

# Efficacy of Volume Stabilizing Collagen Matrix in Modified Pinhole Surgical Technique - A Case Report

**Bhavana Garapati<sup>1</sup>, Sheeja S Varghese<sup>2\*</sup>, Thamaraiselvan Murugan<sup>3</sup>, Arvina Rajasekar<sup>4</sup>**

<sup>1</sup>Post Graduate student, Department of Periodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai -600077.

<sup>2</sup>Registrar and Professor, Department of Periodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical sciences, Saveetha University, Chennai.

<sup>3</sup>Professor, Department of Periodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical sciences, Saveetha University, Chennai.

<sup>4</sup>Reader, Department of Periodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai-600077.

## ABSTRACT

Gingival recession is one of the most popular periodontal diseases. Aesthetics and hypersensitivity are two major concerns with recession. Although there are multiple treatment options, minimally invasive techniques have recently received much attention due to better patient acceptance and pretty much identical outcomes/results when compared to traditional standard treatment options. Here, we report a case of 34-year-old male patient who presented with the chief complaint of sensitivity to warm and cold in the left upper front tooth region. A 2mm hole was created and a full thickness flap was elevated from the apical side of the tooth towards marginal gingiva, leaving the interdental papilla intact. After relieving the gingiva from beneath, it was sutured to the tooth as an anchorage. Many allogenic materials have been used to replace the space between the flap and bone underneath. The prognosis was fair for this procedure. However, the efficacy of a Novel Volume stabilizing collagen matrix with a modified Pinhole technique is unknown. This report has shown promising results for the treatment of Miller's Class I and II gingival recession.

Corresponding Author e-mail: sheejavarghese@saveetha.com

**How to cite this article:** Garapati B, Varghese S S, Murugan T, Rajasekar A (2023), Efficacy of Volume Stabilizing Collagen Matrix in Modified Pinhole Surgical Technique - A Case Report. Journal of Complementary Medicine Research, Vol. 14, No. 3 , 2023 (pp. 134-137).

## INTRODUCTION

One of the major concerns among today's population is Aesthetics. Pink Esthetics include Mucogingival surgeries, which can help treat aesthetic complications, prevent plaque accumulation, and reduce hypersensitivity. Various mucogingival procedures such as the Free Gingival Graft, Coronally Advanced Flap, Subepithelial Connective tissue Graft, Laterally Repositioned flap in combination with Biomaterials like PRP and PRF etc have been used in recent decades<sup>1-3</sup>. Recently, Geistlich Fibro-Gide® has Proven its Efficiency in Soft tissue regeneration<sup>4,5</sup>. It can fill soft-tissue deficiencies because it is a porous, resorbable, and volume-stable collagen matrix which is porcine origin. The collagen matrix is created/embedded of reconstituted collagen and is cross-linked smartly to improve volume stability while maintaining biocompatibility.<sup>4,5</sup>. Our team has extensive knowledge and research experience that has translated into high quality publications.<sup>6-15</sup>

John Chao presented a new method for managing multiple recession defects using a Pinhole Surgical Technique (PST) in 2012<sup>16</sup>. He determined that a 94 percent mean defect reduction was achieved with minimal postoperative complications and optimal patient-based results. As in Chao Pinhole Surgical Procedure, a blade is used to cut a small 2mm hole in the patient's existing gum tissue. Uniquely engineered instruments are used through the pinhole to gradually release the gum tissue.

## KEYWORDS:

Pink esthetics, soft tissue management, minimally invasive, fibrogide

## ARTICLE HISTORY:

Received: Jan 22, 2023  
Accepted: Mar 24, 2023  
Published: May 26, 2023

## DOI:

10.5455/jcmr.2023.14.03.24

This helps to expand and glide the gum tissues, which protects the exposed roots. According to Dr. Chao's Pinhole Surgical Technique, there is no additional necessity for grafts, sutures, or incisions, only the re-adaptation of the available tissue<sup>16</sup>. Till date, only case reports with materials like PRF or Propolis etc were evaluated<sup>17,18</sup>. This is the first case-report on using Fibro-gide as a volume stabilizing material for Modified PST. However, it would be really difficult for this collagen matrix (Geistlich Fibro-Gide®) to stay in place for stabilization of the repositioned gingiva in place. Hence, in this case report, we modified the technique by using a simple anchor suture for holding/stabilizing the collagen matrix into the newly positioned site. The goal of this review was to look at the effectiveness and predictability of modified PST with volume stabilizing collagen matrix.

