

Creeping attachment after 10 years of treatment of a gingival recession with acellular dermal matrix: A case report

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Acellular dermal matrix grafts have become a good alternative to autogenous soft tissue grafts in root coverage. Until now, the literature has reported short- or medium-term data regarding the stability of the gingival margin after the use of acellular dermal matrix on root coverage. The aim of this article is to describe a case report with 10 years of evolution with creeping attachment that developed buccally on a moderate recession of a maxillary canine with an old composite restoration subsequent to an acellular dermal matrix. Long-term creeping attachment and complete root coverage on a restored tooth treated with acellular dermal matrix has not been previously reported in the dental literature. (*Quintessence Int* 2011;42:xxx-xxx)

Key words: acellular dermal matrix, creeping attachment, root coverage

In the last two decades, root coverage has become a predictable periodontal plastic surgical procedure. Traditionally, coverage of denuded root surfaces has been performed by numerous surgical techniques¹ With soft tissue grafts in particular, the connective tissue graft provides excellent esthetics and predictability,² but sometimes the quantity of donor material needed is limited when treating several gingival recessions at once. Likewise, soft tissue grafts will need another surgical area as a donor

site. This area is usually the palate, which eventually increases the morbidity to the patients [au: please clarify this sentence]. Also, some patients are hesitant about the surgical use of the palate as a donor site. Therefore, these limitations have led to the search for other root-coverage techniques.

One of these new surgical alternatives has been the use of acellular dermal grafts[†] [au: what does dagger represent?]. Acellular dermal grafts have been recommended as a way to increase the zone of attached gingiva around teeth and implants, obtain root coverage in gingival recessions, preserve and or increase the gingival thickness in edentulous areas, and eliminate gingival melanin pigmentation.³⁻⁷

Creeping attachment has been reported by several clinicians and is apparently best observed on mandibular anterior teeth with narrow recessions.⁸⁻¹⁰ This phenomenon can be detected 1 to 12 months

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Fig 1 (a) Preoperative clinical appearance of the maxillary right canine. (b) Flap elevated with a partial-thickness dissection. (c) Sutured acellular dermal graft. (d) Sutured overlying flap. (e) Clinical appearance at 6 months. (f) Clinical appearance at 1 year.

after graft surgery with average coverage of about 1 mm.¹⁰

Very limited data on the position and stability of the gingival margin after the application of soft tissue grafts over a long period of time (≥ 5 years) are available.^{11–13} More recently, this phenomenon of creeping attachment was also reported following the use of dermal matrix allograft material by Haeri and Parsell¹⁴; and their findings were comparable to the free gingival graft findings in the literature on creeping attachment. However, this study has shown only short-term data on creeping attachment. Until now, to the author’s knowledge, there is no long-term data (≥ 5 years) of the use of acellular dermal matrix material on the treatment of root coverage. Some studies reported short- or medium-term data dealing with the stability of the gingival margin after the use of acellular dermal grafts on root coverage^{3–7, 15}

This case report describes the creeping attachment that developed buccally on a moderate recession of a maxillary

canine with an old composite restoration subsequent to an acellular dermal matrix graft. To the authors’ knowledge, this degree of root coverage on a restored tooth has not previously been reported in the dental literature.

CASE REPORT

A 65-year-old female presented with the chief complaint of progressive recession and tooth sensitivity on the maxillary right canine (Fig 1a). Prior to the surgical treatment, periodontal phase I therapy was performed, which included oral hygiene instructions, supragingival and subgingival plaque removal, occlusal adjustment, and an occlusal nightguard. During phase I reevaluation and after discussing the treatment options, the patient decided to avoid the palate as a donor surgical site. Therefore, acellular dermal grafting was recommended. The patient gave written informed consent.



Fig 2 (a) Clinical appearance at 3 years. (b) Clinical appearance at 5 years. (c) Clinical appearance at 10 years.

During the clinical examination, it was observed that there was an inadequate band of keratinized tissue with an area of recession of 2.5 mm apical to the composite restoration on the facial aspect of the maxillary right canine. The composite restoration had been placed 6 years earlier. There was mild marginal gingival inflammation. The recession defect was classified as Class III using Miller's classification of the marginal tissue recession.¹

Surgical procedure

Before surgery, the patient was instructed on proper oral hygiene procedures (atraumatic, apicocoronal brushing and personalized interproximal cleaning methods).

