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## Modified Coronally Advanced Flap Technique for Managing Orthodontic Related Gingival Recession

Fabia Yustiaputri\* , Eka F Augustina, I Gusti A Aditya Putra

Universitas Airlangga, Surabaya, Indonesia

Email: [fabia.yustaputri-2023@fkg.unair.ac.id](mailto:fabia.yustaputri-2023@fkg.unair.ac.id)\*, [eka-f-a@fkg.unair.ac.id](mailto:eka-f-a@fkg.unair.ac.id),  
[dhekkimi@gmail.com](mailto:dhekkimi@gmail.com)

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### ABSTRACT

**Keywords:** *Gingival recession; gingival phenotype; coronally advance flap; acellular dermal matrix*

*Background: Gingival recession is one of the most common mucogingival deformities requiring surgical correction. Various mucogingival therapies are available as treatment options for gingival recession, such as connective tissue graft, coronally positioned flap, and acellular dermal matrix application. The acellular dermal matrix (ADM) contains undamaged collagen and elastin matrices and can be used as a substitute for a connective tissue graft (CTG) during the root coverage procedure. This case report studies the effects of ADM graft (SureDerm®) combined with coronally advanced flap (CAF) on root coverage and aesthetics for the treatment of multiple gingival recessions associated with orthodontic treatment in patients with a thin gingival phenotype. A 25-year-old male patient presented to the Periodontics Specialist Clinic at the Dental Hospital, Universitas Airlangga, with the chief complaint of dental hypersensitivity and aesthetic concerns in the maxillary central incisors. The patient had undergone orthodontic treatment for two years and had worn a mandibular lingual retainer for two years before the mucogingival therapy. A modified envelope papilla preservation technique with the additional use of acellular dermal matrix (SureDerm®) was performed to improve gingival thickness and reduce recession length. The three-month follow-up showed an increase in gingival thickness and a decrease in recession length. The success of this treatment depends on the surgical technique and procedure used, and it is measured by the absence of further complaints and the correction of gingival recession. The coronally advanced flap technique with the additional use of acellular dermal matrix (SureDerm®) is effective for managing orthodontic-related gingival recession.*



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### INTRODUCTION

Gingival recession is defined as the displacement of the marginal gingiva to the cemento-enamel junction, leading to exposure of the root surface to the oral environment (Cadenas De Llano-Pérula et al., 2023; Chatzopoulou & Johal, 2015). The prevalence of gingival recession in the global population is 78%, and 5–32% of adults have advanced gingival recession (Dias et al., 2025; Pasca et al., 2023). Many problems occur as a result of gingival recession; it can lead to tooth hypersensitivity, loss of periodontal support, difficulties in maintaining oral hygiene, increased susceptibility to caries, and aesthetic concerns, which seem to be a major issue for patients (Cadenas De Llano-Pérula et al., 2023; Chambrone & Zadeh, 2024; Fu et al., 2025; Gürlek et al., 2020; Jagtap et al., 2023; Morris et al., 2017). Some predisposing factors for gingival recession include a thin periodontal phenotype, reduced alveolar bone thickness, occlusal trauma, age, traumatic tooth brushing, the use of hard-bristled toothbrushes, osseous dehiscence, and the accumulation of biofilm and calculus. Additionally,

the use of fixed orthodontic devices or retainers is also a contributory factor (Dias et al., 2025; Pasca et al., 2023).

Gingival recession is one of the most common mucogingival deformities requiring surgical correction (Shafira Kurnia et al., 2022). To date, the surgical procedures recommended for root coverage to treat gingival recession include pedicle tissue grafts, free tissue grafts, and combined procedures involving tissue regeneration (Guan et al., 2016). Coronally advanced flap (CAF) is an important component of periodontal plastic surgery used to treat Miller Class I/II gingival recession (Zhan et al., 2022). CAF can be used alone or together with connective tissue grafting (CTG), enamel matrix derivative (EMD), acellular dermal matrix (ADM), platelet-rich fibrin (PRF), or in conjunction with low-intensity laser therapy (Cairo et al., 2016; Guan et al., 2016; Zhan et al., 2022).