## Case Report

A 34-year-old male patient presented to the periodontology department with the presenting complaint of sensitivity to warm and cold in the left upper front tooth region. The patient appeared to be systemically healthy with no personal history or past dental history. On intraoral examination, Miller's Class I gingival recession<sup>22</sup> with recession height of 2 mm and width of 4 mm was observed in relation to tooth number 21,22 (Federation Dentaire Internationale- FDI tooth numbering system) [Figure 1]. A minimally invasive Pinhole surgical technique was proposed as a treatment plan and patient agreed to it over the conventional treatment options. Complete blood picture was obtained from the patient and the results were normal. The procedure was explained to the patient and informed consent was taken. After completing Phase I therapy, the patient was recalled after three weeks.

## Surgical Technique

Initially, at the surgical site, local anaesthesia (2 percent lignocaine and 1:80,000 adrenaline) was administered. A small horizontal incision of 2 mm wide was made at the mucogingival junction in between both the teeth involved, using a no.12 scalpel (Bard-Parker) [Figure 2]. Tunneling and Orbans knives (HuFriedy) were inserted through the incision [Figure 3], and the full thickness flap was elevated in the apico-coronal direction. The flap was extended coronally and horizontally to allow elevation of two adjacent papillae on each side of the exposed root. A collagen membrane (Geistlich Fibro-Gide®) was then placed into the sub-gingival space under the papilla and marginal soft tissue through the incision. For about 5 minutes, gentle digital pressure was applied on the flap. The incision was left without suturing in order to heal by the first intention. To stabilize the membrane, anchor suture was given using a composite [Figure 4]. As the patient had midline diastema, composite build up was done to create support as an anchor for the suture. No pressure pack such as Coe-pack was given. As there were no systemic limitations, no antibiotic was administered to the patient. Analgesic medication (Zerodol-P - aceclofenac 100mg and paracetamol 325mg) was prescribed for 5 days (BD).

Postsurgical instructions were given and was recalled after 1 week and 6 months for re-evaluation [Figure 5]. Patient was advised not to brush near the treated site and to rinse morning and night with 0.2 percent chlorhexidine mouthwash - Hexidine® (Chlorhexidine Gluconate Oral Rinse USP, 0.2%, ICPA). Postoperatively, after a week, the patient reported with

complete root coverage, and the incision was healed completely. The patient experienced very minor postoperative discomfort without any bleeding or pain. Discomfort was assessed via a Visual Analogue Scale (VAS) scoring from 1 to 10 where 10 is highly satisfied and 1 is least satisfied. Pain and bleeding was assessed via a Visual Analogue Scale (VAS) scoring from 1 to 10 where 1 is no pain/bleeding and 10 is more pain and bleeding.

## DISCUSSION

One of the major concerns among today's population is Aesthetics. Pink Esthetics include Mucogingival surgeries, which can help treat aesthetic complications, prevent plaque accumulation, and reduce hypersensitivity. Various mucogingival procedures such as the Free Gingival Graft, Coronally Advanced Flap, Subepithelial Connective tissue Graft, Laterally Repositioned flap in combination with Biomaterials like Platelet rich plasma (PRP) and Platelet rich plasma (PRF) etc have been used in recent decades<sup>1-3</sup>. One of the key factors that determines the success of a root covering surgery is the percentage of the treated defect wherein the soft-tissue margin has been relocated just at level of, or coronal to, the cemento-enamel junction<sup>19</sup>. The Coronally Advanced Flap, in conjunction with a subepithelial connective tissue graft, is recognized as the gold standard method for gingival recession covering, and has demonstrated improved reliability for attaining complete root coverage (CRC)<sup>20</sup>. The alternative treatments for marginal tissue recession have grown in recent years, leading to the advent of newer techniques. There is currently a transition in surgical procedures from extensive to minimally invasive. All such techniques have the benefit of narrowing surgical time and improving patient comfort. The pinhole technique, invented by John Chao, is one such evolving minimally invasive technique for managing multiple recession defects in 2012<sup>16</sup>. This is a minimal scalpel usage, suture-free technique for treating multiple gingival recessions. Chao<sup>16</sup> demonstrated a recession coverage of 88.6%. This approach has the extra advantage of not requiring donor tissue harvesting, suturing, except for a pinhole-sized incision. Till date, only case reports with materials like PRF or Propolis etc were evaluated<sup>17,18</sup>. Recently, Geistlich Fibro-Gide® has Proven its Efficiency in Soft tissue regeneration<sup>4,5</sup>. It can fill soft-tissue deficiencies because it is a porous, resorbable, and volume-stable collagen matrix which is porcine origin. The collagen matrix is created/embedded of reconstituted collagen and is cross-linked smartly to improve volume stability while maintaining biocompatibility<sup>4,5</sup>. This is the first case-report on using Fibro-Gide as a volume stabilizing material for Modified PST. However, the Indian biotype is thin, hence it would be really difficult for this collagen matrix (Geistlich Fibro-Gide®) to stay in place for stabilization of the repositioned gingiva in place. Hence, in this case report, we modified the technique by using a simple anchor suture for holding/stabilizing the collagen matrix into the newly positioned site. The goal of this review was to look at the effectiveness and predictability of modified PST with volume stabilizing collagen matrix.