Acellular dermal graft was performed according to technique described by Santos et al.³ In brief, after induction of local anesthesia, the composite restoration was removed and the exposed root surface was carefully planed with currettes and ultrasonic instruments. The root surface was not subjected to any chemical conditioning. A scalloped intrasulcular incision was made corresponding to the recession, extending the incision horizontally 3 mm mesially and distally at the level of the cemento-enamel junction. Two oblique coronal incisions were made extending into the alveolar mucosa. A partial thickness flap was raised by sharp dissection. (Fig 1b). The exposed root surface was treated with an acellular dermal matrix allograft (Alloderm, Lifecore Biomedical) that was asepti-

cally rehydrated in sterile saline prior to its placement, according to the manufacturer's instructions. The graft was trimmed to a shape and size designed to cover the root surfaces and surrounding bone. The basement membrane side of the material as placed facing up toward the vestibule. The acellular dermal matrix was sutured over the defect with 5-0 resorbable sutures. (Fig 1c). The previously reflected flap was coronally positioned covering the entire graft and sutured into place using a 5-0 resorbable suture (Fig 1d). No periodontal dressing was placed. The patient was instructed to discontinue toothbrushing and avoid trauma or pressure at the surgical site. An essential oil mouthrinse (Listerine, McNeil) was prescribed twice daily for 2 to 3 weeks following surgery, and an anti-inflammatory drug was also prescribed as needed. The sutures were removed 10 to 15 days after surgery. After this period, the patient resumed mechanical toothbrushing of the treated areas using an ultrasoft toothbrush. The patient was recalled for control and prophylaxis after 2 and 4 weeks and every 4 to 6 months thereafter [au: edit ok?].

At 6 months and 1 year, incomplete root coverage was observed, but with a good esthetic result (Figs 1e and 1f). One year postoperatively, the patient was referred to her general dentist for a new composite restoration. At 3, 5, and 10 years, without any additional surgery, complete root coverage was noticed (Fig 2).

DISCUSSION

This case report showed that after treatment of a gingival recession with an acellular dermal graft, the gingival margin had remained stable after 10 years. Moreover, the gingival margin had shifted coronally from 6 months after surgery and during the follow-up period.

It is known that gingival recession has a multifactorial etiology. The following factors have been implicated in gingival recession: faulty toothbrushing technique (gingival abrasion), tooth malposition, friction from soft tissues (gingival ablation), gingival inflammation, and abnormal frenum attachment. Trauma from [au: edit ok?] occlusion has been suggested in the past, but its mechanism of action has never been demonstrated.¹⁶ However, this case report highlights the possible relationship between occlusal trauma and attachment loss. It has been suggested that traumatic occlusal forces may have a damaging effect on the periodontal tissues,¹⁷ but other clinical studies show no such association.¹⁸ Regarding the relationship between occlusal discrepancies and gingival recession, Harrel et al¹⁹ did not detect any statistically significant relationship between the presence of occlusal discrepancies and initial width of the gingival tissue or between occlusal treatment and changes in the width of the gingiva. It has also been suggested that eccentric occlusal forces may be an etiologic factor for abfraction lesions. Abfractions are not only associated with occlusal factors, such as occlusal wear, but also inlay restorations, altered tooth position, and toothbrushing behavior.²⁰

In this case report, different factors could have been associated with the etiology of the gingival recession: faulty toothbrushing technique, tooth malposition, and traumatic occlusal forces. In fact, in phase 1 periodontal therapy, the patient was instructed and motivated to use proper oral hygiene procedures (atraumatic, apicocoronal brushing technique), occlusal adjustment was performed where fremitus was present, and an occlusal nightguard was provided.

The 2-mm coronal migration of the gingival tissue (creeping) in the present case exceeded the reported mean creeping of 0.89 mm reported⁹ after the 5-year follow-up following surgery. Harris²¹ reported mean creeping attachment of 0.8 mm in his subjects using partial thickness double pedicle connective tissue graft.

Recently, 5 mm of a unique creeping attachment was reported²² after gingival grafting of a deep and wide recession (more than 3 mm) on a maxillary molar which was far more than the amount of creeping in our case and this may be attributed to the type of surgical technique used. This degree of creeping attachment may be attributed to the original width of recession which was less than 3 mm (narrow) and the graft was directly placed over the denuded root surface. This coincided with the findings of Matter and Cimasoni⁸ who studied 20 cases of localized gingival recession treated by free gingival grafts to determine which conditions were predisposed to creeping attachment. In their study, factors which influenced the degree of creeping attachment were width of recession, position of the graft in relation to the denuded root surface, position of the tooth in the arch, the level of interproximal bone height, and oral hygiene and ability to maintain optimum plaque control. In their study, the best results of coverage by creeping attachment were obtained in three cases in which the recession had been classified as narrow (width less than 3 mm) and the graft placed over the denuded root surface. However, creeping attachment was less successful in areas of wide recessions (0% to 33%)