Acellular dermal matrix (ADM) serves as a substitute for an autogenous graft when it is difficult or impossible to harvest a connective tissue graft (Dadlani, 2021; Halim & Sulijaya, 2024; Tognetti et al., 2021). It contains undamaged collagen and elastin matrices that can be used as a substitute for connective tissue graft (CTG) during root coverage procedures. The fact that it eliminates the need for a flap graft procedure helps to reduce patient discomfort associated with such treatments (Guan et al., 2016; Tavelli et al., 2019; Zhan et al., 2022). This case report aimed to evaluate the clinical effectiveness of ADM graft (SureDerm®) combined with coronally advanced flap (CAF) on root coverage and aesthetics in managing orthodontic-related gingival recession. The purpose of this case report is to provide clinical evidence regarding the effectiveness of the modified coronally advanced flap technique with ADM in managing orthodontic-related gingival recession, to contribute to the body of knowledge on mucogingival therapy alternatives, and to offer practical guidance for clinicians in selecting appropriate surgical techniques for patients with a thin gingival phenotype undergoing orthodontic treatment.

## **METHOD**

A 25 year male patient came to Periodontics Specialist Clinic in Dental Hospital Universitas Airlangga with chief complaint of dental hypersensitivity and aesthetic issue on the maxilla central incisors. Patient was on orthodontic treatment for two years to correct dental misalignment, had them removed in 2022 and wearing retainer in mandibular lingual for two years. The patient brushes his teeth twice daily, once in the morning and once in the evening. The patient denied having a history of systemic illnesses (such diabetes and hypertension) or drug and food sensitivities, nor did they smoke or had a bruxism while they slept. Clinical examination performed outside the mouth did not find any anomalies. Intra-oral clinical examination revealed Miller's class I gingival recession on teeth #11 and #21, details regarding the gingival condition are provided in Figure 1 and Table 1.





**Figure 1.** Pre-operative clinical photograph (A) Post-orthodontic treatment , (B) Periapical photograph, (C) Clinical recession on #11 (D) Clinical recession on #21  
Source: Personal documentation

**Table 1.** Pre-operative clinical photograph (A) Clinical recession on #11 (B) Clinical recession on #21

#	RT	REC	GT	KTW	CEJ	STEP
11	RT1	1 mm	< 1 mm	6 mm	A	-
21	RT1	2 mm	< 1 mm	6 mm	A	-

Source: Primary data from clinical examination (2026)

RT: Recession type; REC: Recession depth; GT: Gingival type; KTW : Keratinized tissue width; CEJ: Cemento enamel junction type ; STEP: Root Surface Concavity

### Case Management

The treatment plan proposed to the patient to resolve multiple recession with an acellular dermal matrix. The patient consented to the treatment, and the coronally advance flap with envelope surgical treatment was chosen. The patient agrees if the case management will be published. In the initial phase of treatment, Dental Health Education (DHE), scaling and root planing were performed, along with occlusal adjustment on booth the upper and lower jaws.

During the subsequent surgical phase, strict asepsis was established for booth the extraoral and intraoral areas. Topical anesthesia was first applied using Topical Anesthetic Spray (Xylonor Spray, Septodont, UK), followed by local anesthesia (Orabloc, Phapros) and then the exposed root surface was smoothed and etched with EDTA (Meta Biomed). After marking the incision line with a UNC-15 probe, a bevel incision was made with a No.15c blade to get split thickness approach.

The flap was elevated using periosteal elevator to achieved a full thickness approach, followed by an additional incision to get a split thickness approach. After the flap is opened, an alveolectomy was performed and the bone is smoothed using a bonefile to achieve tension-less flap and provide sufficient space for ADM material.

Before the Acellular Dermal Matrix (SureDerm□) was applied and sutured with absorbable Polyglecaprone25 5.0 sutures, rootplaning is performed in the probable recession area and de-epithelialization is conducted on the papilla. The surgical site was then irrigated with normal saline (NaCl), followed with Platelet Poor Plasma (PPP). Finally, the flap was

repositioned and sutured using Nylon 5.0 sutures without tension for ensuring complete coverage of the ADM, as shown at Figure 2.



**Figure 2.** Coronally Advanced Flap Procedure, (A) ADM application, (B) Suture the ADM, (C) Completely cover with sling suture.

