetics and root hypersensitivity from teeth #9 (2.1), #10 (2.2), and #11 (2.3). Clinical examination revealed the presence of multiple adjacent GRD of the involved sites, previously treated with resin restorations (Figure 1). The diagnosis was formulated as Miller Class I[18] (RT1),[19] undetectable CEJ (B),[2] presence of a root step on #10 (2.2) (+),[2] >2 mm of keratinized tissue apical to the recessions. Risks and benefits of perio-plastic surgery interventions were discussed with the patient who expressed the desire to proceed with recession coverage treatment. Oral consent was obtained from the patient prior to any further clinical activity.

FIGURE 1 Clinical examination of teeth #9, 10, and 11 (2.1, 2.2, 2.3) revealed multiple gingival recession defects diagnosed as Miller Class 1 (Recession Type 1), undetectable CEJ (B), presence of root step (+) on #10 (2.2), and adequate width of keratinized tissue apical to the recession.

Before the surgical procedure, the patient underwent oral hygiene instructions, supragingival scaling, and polishing. The following parameters were assessed at the beginning of the treatment, prior to the periodontal surgery: recession depth, recession width, probing depth, clinical attachment level, tissue thickness via sulcular probing, and keratinised tissue width. All the measurements were performed by the same operator (SB) using a periodontal probe (UNC-15, Hu-Friedy).

Case management

After local anesthesia, the restorations and the cervical carious lesions were removed using a #6 round Neumeyer bur on handpiece. Hand instruments (Younger-Goog, Harmony TM, Hu-Friedy) were used to ensure a smooth root surface. The surgical loupes enhanced the visibility to ensure that the entire composite or carious lesion was removed. After thorough debridement and smoothing of all the root surfaces, the exposed root surface was treated with 17% ethylene-diaminetetraacetic acid applied for 1 min with a cotton tip applicator, to remove the smear layer and to expose the dentinal collagen fibers/tubules. The flap elevation was performed in a minimally invasive fashion,[20] using the technique reported in Allen (2010).[16] The site preparation started with an intrasulcular incision made with an end-cutting intrasulcular knife (Allen End-Cutting Intrasulcular Knife, Hu-Friedy HF-KPA). This was followed by a supra-periosteal blunt dissection until the mucogingival junction using an Allen Periosteal elevator (Periosteal Allen Elevator, Hu Friedy, HF-PPAEL). Then, a partial thickness dissection with modified Orban knife (1/2 Orban Knife, Hu Friedy, HF-KO12KPO3A6) was continued apically, approximately 10 mm from the gingival margin, to allow for a passive advancement of the pouch. The palatal tissue was then elevated about 3 mm, and the papillae were lifted from the alveolar crest.[21] This palatal elevation of the flap, a modification from the original supra-periosteal protocol described by Allen, was completed in order to facilitate the flap advancement. The pouch was extended laterally to include the papillae of the adjacent teeth. The allograft (Alloderm, BioHorizons) was rehydrated according to the instructions for a minimum of 10 min. The Alloderm was trimmed lengthwise to the site's adjacent line angles, and vertically, to a dimension of 8 mm (Figure 2). The graft was placed in the pouch and aligned with the gingival margin (Figure 3). The connective tissue site of the Alloderm was placed against the tooth surface, as recommended by the manufacturer. The tension free pouch was coronally positioned to cover the ADM and 2 mm of tooth enamel (Figure 4). Double sling sutures (5.0 polypropylene) were used around each tooth to secure the graft in place and to coronally position the graft and the pouch

FIGURE 2 Acellular dermal matrix was trimmed and tried on the outer surface of the tunnel.

FIGURE 3 The acellular dermal matrix was inserted into the tunnel.

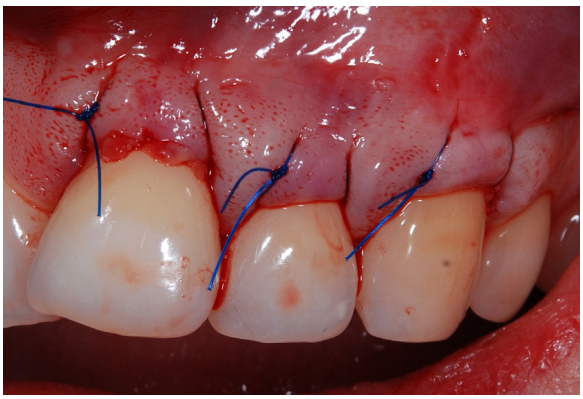

FIGURE 4 Double sling monofilament sutures (polypropylene 5–0) were used to coronally advance the flap and the graft.