Initially this case had a recession height(RH) of 2mm and recession width(RW) of 4mm in relation to tooth-21,22. Post treatment complete root coverage (90%) was seen from baseline to 6 months in the present case, sharing a common pattern to previous studies by Reddy<sup>21</sup>, Chao<sup>16</sup>. The width of keratinized tissue (WKT) was also maintained from baseline to 6 months. The findings of this case series are also consistent with the findings of<sup>18,21,17</sup>, who gained a maximum root coverage of 96.7 percent with a significant difference in RH and RW throughout

a 6-month postoperative follow-up. The use of Fibro-Gide, combined with minimal tissue manipulation, may have contributed to the significant increase and preservation of WKT, as well as the stability of the results. One of the ultimate goals of any surgical technique is patient satisfaction, which again was observed to be high in the current case (VAS value: 10 out of 10). Intraoperative pain was minimal, and postoperative bleeding, swelling, and pain were minimal and brief. Tissue color matching was also aesthetically pleasing. The higher success rate of this novel surgical technique could also be credited from its minimal invasiveness as well as the instantaneous aesthetic results that patients can see. This approach also has the benefit of not interfering with blood supply (no vertical release incisions), no scar formation, and a reduced surgery time. One of the current technique's limitations is the use of specialized instruments, the cost of the collagen membrane. Furthermore, original studies and randomized controlled trials comparing with gold standard techniques and biomaterials are needed to be done to confirm the results.

## CONCLUSION

PST is a novel technique that is both operator and patient friendly since it is a minimally invasive, cost effective, time-saving, and efficiently predictable procedure in recession coverage for Millers Class I and Class II recession defects that occur primarily in the facial areas. More long-term research is needed to assess the success of PST in the management of single or multiple recession defects, as well as the lingual aspects of teeth.