In only one case (a 39-year-old patient) did bilateral creeping attachment result in root coverage of wide recessions on the maxillary canines after autogenous gingival grafting.²³

Some studies²⁴⁻²⁶ reported that creeping attachment took place between 1 month and 1 year after surgery, whereas no other measurable coronal migration was observed after a longer period of time (5 years).⁹ On the contrary, the creeping attachment did not stop 1 year

after surgery in the Agudio et al study.¹³ A continued coronal shift of the gingival margin (mean creeping 0.6 mm) was observed during the entire follow-up period (10 to 25 years).

Another conclusion may be drawn from the results of this case report. Soft tissue augmentation with acellular dermal graft was effective in halting the progression of recession over a 10-year period. Other studies have reported comparable results with other soft tissue graft procedures.^{11–13,26} Kennedy et al²⁶ treated a group of 14 subjects with a combination of recession (2.3 ± 0.22 mm) and reduced attached gingiva (0.8 ± 0.19 mm) at baseline with free gingival grafts. After 6 years, the mean recession was reduced significantly (1.7 ± 0.30 mm) and keratinized tissue increased (5.5 ± 0.14 mm). Paloantonio et al¹¹ showed a mean percentage of root coverage of $85.5\% \pm 17.86\%$ of exposed root surface by a bilaminar connective subpedicle grafts at 5 years postoperatively. Rosberg et al¹² reported long-term stability (6 to 22 years) of root coverage with connective tissue in the envelope technique. Agudio et al¹³ showed that the gingival margin had shifted coronally 1 year after surgery with free gingival grafts, and additional coronal shift was observed during the follow-up period (10 to 25 years).

Regarding the amount of keratinized tissue, this study confirms the study of Agudio et al¹³ where there was a slight reduction over time. In the current case report, there was a slight reduction of keratinized tissue from year 5 to year 10. As Agudio et al¹³ suggested, these controversial remodelling patterns could be explained, at least in part, by a parallel coronal shifting of the mucogingival junction. The potential tendency of the mucogingival junction to regain its original position with time after the gingival augmentation procedure may be supported by a similar trend reported after apically repositioned flap²⁷ and coronally advanced flap procedures.²⁸

More recently, this phenomenon of creeping attachment was also reported

following the use of dermal matrix allograft material by Haeri and Parsell,¹⁴ whose findings were comparable to the free gingival graft findings in the literature on creeping attachment. However, this study has shown only short-term data on creeping attachment.

There is a limited amount of information available on the long-term results of root coverage procedures with the use of acellular dermal grafts. Our result has shown that the gingival margin had shifted coronally 1 year after surgery with an acellular dermal grafts; additional coronal shift was observed during the follow-up period (10 years). This result, in some way, is in contrast to the results of Harris,¹⁵ whose short- (mean 12.3 to 13.2 weeks) and long-term (mean 48.1 to 49.2 months) results obtained with acellular dermal matrix and subepithelial graft were compared. The mean results with the subepithelial graft held up better with time than the mean results with an acellular dermal matrix. However, the results were not universal. In 32.0% of cases treated with an acellular dermal matrix, the results improved or remained stable.¹⁵

Creeping attachment typically occurs within 1 to 12 months of the graft surgery.⁹ However, it seems that creeping attachment may continue to progress beyond the first postoperative year. Even though it seems to occur whenever there has been an attempt to achieve root coverage with graft surgery, the amount of creeping attachment is unpredictable.²¹

Therefore, a well-designed clinical trial, with careful observation of the clinical healing process of soft tissue grafts over the long term, is needed to identify factors that could play a significant role in this clinical finding. Such studies might ultimately elucidate the mechanism of creeping attachment.

CONCLUSION

Long-term creeping attachment and complete root coverage on a restored tooth

treated with an acellular dermal matrix has been obtained. It seems that this procedure has been effective in halting the progression of recession over a 10-year period. However, well-designed clinical trials are needed to confirm the results.

