



## Changing Trends in Root Coverage Procedures using Choukroun's Magic Wand (Platelet Rich Fibrin): A Review

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### ABSTRACT

Esthetics is the science of beauty and encompasses almost every field of dentistry. Gingival recession is defined as the oral exposure of the root surface due to displacement of the gingival margin apical to the cement-enamel junction and it is regularly linked to the deterioration of dental aesthetics. It has been associated with many factors such as inflammatory periodontal disease, developmental anatomic abnormalities (aberrant frenal attachment, thin bony plate), toothbrush injury, tooth malposition and iatrogenic factors. Among the various treatment modalities for root coverage, Coronally Advanced Flap (CAF) procedure demonstrates a high percentage of root coverage with a high predictability and without significant post-surgical complications. Management of gingival recession using Choukroun's Magic Wand i.e. Platelet Rich Fibrin along with CAF, undoubtedly is a promising treatment modality for root coverage in vogue and should definitely be explored in future.

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### Introduction

Gingival recession is the displacement of the gingival margin apical to the cemento-enamel junction resulting in the exposure of root surface.<sup>1</sup> Besides compromised esthetics, gingival recession also results in a variety of other problems such as root hypersensitivity, a higher incidence of root caries and diminished plaque control, thus necessitating treatment.<sup>2</sup> Gingival Recession is observed more frequently on the labial/buccal surfaces of the teeth.<sup>3,4,5</sup>

#### Etiology of Gingival Recession:<sup>6</sup>

It has been associated with many factors such as:

1. Inflammatory periodontal disease (considered as the principal etiologic factor).
2. Ageing.
3. Developmental anatomic abnormalities (dehiscences, thin bony plates, high frenum attachments).
4. Malalignment of teeth.
5. Trauma while toothbrushing.
6. Deleterious habits (pressure from foreign objects, fingernails, pencils, hairpins).
7. Iatrogenic factors (Doctor-Induced)- such as orthodontic forces, pressure from bands, arch wires, clasps, subgingival restorations, post periodontal surgery.

#### Gingival Recession and Tissue Biotype

Gingival recession involves loss of both soft tissue as well as hard tissue. The probability of gingival recession is more when the thickness of gingiva is less. A thicker gingival tissue is more stable and provides better resistance against recession. According to McFall, tissue thickness in the recipient site and the donor site are key factors in how mucogingival defects are treated.<sup>7</sup> An initial gingival thickness was found to be the most predictable factor for predicting the success of complete

root coverage procedures.<sup>8</sup> There is a correlation between flap thickness and complete root coverage.<sup>9</sup>

The thickness of the gingiva in the facio-palatal dimension has been described as gingival biotype<sup>10</sup> which is classified commonly as thick, normal and thin. It has been quoted in several studies that a thick biotype is more resistant to recession. Since studies have concluded that the thickness of the gingiva plays a vital role in development of mucogingival problems and in the success of treatment for recession and wound healing, assessment of gingival thickness is relevant to clinical periodontics.<sup>11</sup> It has also been shown that subjects with thin marginal tissue are more prone to the development of mucogingival problems, particularly in case of thin underlying bone.

#### Classification of gingival recession

Several classification systems have been proposed in the literature in order to facilitate the diagnosis of gingival recession.

Sullivan's and Atkins in 1968 classified recession into four categories.<sup>12</sup>

1. Shallow – Narrow
2. Shallow – Wide
3. Deep – Narrow
4. Deep – Wide

Mlinek et al in 1973 classified recession as, <sup>6</sup>

1. Shallow-narrow clefts as being <3 mm in both dimensions.
2. Deep-wide defects as being >3 mm in both dimensions.

#### Miller's classification of gingival recession.<sup>13</sup>

Four types of recession defects were categorized on the basis of evaluation of the soft and hard periodontal tissues.

Class I – Marginal tissue recession does not extend to the mucogingival junction (MGJ). There is no periodontal loss

(bone or soft tissue) in the interdental area and 100% root coverage can be anticipated.

**Class II** - Marginal tissue recession that extends to or beyond the MGJ. There is no periodontal loss (bone or soft tissue) in the interdental area and 100% root coverage can be anticipated. **Class III** - Marginal tissue recession that extends to or beyond the MGJ. Bone or soft tissue loss in the interdental area is present or there is malpositioning of the teeth, which prevents the attempting of 100% of root coverage. Partial root coverage can be anticipated.

**Class IV** - Marginal tissue recession that extends to or beyond the MGJ. The bone or soft tissue loss in the interdental area and/or malpositioning of teeth is so severe that root coverage cannot be anticipated.

#### Ahajan's modification of Miller's classification.<sup>14</sup>

1. **Class I:** Gingival tissue recession not extending to mucogingival junction.
2. **Class II:** Gingival tissue recession extending to mucogingival junction or beyond it.
3. **Class III:** Gingival tissue recession with bone or soft-tissue loss in interdental area up to cervical 1/3 of root surfaces and/or malpositioning of the teeth.
4. **Class IV:** Gingival tissue recession with severe bone or soft tissue loss in interdental area greater than cervical 1/3 of root surface and/or severe malpositioning of teeth.