## REFERENCES

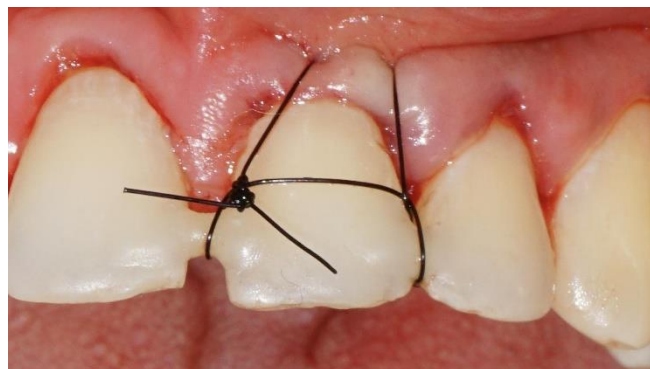
- Cortellini P, Prato GP. Coronally advanced flap and combination therapy for root coverage. Clinical strategies based on scientific evidence and clinical experience [Internet]. Vol. 59, *Periodontology* 2000. 2012. p. 158-84.
- Carnio J. Modified apically repositioned flap technique: a surgical approach to enhance donor sites prior to employing a laterally positioned flap. *Int J Periodontics Restorative Dent*. 2014 May;34(3):423-9.
- Tadepalli A, Chekurthi S, Balasubramanian SK, Parthasarathy H, Ponnaian D. Comparative Evaluation of Clinical Efficacy of Leukocyte-Rich Platelet-Rich Fibrin (L-PRF) with Advanced Platelet-Rich Fibrin (A-PRF) in Management of Gingival Recession Defects - A Randomized Controlled Trial [Internet]. *Medical Principles and Practice*. 2022.
- Vallecillo C, Toledano-Osorio M, Vallecillo-Rivas M, Toledano M, Osorio R. In Vitro Biodegradation Pattern of Collagen Matrices for Soft Tissue Augmentation. *Polymers* [Internet]. 2021 Aug 7;13(16).
- Vallecillo C, Toledano-Osorio M, Vallecillo-Rivas M, Toledano M, Rodriguez-Archilla A, Osorio R. Collagen Matrix vs. Autogenous Connective Tissue Graft for Soft Tissue Augmentation: A Systematic Review and Meta-Analysis. *Polymers* [Internet]. 2021 May 31;13(11).
- Vadivel JK, Govindarajan M, Somasundaram E, Muthukrishnan A. Mast cell expression in oral lichen planus: A systematic review. *J Investig Clin Dent*. 2019 Nov;10(4):e12457.
- Panda S, Jayakumar ND, Sankari M, Varghese SS, Kumar DS. Platelet rich fibrin and xenograft in treatment of intrabony defect. *Contemp Clin Dent*. 2014 Oct;5(4):550-4.
- Mehta M, Dhanjal DS, Paudel KR, Singh B, Gupta G, Rajeshkumar S, et al. Cellular signalling pathways mediating the pathogenesis of chronic inflammatory respiratory diseases: an update. *Inflammopharmacology*. 2020 Aug;28(4):795-817.
- Venkatesan J, Singh SK, Anil S, Kim SK, Shim MS. Preparation, Characterization and Biological Applications of Biosynthesized Silver Nanoparticles with Chitosan-Fucoidan Coating. *Molecules* [Internet]. 2018 Jun 12;23(6).
- Bhansali KJ, Balinge KR, Raut SU, Deshmukh SA, Senthil Kumar M, Ramesh Kumar C, et al. Visible light assisted sulfonic acid-functionalized porphyrin comprising benzimidazolium moiety for photocatalytic transesterification of castor oil. *Fuel*. 2021 Nov 15;304:121490.
- Deepanraj B, Senthilkumar N, Mala D, Sathiamourthy A. Cashew nut shell liquid as alternate fuel for CI engine—optimization approach for performance improvement. *Biomass Conversion and Biorefinery*. 2022 May 1;12(5):1715-28.
- Kamath M, Rao SK, Jaison, Sridhar, Kasthuri, Gopinath, et al. Melatonin delivery from PCL scaffold enhances glycosaminoglycans deposition in human chondrocytes - Bioactive scaffold model for cartilage regeneration. *Process Biochem*. 2020 Dec;99:36-47.
- Paramasivam A, Priyadharsini JV. Novel insights into m6A modification in circular RNA and implications for immunity [Internet]. Vol. 17, *Cellular & Molecular Immunology*. 2020. p. 668-9.
- Li Z, Veeraraghavan VP, Mohan SK, Bolla SR, Lakshmanan H, Kumaran S, et al. Apoptotic induction and anti-metastatic activity of eugenol encapsulated chitosan nanopolymer on rat glioma C6 cells via alleviating the MMP signaling pathway [Internet]. Vol. 203, *Journal of Photochemistry and Photobiology B: Biology*. 2020. p. 111773.
- Nambi G, Kamal W, Es S, Joshi S, Trivedi P. Spinal manipulation plus laser therapy versus laser therapy alone in the treatment of chronic non-specific low back pain: a randomized controlled study. *Eur J Phys Rehabil Med*. 2018 Dec;54(6):880-9.
- Chao JC. A novel approach to root coverage: the pinhole surgical technique. *Int J Periodontics Restorative Dent*. 2012 Oct;32(5):521-31.
- Mostafa D, Mandil OA. Treatment of gingival recession defects using non-invasive pinhole technique with propolis application, a case report. *Int J Surg Case Rep*. 2021 Jun;83:106042.
- Agarwal MC, Kumar G, Manjunath RGS, Karthikeyan SSS, Gummaluri SS. Pinhole Surgical Technique - A Novel Minimally Invasive Approach for Treatment of Multiple Gingival Recession Defects: A Case Series. *Contemp Clin Dent*. 2020 Jan;11(1):97-100.
- Periodontology RSATC of TAA of, Research, Science and Therapy Committee of the American Academy of Periodontology. Informational Paper: Oral Reconstructive and Corrective Considerations in Periodontal Therapy [Internet]. Vol. 76, *Journal of Periodontology*. 2005. p. 1588-600.
- Pagliari U, Nieri M, Franceschi D, Clauser C, Pini-Prato G. Evidence-Based Mucogingival Therapy. Part 1: A Critical Review of the Literature on Root Coverage Procedures [Internet]. Vol. 74, *Journal of Periodontology*. 2003. p. 709-40.
- Reddy SSP. Pinhole Surgical Technique for treatment of marginal tissue recession: A case series. *J Indian Soc Periodontol*. 2017 Nov;21(6):507-11.
- (Miller PD., Jr. A classification of marginal tissue recession. *Int J Periodontics Restorative Dent*. 1985; 5: 8-13)



**Figure 1:** Preoperative baseline gingival recession showing multiple recession irt 21,22.



**Figure 2:** Pinhole incision given in the mucogingival junction



**Figure 4:** Modified Anchor suture given to stabilize Fibro-Gide



**Figure 3:** Preparation of the site using Tunneling knives - full thickness flap was elevated through the pinhole and flap was then displaced towards cemento-enamel junction



**Figure 5:** Postoperative healing after 6 months