REFERENCES

1. Miller PD. Root coverage grafting for regeneration and aesthetic. *Periodontol 2000* 1993;1:118–187.
2. Chambrone L, Sukekava F, Araujo MG, Pustigliani FE, Chambrone LA, Lima LA. Root coverage procedures for the treatment of localised recession-type defects. *Cochrane Database Syst Rev* 2009;15: CD007161.
3. Santos A, Goumenos G, Pascual A. Management of gingival recession by the use of an acellular dermal graft material: A 12-case series. *J Periodontol* 2005; 76:1982–1990.
4. Henderson RD, Greenwell H, Drisko C, et al. Predictable multiple site root coverage using an acellular dermal matrix allograft. *J Periodontol* 2001; 72:571–582.
5. Griffin TJ, Cheung WS, Zavras AI, Damoulis PD. Hard and soft tissue augmentation in implant therapy using acellular dermal matrix. *Int J Perio Rest Dent* 2004;24:352–361.
6. Novaes AB Jr, de Barros RR. Acellular dermal matrix allograft. The results of controlled randomized clinical studies. *J Int Acad Periodontol* 2008;10:123–129.
7. Park JB. Increasing the width of keratinised mucosa around endosseous implant using acellular dermal matrix allograft. *Implant Dent* 2006;15:275–281.
8. Matter J, Cimasoni G. Creeping attachment after free gingival grafts. *J Periodontol* 1976;47:574–579.
9. Matter J. Creeping attachment of free gingival grafts. A five-year follow-up study. *J Periodontol* 1980;51:681–685.
10. Bell LA, Valluzzo TA, Garnick JJ, Pennel BM. The presence of “creeping attachment” in human gingiva. *J Periodontol* 1978;49:513–517.
11. Paloantonio M, Di Murro C, Cattabriga A, Cattabriga M. Subepithelial connective tissue graft versus free gingival graft in the coverage of exposed root surfaces: a 5-year clinical study. *J Clin Periodontol* 1997;24:51–56.
12. Rosberg M, Eickholz P, Raetzke P, Ratka-Krüger P. Long-term results of rot coverage with connective tissue in the envelope technique: A report of 20 cases. *Int J Perio Rest Dent* 2008;28:19–27.
13. Agudio G, Nieri M, Rotundo R, Cortellini P, Pini Prato GP. Free gingival grafts to increase keratinized tissue: A retrospective long-term evaluation (10 to 25 years) of outcomes. *J Periodontol* 2008;79:587–594.
14. Haeri A, Parsell D. Creeping attachment: Autogenous graft vs. dermal matrix allograft. *Compen Contin Educ Dent* 2000;29:725–729.
15. Harris RJ. A short-term and long-term comparison of root coverage with an acellular dermal matrix and a subepithelial graft. *J Periodontol* 2004;75:734–743.
16. Carranza FA, Rapley JW. *Clinical Periodontology*, ed 9. Philadelphia: WB Saunders, 2002.
17. Harrel SK, Nunn ME. The effect of occlusal discrepancies on periodontitis. II. Relationship of occlusal treatment to the progression of periodontal disease. *J Periodontol* 2001;72:495–505.
18. Pihlstrom BL, Anderson KA, Aeppli D, Schaffer EM. Association between signs of trauma from occlusion and periodontitis. *J Periodontol* 1986;57:1–6.
19. Harrel SK, Nunn ME. The effect of occlusal discrepancies on gingival width. *J Periodontol* 2004;75:98–105.
20. Bernhardt O, Gesch D, Schwahn C, Mack F, Meyer G, John U, Kocher T. Epidemiological evaluation of the multifactorial aetiology of abfractions. *J Oral Rehabil* 2006;33:17–25.
21. Harris RJ. Creeping attachment associated with the connective tissue with partial-thickness double pedicle graft. *J Periodontol* 1997;68:890–899.
22. Otero-Cagide FJ, Otero-Cagide MF. Unique creeping attachment after autogenous gingival grafting: Case report. *J Can Dent Assoc* 2003;69:432–435.
23. Pollack RP. Bilateral creeping attachment using free mucosal grafts. A case report with 4-year follow-up. *J Periodontol* 1984;55:670–672.
24. Borghetti A, Gardela JP. Thick gingival autograft for the coverage of gingival recession: A clinical evaluation. *Int J Perio Rest Dent* 1990;10:216–229.
25. Laney JB, Saunders VG, Garnick JJ. A comparison of two techniques for attaining root coverage. *J Periodontol* 1992;63:19–23.
26. Kennedy JE, Bird WC, Palcanis KG, Dorfman HS. A longitudinal evaluation of varying widths of attached gingiva. *J Clin Periodontol* 1985;12:667–675.
27. Ainamo A, Bergenholtz A, Hugoson A, Ainamo J. Location of mucogingival junction 18 years after apically repositioned flap surgery. *J Clin Periodontol* 1992;19:49–52.
28. Pini Prato GP, Baldi C, Nieri M, et al. Coronally advanced flap: The post-surgical position of the gingival margin is an important factor for achieving complete root coverage. *J Periodontol* 2005;76:713–722.