#### Prognosis according to Mahajan's modification

- BEST** - Class I and Class II with thick gingival profile.  
**GOOD** - Class I and Class II with thin gingival profile.  
**FAIR** - Class III with thick gingival profile.  
**POOR** - Class III and Class IV with thin gingival profile.

#### Management of gingival recession with Choukroun's Magic Wand- PRF

Treatment modalities for root coverage can be classified as pedicle grafts, free soft-tissue grafts or a combination of the two. Among the soft-tissue grafts, the subepithelial connective tissue graft combined with or without a coronally advanced flap (CAF), is the most widely used and predictable technique in the esthetic treatment of gingival recession.<sup>15</sup> The goals of treatment are to restore the tissue margin to the CEJ and to create a normal gingival sulcus with functional attachment. Among these treatment modalities, root coverage with coronally advanced flap holds the most promising results and hence could be considered as the "gold standard" procedure in the treatment of gingival recession defects.<sup>16</sup>

Although CAF has been regarded as gold standard yet long term studies have shown post-operative recurrence of recession.<sup>17</sup> One of the reasons for recurrence can be the presence of thin tissue at the site of recession so an attempt to increase the thickness of mucosa can prevent chances of recurrence. For this purpose subepithelial connective tissue graft (SCTG) can be used. But SCTG has got its own limitations, such as lack of graft availability, need for a second surgical site, proximity to palatine neurovascular complex and unaesthetic tissue contour at the recipient site. To overcome these limitations and to accomplish optimum root coverage by increasing the thickness of mucosa, many newer generation biomaterials have been proposed such as EMDOGAIN, Amnion-Chorion allograft, Platelet Rich Plasma etc. But they have certain drawbacks such as lack of availability, cost-effectiveness, difficulty of preparation etc. which make them less favourable. A more favourable biomaterial is the autologous Platelet Rich Fibrin clot (PRF) which has the advantages of ease of preparation/application, minimal

expense, and lack of biochemical modification i.e. no bovine thrombin or anticoagulant is required.<sup>18</sup>

#### Platelet Rich Fibrin

Platelet-rich fibrin (PRF), a second generation platelet concentrate, developed in France by Choukroun et al. (2001) was initially intended for specific use in oral and maxillofacial surgery.<sup>19</sup> It is widely used to accelerate soft and hard tissue healing. PRF consists of an intimate assembly of cytokines, glycan chains and structural proteins enmeshed with a slowly polymerized fibrin meshwork. These biochemical components have well known synergistic effects on healing processes.

#### Method of Preparation

10 ml of blood is drawn intravenously from the antecubital vein of each patient and centrifuged by using a temperature controlled centrifuge machine for 10 minutes at 3000 revolutions per minute (rpm). (Fig.1)



**Fig 1. PRF preparation**

The resultant product consists of three layers.

- Platelet poor plasma supernatant.
- Platelet rich fibrin in the middle layer.
- Red blood cells at the bottom.

Because of the absence of an anticoagulant, blood begins to coagulate as soon as it comes in contact with the glass surface. Therefore, for successful preparation of PRF, speedy blood collection and immediate centrifugation, before the clotting cascade is initiated, is absolutely essential.

PRF can be obtained in the form of a membrane by squeezing out the fluids in the fibrin clot. PRF is separated from the other two layers. PRF can be obtained in the form of a membrane by squeezing out the fluids in the fibrin clot. Then it is placed over the denuded root surface.

#### Discussion

A recent innovation in dentistry is the preparation and use of platelet concentrates such as platelet rich plasma (PRP) and platelet rich fibrin (PRF), a concentrated suspension of growth factors found in platelets. These growth factors are involved in wound healing and are postulated as promoters of tissue regeneration. Using platelet concentrates, is a way to accelerate and enhance the body's natural wound healing mechanisms. Platelets contain important growth factors that, when secreted, are responsible for increasing cell mitosis, increasing collagen production, recruiting other cells to the site of injury, initiating vascular in-growth, and inducing cell differentiation.<sup>18,19</sup>

One of the main differences between fibrin adhesives, PRP and PRF is attributable from the gelling mode. PRF belongs to a new generation of platelet concentrates with simplified processing. PRF preparation techniques require neither anticoagulant nor bovine thrombin. Clinical implications and advantages of PRF membrane as graft material are related to advanced tissue healing postoperatively. Similarly, the exposure of root surface to PRF provides a scaffold for cell migration, proliferation and upregulation of collagen synthesis in the extracellular matrix. Platelet degranulation releases various growth factors like platelet-derived growth factors (PDGFs), transforming growth factor - beta (TGF- $\beta$ ), vascular endothelial growth factor (VEGF), and epidermal growth factor (EGF), insulin like growth factor-1 (IGF-1) which promotes regeneration, rapid angiogenesis and easier remodeling of fibrin in a more resistant connective tissue, thereby enhancing wound healing. PRF has also shown to improve the final esthetic result of periodontal soft tissues along with hard and soft tissue maturation when used in conjunction with various root coverage procedures.<sup>20</sup>

### Conclusion

Among the various treatment modalities of root coverage Coronally Advanced Flap (CAF) procedure demonstrates a high percentage of root coverage with a high predictability and without significant post-surgical complications. The root coverage gained by this technique has been reported as stable over long term.<sup>21</sup>

Therefore, CAF procedure has commonly served as “gold standard” to evaluate the safety and results of new root coverage techniques. CAF has been frequently used because of its demonstrated advantages, which improved color blending and high degree of clinical success.