Source: Personal documentation

After the surgical procedure, the patient was given analgesic mefenamic acid 500 mg twice daily for three days, as well as chlorhexidine 0,12% mouthwash twice daily after brushing his teeth. Patient was advised to practice good dental hygiene at all times and to stay away from hot, spicy and acidic foods. The patient was instructed to attend follow up appointments on day 7, day 14, day 30 and day 90. At the 90-day follow-up, the clinical examination revealed a reduction in gingival recession and an increase in gingival thickness, as shown in Figure 3



**Figure 3.** Post-operative clinical documentation (A) Day 7, (B) Day 14, (C) Day 30, (D) Day 90, (E) Comparison with pre-operative

Source: Personal documentation

## **RESULTS AND DISCUSSION**

Significantly higher prevalence, severity, and extent of gingival recession have been found in orthodontic patients. Several studies have reported significantly more recession and increased clinical crown height in patients who underwent orthodontic incisor proclination (AlBagshi et al., 2024; Lee et al., 2020). Multiple recessions present a great challenge to the clinician (Kaur, 2024). The modified envelope papilla preservation technique was performed for the coverage of multiple recessions and to provide adequate vascularity, as the region was within the aesthetic zone. It is a redesigned version of the classic coronally advanced flap (CAF) approach (Windisch & Molnar, 2019). This technique has advantages over other surgical methods, as it avoids the use of vertical incisions and the need to incise the papilla, thereby reducing scarring and improving aesthetics (Suhartono et al., 2024).

Acellular dermal matrix (ADM) serves as a scaffold in the regeneration of periodontal tissue. It contains a high concentration of collagen, primarily type I and type III, which are

essential for periodontal tissue regeneration (Shafira Kurnia et al., 2022). The combination of acellular dermal matrix (ADM) and coronally advanced flap (CAF) provides effective results for the treatment of Miller Class I/II or Cairo RT1 gingival recession (Mostafa & Fatima, 2022). The application of ADM increases the thickness of the flap margin, which is considered important for defect coverage (Guan et al., 2016).

Postoperative images showed significant improvement compared to preoperative photographs. There was no recurrence of recession following treatment, and the gingiva appeared thicker. The patient no longer experienced subjective symptoms such as discomfort caused by tooth hypersensitivity and reported improved confidence when smiling. A thin gingival biotype, previous gingival recession, baseline width of keratinized gingiva, and facial gingival margin thickness are correlated with an increased risk of gingival recession after orthodontic treatment. The coronally advanced flap technique, combined with the modified envelope papilla preservation technique and the additional use of acellular dermal matrix (SureDerm®), is effective for managing orthodontic-related gingival recession.

## **CONCLUSION**

The modified coronally advanced flap technique with the additional use of acellular dermal matrix (SureDerm®) proved effective in managing orthodontic-related gingival recession in a 25-year-old male patient with a thin gingival phenotype. The three-month follow-up evaluation demonstrated significant clinical improvements, including increased gingival thickness, reduced recession depth, and complete resolution of dental hypersensitivity. The modified envelope papilla preservation technique successfully provided adequate vascularity and optimal aesthetic outcomes in the maxillary anterior region without the need for vertical incisions. The application of ADM effectively served as a scaffold for periodontal tissue regeneration, contributing to enhanced flap thickness and improved defect coverage. The patient reported no further discomfort and expressed satisfaction with the aesthetic results, allowing for confident smiling. This case report concludes that the combination of coronally advanced flap with acellular dermal matrix is a reliable and effective treatment modality for multiple gingival recessions associated with orthodontic treatment, particularly in patients with a thin gingival phenotype. Further research with longer follow-up periods and larger sample sizes is recommended to confirm the long-term stability of this technique.

## **REFERENCES**

- Cadenas De Llano-Pérula, M., Castro, A. B., Danneels, M., Schelfhout, A., Teughels, W., & Willems, G. (2023). Risk factors for gingival recessions after orthodontic treatment: A systematic review. *European Journal of Orthodontics*, *45*, 528–544.
- Cairo, F., Cortellini, P., Pilloni, A., Nieri, M., Cincinelli, S., Amunni, F., et al. (2016). Clinical efficacy of coronally advanced flap with or without connective tissue graft for the treatment of multiple adjacent gingival recessions in the aesthetic area: A randomized controlled clinical trial. *Journal of Clinical Periodontology*, *43*(10), 849–856.
- Chambrone, L., & Zadeh, H. H. (2024). Evidence-based rationale for the management of mucogingival deformities before or after orthodontic treatment. *Seminars in Orthodontics*, *30*, 95–104.
- Chatzopoulou, D., & Johal, A. (2015). Management of gingival recession in the orthodontic