simultaneously. Analgesics were prescribed to control postoperative discomfort (Ibuprofen 800 mg q6h for 1 week, Tylenol #3 q6h as needed). Antibiotic therapy was employed to promote favorable wound healing and prevent any potential infection.[22] Azithromycin (500 mg) was prescribed; two tablets were taken the day of surgery, followed by one tablet per day for 3 days. To control the swelling, steroids were also prescribed (Dexamethasone 8 mg 2 h before surgery, 6 mg on the second day, 4 mg on the third day and 2 mg on the fourth day). No brushing or flossing at the surgical site was performed for 3 weeks. Chlorhexidine gluconate (0.12%) mouth rinse twice daily was prescribed for 3 weeks after the surgery to control plaque buildup. The patient was seen postoperatively at 3 weeks when the sutures were removed. Oral hygiene instructions were given, and professional cleanings were performed at each of the follow up visits if indicated (ie visible plaque present). The patient was followed up after 3 months and after 6 months to monitor the surgical healing.

RESULTS

The patient complied with all the recommended instructions, the healing was uneventful, and the self-reported discomfort was minimal. Clinical outcomes were evaluated 6 months after therapy, and at every hygiene recall. Position of the gingival margin was recorded by the same operator (SB) using a UNC-15 probe (Hu-Friedy). Esthetic evaluation was perfomed according to the root coverage esthetic score (RES) by Cairo et al. (2009).[23]

- Gingival margin position: zero points = failure to obtain root coverage (gingival margin apical or equal to the baseline recession); 3 points = partial root coverage; 6 points = complete root coverage.
- Marginal tissue contour: zero points = irregular gingival margin (does not follow the cemento– enamel junction); 1 point = proper marginal contour/ scalloped gingival margin (follows the cemento–enamel junction).
- Soft-tissue texture: zero points = scar formation and/or keloid-like appearance; 1 point = absence of scar or keloid formation.
- Mucogingival junction alignment: zero points = mucogingival junction not aligned with the mucogingival junction of adjacent teeth; 1 point = mucogingival junction aligned with the mucogingival junction of adjacent teeth.
- Gingival color: zero points = color of tissue varies from the gingival color at adjacent teeth; 1 point = normal color and integration with the adjacent soft tissues.

At 6 months (Figure 5), all the treated teeth achieved complete root coverage, thickening of the gingival phenotype and excellent RES. Achieved results were maintained over the years. Stability of gingival margin and pleasant esthetics were documented in 2016, 4 years after treatment (Figure 6), and in 2022, 10 years after treatment (Figure 7). Throughout the follow-up period, no negative events occurred. No keloid tissue was ever noted in proximity of the gingival margin; no increasing probing depth was noted; and no dental hypersensitivity was reported from the patient after the therapy at any timepoint. The tissue contour, texture, color, and mucogingival junction were identical to those of the adjacent teeth. The patient was happy with the pleasant esthetic result. Tables 1 and 2

FIGURE 5 Clinical appearance 6 months after treatment. Complete root coverage, excellent esthetics, and phenotype augmentation were achieved.

FIGURE 6 Clinical appearance 4 years after treatment. Complete root coverage, thick flat phenotype, and excellent esthetic score were maintained.

FIGURE 7 Clinical appearance 10 years after treatment. The gingival margin showed tissue stability without any relapse during the 10 years following the treatment. Complete root coverage, thick flat phenotype, and excellent esthetic score were maintained.

TABLE 1 Position of the gingival margin at baseline and throughout the follow-up period for teeth #9 (2.1), #10 (2.2), and #11 (2.3). Complete root coverage was obtained 6 months after therapy and maintained over the following 10 years.

Recession depth (mm)				
	Tooth	**# 9**	**#10**	**#11**
Follow up	Baseline	3	2	3
	6 months	0	0	0
	4 years	0	0	0
	10 years	0	0	0

TABLE 2 The root coverage esthetic scores at 4 years and 10 years after intervention.

Tooth	#9	#10	#11
Gingival margin position	6	6	6
Marginal tissue color	1	1	1
Soft tissue texture	1	1	1
Mucogingival junction alignment	1	1	1
Gingival color	1	1	1
Total score: 4 years	10	10	10
Total score: 6 years	10	10	10

reported recession reduction and RES for the operated teeth.

