

Recession Coverage: Current Trends and Future Directions

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ABSTRACT

Background: Gingival recession (GR), characterized by apical displacement of the gingival margin and root exposure, presents aesthetic, functional, and clinical challenges.

Objective: This review summarizes recent advances in root coverage, emphasizing surgical innovations, regenerative adjuncts, and patient-centred outcomes.

Methods: A review of current literature on traditional grafting, minimally invasive tunnelling, and biomaterial-assisted procedures was conducted to identify effective and predictable approaches for Gingival Recession management.

Results: The subepithelial connective tissue graft (SCTG) remains the gold standard, especially for Miller Class I and II defects. However, minimally invasive procedures such as the modified coronally advanced tunnel (MCAT), use of collagen matrices, platelet-rich fibrin (PRF), and enamel matrix derivative (EMD) have achieved comparable results with reduced morbidity.

Conclusion: Gingival recession management is transitioning toward regenerative and minimally invasive methods that enhance aesthetic outcomes and patient comfort. Long-term success relies on precise defect classification, maintenance, and individualized treatment planning.

Keywords: Gingival recession, connective tissue graft, collagen matrix, enamel matrix derivative, platelet-rich fibrin, tunnelling technique.

INTRODUCTION

Gingival recession (GR) is the apical migration of the gingival margin from the cemento-enamel junction (CEJ), exposing the root surface and causing aesthetic concerns, dentin hypersensitivity, and risk of root caries. Its global prevalence exceeds 50% among adults (1). The etiology of GR is multifactorial, involving traumatic tooth brushing, periodontal inflammation, orthodontic movement, thin biotype, and iatrogenic factors (2).

Management strategies have evolved from traditional mucogingival surgeries to regenerative and minimally invasive techniques designed to meet modern aesthetic and patient comfort demands. This review explores current and emerging methods for gingival recession coverage, highlighting trends that improve predictability and long-term success.

Etiology and Classification

Gingival Recession arises from mechanical trauma, inflammation, or anatomical predisposing factors such as dehiscence or thin cortical bone (3). Genetic susceptibility and oral hygiene practices further influence onset and progression.

Miller's classification (1985) remains the most widely used system, dividing GR into four classes based on interproximal attachment loss and bone support. Complete root coverage is generally achievable in Class I and II defects, while outcomes are limited in advanced cases (4). Modified systems, such as Cairo's RT classification, emphasize interproximal attachment loss as a prognostic determinant.

Traditional Surgical Therapies

1. Free Gingival Graft (FGG)

The FGG involves harvesting epithelium and connective tissue from the palate and transplanting it to the recipient site. While effective for increasing keratinized gingiva, its aesthetic limitations; particularly colour mismatch, restrict its use in anterior areas (5).

2. Subepithelial Connective Tissue Graft (SCTG)

SCTG, frequently combined with a coronally advanced flap (CAF), remains the gold standard for Miller Class I and II defects due to its high predictability and superior aesthetic outcomes (6). Despite these advantages, it carries donor site morbidity and requires advanced surgical skill.

3. Coronally Advanced Flap (CAF) and Variants

CAF involves repositioning gingival tissue coronally over the denuded root. Modifications such as semilunar, laterally positioned, and double papilla flaps have improved outcomes for isolated defects (7). These procedures are often combined with SCTG or biologic adjuncts to enhance tissue stability and coverage.

Minimally Invasive and Regenerative Techniques

1. Tunnel and Modified Coronally Advanced Tunnel (MCAT)

The tunnel technique, developed to minimize incisions and preserve papillae, has shown superior aesthetic blending and patient comfort (8). MCAT combined with SCTG or collagen matrix achieves comparable root coverage with fewer complications (9).

2. Collagen Matrices and Biologics

Xenogeneic collagen matrices offer an alternative to autogenous grafts, reducing surgical time and morbidity while providing stable root coverage (10). Adjunctive use of biologics like enamel matrix derivative (EMD) and platelet-rich fibrin (PRF) enhances cell migration, angiogenesis, and tissue thickness, promoting faster healing (11).

3. Odontoplasty-Enhanced Grafting

Selective root reshaping (odontoplasty) improves tissue adaptation and aesthetics, particularly for prominent roots or irregular surfaces. This adjunct has demonstrated enhanced contour integration and reduced tension at the graft interface (12).