- patient. *Seminars in Orthodontics*, 21(1), 15–26.
- Dadlani, S. (2021). Porcine acellular dermal matrix: An alternative to connective tissue graft— A narrative review. *International Journal of Dentistry*, 2021, 1652032.
- Dias, A. T., Lopes, J. F., Fernandes, J. C. H., & Fernandes, G. V. O. (2025). The treatment of gingival recessions in the lower anterior region associated with the use/absence of lingual-fixed orthodontics retainers: Three case reports using the laterally closed tunnel technique and parallel incision methods. *Dentistry Journal*, 13(3), 93.
- Fu, Y., Zhang, Z., Tang, X., & Su, J. (2025). A narrative review of papilla preservation techniques in clinical dentistry. *Medicine*, 104, e41033.
- Guan, W., Liao, H., Guo, L., Wang, C., & Cao, Z. (2016). Root coverage using a coronally advanced flap with or without acellular dermal matrix: A meta-analysis. *Journal of Periodontal & Implant Science*, 46(1), 22–34.
- Gürlek, Ö., Gümüş, P., Nizam, N., & Buduneli, N. (2020). Coronally advanced flap with connective tissue graft or xenogeneic acellular dermal matrix in the treatment of multiple gingival recessions: A split-mouth randomized clinical trial. *Journal of Esthetic and Restorative Dentistry*, 32(4), 380–388.
- Halim, F. C., & Sulijaya, B. (2024). Allogenic acellular dermal matrix and xenogeneic dermal matrix as connective tissue graft substitutes for long-term stability gingival recession therapy: A systematic review and meta-analysis. *European Journal of Dentistry*, 18(2), 430–440.
- Jagtap, A., Mangalekar, S. B., & Kamble, P. (2023). Clinical evaluation of coronally advanced flap with or without advanced platelet-rich fibrin membrane in the treatment of Miller’s class II localized gingival recession: A clinical study. *Cureus*, 15(2).
- Kaur, N. (2024). Clinical outcome of root coverage following the treatment of multiple gingival recession defects treated with VISTA in combination with PRF and Zucchelli’s technique: A case series. *Open Access Journal of Dental Sciences*, 9(1).
- Lee, J. B., Baek, S. J., Kim, M., & Pang, E. K. (2020). Correlation analysis of gingival recession after orthodontic treatment in the anterior region: An evaluation of soft and hard tissues. *Journal of Periodontal & Implant Science*, 50(3), 146–158.
- Morris, J. W., Campbell, P. M., Tadlock, L. P., Boley, J., & Buschang, P. H. (2017). Prevalence of gingival recession after orthodontic tooth movements. *American Journal of Orthodontics and Dentofacial Orthopedics*, 151(5), 851–859.
- Mostafa, D., & Fatima, N. (2022). Gingival recession and root coverage up to date: A literature review. *Dentistry Review*, 2(1), 100008.
- Pasca, T., Sinisi, F., Haddad, G. E., Haddad, E. E., & Haddad, E. E. (2023). Envelope graft technique for the treatment of single gingival recession: A 17-year follow-up case report. *Annals of Stomatology*, 3(3), 101–106.
- Shafira Kurnia, Mulyati, & Lubna. (2022). Mucogingival surgery with SureDerm application for gingival recession treatment in periodontics clinic University of Airlangga in 2022. *World Journal of Advanced Research and Reviews*, 16(2), 335–340.
- Suhartono, M., Prahasanti, C., & Wiyono, N. (2024). The treatment of Miller’s class I gingival recession implementing the modified coronally advanced tunnel technique (MCAT) and acellular dermal matrix (ADM). *International Journal of Health & Medical Research*, 3(3).
- Tavelli, L., Barootchi, S., Di Gianfilippo, R., Modarressi, M., Cairo, F., Rasperini, G., et al. (2019). Acellular dermal matrix and coronally advanced flap or tunnel technique in the treatment of multiple adjacent gingival recessions: A 12-year follow-up from a randomized clinical trial. *Journal of Clinical Periodontology*, 46(9), 937–948.
- Tognetti, L., Pianigiani, E., Ierardi, F., Lorenzini, G., Casella, D., Liso, F. G., De Pascalis, A., Cinotti, E., & Rubegni, P. (2021). The use of human acellular dermal matrices in

- advanced wound healing and surgical procedures: State of the art. *Dermatologic Therapy*, 34(4), e14987.
- Windisch, P., & Molnar, B. (2019). Surgical management of gingival recession using autogenous soft tissue grafts. *Clinical Dentistry Reviewed*, 3(1).
- Zhan, Y., Wang, M., Cao, X., & Liu, F. (2022). Effectiveness of acellular dermal matrix graft with a coronally advanced flap for the treatment of Miller class I/II single gingival recession with thin gingival phenotype: Study protocol for a split-mouth randomised controlled trial. *BMJ Open*, 12(1).