DISCUSSION

In this case report, multiple GRD RT1 B+, with pre-existing restorations, were treated with MCAT and ADM, which resulted in complete root coverage and perfect RES in the short and long term.

One of the key elements for success in this case was the proper diagnosis. Periodontal evaluation did not stop to the sole measurement of the midbuccal recession and interproximal attachment loss,[18,19] but it comprised a more global investigation of the tooth structure,[2] existing restorations, and baseline gingival phenotype. These measurements were recorded following independent classification systems in 2012, when the patient presented to periodontal examination for the first time. However, all these variables are today summarized in a single matrix known as the 2018 Classification of Gingival Recession Defects and Gingival Phenotype.[1,24,25] Accurate evaluation of recession characteristics, tooth structure, phenotype, and previous periodontal/restorative treatments was one of the keys for proper treatment planning.

Once diagnosed, GRD complicated by cervical lesions may be treated by means of several periodontal plastic techniques, and choosing the appropriate method usually depends on personal preference, prior experience, and training. The authors of this case report endorse the use of a tunneling approach to treat multiple shallow gingival recessions in the maxilla due to the superior short-term

esthetic outcomes attained without incision lines, which are usually visible after a coronally advanced flap (CAF) intervention. In addition, an exogenous grafting material (ADM) has been employed to improve subjective patient-reported outcomes such as decreased pain and morbidity. Several randomized clinical trials and meta-analyses have investigated and confirmed the high effectiveness of various treatment approaches using both tunneling and CAF for recession coverage.[15,26–29] The authors do not exclude that other approaches, such as the modified CAF for multiple recessions,[30] in combination with connective tissue grafting or site-specific application of connective tissue graft,[31] could have equally accomplished satisfactory results. This case report of GRDs complicated by cervical lesions was ultimately treated with MCAT with ADM, and the favorable outcomes after therapy represented a proof of the effectiveness of this technique.

Periodontal literature is in strong support of minimally-invasive procedures and armamentarium for reduced vascular damage and, ultimately, improved root coverage.[20] Literature extensively published on efficacy of the ADM in absence of cervical lesions or previous restorations[32–34] suggesting that the addition of the ADM improves the short-term outcome of the flap-alone conterparts.[35] The increase in the tissue thickness is one of the advantages attributed to ADM compared to flap alone.[21,35,36] ADM serves as a scaffold that promotes cellular migration and revascularization from the host tissue.[37] The increase in gingival thickness, ranging from 0.51[21] to ≥1.2 mm,[15] makes the gingival margin more stable and less prone to relapse in the long-term, as noted in the present case report as well as in the periodontal literature.[38]

The treatment with a connective tissue graft of a root surface with cervical lesion is a procedure that resembles the treatment of intact root surfaces.[13,39,40] Studies have shown that ADM provides a suitable alternative for the autogenous graft and, in selected cases, lead to similar results.[41] The use of ADM has many advantages. Because of the non-autogenous sourse, the supply is unlimited, and generalized recession cases can be potentially treated in a single appointment. It has a relative uniform thickness, between 0.9 and 1.6 mm. It acts as a biological filler that stabilizes a CAF or a tunneling on the root surface preventing the collapse of the flap. It increases gingival thickness, and the thick dense connective tissue that results creates a stable marginal tissue preventing the recurrence of gingival recessions.

CONCLUSIONS

Within the limits of this case report, it can be concluded that

1. MCAT with ADM is an efficacious technique for treatment of multiple RT1 gingival recessions with previous restorations.
2. Complete root coverage, phenotype modification, and excellent esthetic results were obtained and maintained over 10 years of follow-up.
3. ADM can act as a biological filler to stabilize the gingival margin of a minimally-invasive flap and prevent its collapse.

AUTHOR CONTRIBUTIONS

All authors significantly contributed to the realization of the study and approved the manuscript before submission. Conceptualization, writing – original draft, writing – review and editing: Sorin Boeriu. Conceptualization, software, supervision, writing – review, and editing: Larissa Steigmann. Conceptualization, methodology, formal analysis, writing – review, and editing: Riccardo Di Gianfilippo.

CONFLICT OF INTEREST STATEMENT

All the authors have no conflicts of interest to declare.

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