Management of gingival recession using Choukroun's magic wand i.e. PRF undoubtedly is a promising treatment modality for root coverage in vogue and should definitely be explored in future. More well-designed and properly controlled studies are needed to provide solid evidence of PRF's capacity for and impact on wound healing, soft tissue reconstruction and augmentation procedures, especially in periodontal therapy.

### References

1. The American Academy of Periodontology. Glossary of periodontal terms, 4th edition. Chicago IL: The American Academy of Periodontology 200; 44.
2. Deby Johnson. *Perio Plastic Surgery*. 2012. Garant, Stern, Listgarten. Periodontics. 6th ed. Mosby; 1988.
3. Serino G., Wennstrom J.L., Lindhe J., Eneroth L. The prevalence and distribution of gingival recession in subjects with a high standard of oral hygiene. *J. Clin. Periodontol.* 1994;21(1):57-63.
4. Sangnes G., Gjermo P. Prevalence of oral soft and hard tissue lesions related to mechanical toothcleansing procedures. *Community Dent. Oral Epidemiol.* 1976;4(2):77-83.
5. Neely A.L., Holford T.R., Loe H., Anerud A., Boysen H. The natural history of periodontal disease in humans: risk factors for tooth loss in caries-free subjects receiving no oral health care. *J. Clin. Periodontol.* 2005;32(9):984-993.
6. Mlinek A, Smukler H, Buchner A. The use of free gingival grafts for the coverage of denuded roots. *J Periodontol* 1973;44:248-54.
7. McFall WT Jr. The laterally repositioned flap—criteria for success. *Periodontics.* 1967; 5(2):89-92.
8. Baldi C, Pini-Prato G, Pagliaro U, et al. Coronally advanced flap procedure for root coverage. Is flap thickness a relevant predictor to achieve root coverage? A 19-case series. *J Periodontol.* 1999; 70(9):1077-1084.
9. Hwang D, Wang HL. Flap thickness as a predictor of root coverage: a systematic review. *J Periodontol.* 2006; 77(10):1625-1634.
10. Kao RT, Fagan MC, Conte GJ. Thick vs. thin gingival biotypes: A key determinant in treatment planning for dental implants. *J Calif Dent Assoc* 2008; 36: 193-198.
11. De Rouck T, Eghbali R, Collys K, De Bruyn H, Cosyn J. The gingival biotype revisited: transparency of the periodontal probe through the gingival margin as a method to discriminate thin from thick gingiva. *J Clin Periodontol* 2009; 36(5): 428-433.
12. Sullivan HC, Atkins JH. Free autogenous gingival grafts and utilization of grafts in the treatment of gingival recession. *Perio* 1968;6(4):152-60.
13. Mlinek A, Smukler H, Buchner A. The use of free gingival grafts for the coverage of denuded roots. *J Periodontol* 1973; 44: 248-54.
14. Miller Jr PD. A classification of marginal tissue recession. *Int J Periodontics Restorative Dent* 1985; 5: 8-13.
15. Mahajan A. Mahajan's Modification of the Miller's Classification for Gingival Recession. *Dental hypotheses* 2010; 1(2): 45-50.
16. Hägewald S, Spahr A, Rompola E, Haller B, Heijl L, Bernimoulin JP. Comparative study of Emdogain and coronally advanced flap technique in the treatment of human gingival recessions. A prospective controlled clinical study. *J Clin Periodontol.* 2002; 29: 35-41.
17. Cairo F, Pagliaro U, Nieri M. Treatment of gingival recession with coronally advanced flap procedures: A systematic review. *J Clin Periodontol* 2008; 35 8 Suppl:136-62.
18. Toffler M, Toscano N, Holtzclaw D, Del Corso M, Ehrenfest DD. Introducing Choukroun's Platelet Rich Fibrin (PRF) to the Reconstructive Surgery Milieu. *The Journal of Implant & Advanced Clinical Dentistry* 2009; 1(6):21-31.
19. Choukroun J, Diss A, Simonpieri, A et al. Platelet-rich fibrin (PRF): A second-generation platelet concentrate. Part IV: Clinical effects on tissue healing. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2006; 101: 56-60.
20. Kumar AP, Fernandes B and Surya C. Platelet rich fibrin: A promising approach for root coverage. *J Interdiscip Dentistry* 2011;1(2):115-118.
21. McGuire MK, Cochran DL. Evaluation of human recession defects treated with coronally advanced flaps and either enamel matrix derivative or connective tissue. Part 2: Histological evaluation. *J Periodontol* 2003;74: 1126-1135.