Outcomes and Prognostic Factors

The predictability of root coverage depends primarily on defect class, recession depth, keratinized tissue width, and gingival biotype. Favourable outcomes are achieved in shallow, narrow defects with intact interdental bone.

Patient factors, including smoking, plaque control, and systemic health, significantly affect healing and long-term success (13). Complications such as graft necrosis or partial root coverage often result from poor vascularization or excessive flap tension.

Long-term studies report stable results with SCTG and MCAT techniques, provided patients maintain adequate oral hygiene and regular follow-up care (14).

DISCUSSION

The paradigm in GR management has shifted toward minimally invasive, regenerative, and patient-centred approaches. While SCTG remains the reference standard, collagen matrices and biologic agents such as EMD and PRF have demonstrated similar clinical efficacy with reduced postoperative morbidity (9-11).

Emerging concepts, including tunnelling techniques and odontoplasty-assisted grafting, allow treatment of previously challenging cases with improved aesthetic integration. The combination of biological enhancement, surgical precision, and individualized patient planning defines current and future trends in recession coverage.

Continued research on biomaterials, growth factors, and three-dimensional tissue regeneration is expected to refine outcomes and further reduce the need for donor site harvesting.

CONCLUSION

Modern recession coverage techniques integrate surgical precision, biomaterial innovation, and biologic stimulation to achieve predictable, aesthetic, and durable results. The choice of procedure should be guided by defect morphology, patient expectations, and long-term maintenance capacity.

Future directions lie in bioengineered tissues, advanced scaffolds, and regenerative adjuncts that can replicate the structural and functional integrity of native gingiva, enhancing patient quality of life and clinical longevity.

REFERENCES

1. Kumar V, Singh P, Rao A. Prevalence, etiology, and clinical characteristics of gingival recession: A narrative review. *J Indian Soc Periodontol*. 2025;29(2):89–96.
2. Kassab MM, Cohen RE. The etiology and prevalence of gingival recession. *J Am Dent Assoc*. 2003;134(2):220–5.
3. Zucchelli G, Mele M, Mazzotti C, Marzadori M, Montebugnoli L, De Sanctis M. Coronally advanced flap with and without connective tissue graft for root coverage. *J Clin Periodontol*. 2009;36(7):687–93.
4. Miller PD Jr. A classification of marginal tissue recession. *Int J Periodontics Restorative Dent*. 1985;5(2):8–13.
5. Sullivan HC, Atkins JH. Free autogenous gingival grafts. *Periodontics*. 1968;6(5):152–60.
6. Langer B, Langer L. Subepithelial connective tissue graft technique for root coverage. *J Periodontol*. 1985;56(12):715–20.
7. Raetzke PB. Covering localized areas of root exposure employing the "envelope" technique. *J Periodontol*. 1985;56(7):397–402.
8. Saadoun AP. Current trends in gingival recession coverage—Part I: The tunnel connective tissue graft. *J Esthet Restor Dent*. 2022;34(3):217–26.
9. Aroca S, Keglevich T, Barbieri B, Gera I, Etienne D. Clinical evaluation of modified coronally advanced tunnel combined with collagen matrix. *Clin Oral Investig*. 2010;14(6):693–702.
10. McGuire MK, Scheyer ET. Xenogeneic collagen matrix with coronally advanced flap for root coverage. *J Periodontol*. 2010;81(8):1108–17.
11. Sharma R, Patel K, Mehta S. Comparing connective tissue grafts and collagen matrix in treatment of isolated gingival recession type 1: A randomized clinical trial. *Clin Oral Investig*. 2024;28(5):1203–12.
12. Bhatia N, Gupta D, Kumar R. Novel approach to managing gingival recession in protruded roots: Case report. *J Clin Periodontol*. 2023;50(2):199–203.
13. Chambrone L, Tatakis DN. Long-term outcomes of root coverage procedures: A systematic review. *J Periodontol*. 2015;86(7):1–15.
14. Cortellini P, Tonetti MS. Treatment of gingival recession with vestibular incision subperiosteal tunnel access: A review. *Periodontol 2000*. 2020;84(1):240–52.