

International Journal of Dental Science and Innovative Research (IJDSIR)

IJDSIR : Dental Publication Service

Available Online at:www.ijdsir.com

Volume – 4, Issue – 5, September - 2021, Page No. : 322 - 330

Minimally invasive surgical techniques (mist) for root coverage - A narrative review

¹Dr.R. Kadhiresan, MDS, Professor, Department of Periodontics and Oral Implantology, Sri Venkateswara Dental College And Hospital

²Dr.M.Indumathi, Post Graduate, Department of Periodontics and Oral Implantology, Sri Venkateswara Dental College And Hospital

³Dr.U.Arunmozhi, MDS, Professor, Department of Periodontics and Oral Implantology, Sri Venkateswara Dental College And Hospital

⁴Dr. R. A. Jenifer Cynthia, MDS, Professor, Department of Periodontics And Oral Implantology, Sri Venkateswara Dental College And Hospital

⁵Dr.M.Indumathi, Post Graduate, Department of Periodontics and Oral Implantology, Sri Venkateswara Dental College and Hospital off OMR Road, Near Navalur, Thalambur, Chennai-603103

Corresponding Author: Dr. M. Indumathi, Post Graduate Department of Periodontics and Oral Implantology, Sri Venkateswara Dental College and Hospital off OMR Road, Near Navalur, Thalambur, Chennai-603103

Citation of This Article: Dr. R. Kadhiresan, Dr. M. Indumathi, Dr. U. Arunmozhi, Dr. R. A. Jenifer, Dr. M. Indumathi, "Minimally invasive surgical techniques (mist) for root coverage - A narrative review", IJDSIR- September - 2021, Vol. – 4, Issue - 5, P. No. 322 – 330.

Copyright: © 2021, Dr M. Indumathi, et al. This is an open access journal and article distributed under the terms of the creative commons attribution noncommercial License. Which allows others to remix, tweak, and build upon the work non commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Type of Publication: Review Article

Conflicts of Interest: Nil

Abstract

Gingival recession is one of the most prevalent sign of periodontal disease. The major concerns associated with recession defects include sensitivity and esthetic demands. There are various treatment options for the management, but recently, minimally invasive techniques for root coverage have gained more importance because of its merits such as low patient morbidity, less discomfort, faster healing, more patient acceptance and comparable results when compared to conventional techniques. Minimally invasive surgical techniques for root coverage provides a new opportunity for the successful management of mucogingival deformities that enhances the patient's comfort and esthetic demands which is the ultimate goal of periodontal plastic surgery. Reports indicate that the use of the surgical microscope helped considerably less invasive surgical incisions and flap reflections in periodontics.

Keywords: Gingival recession, Microsurgery, Minimally invasive surgical techniques, Root coverage

Introduction

Gingival recession is one of the most common encountered problems in day today dental practice. The most important goals of periodontal plastic surgery is to arrest the progression of gingival recession and to improve the ability for plaque control.

According to the literature various Root coverage procedures have been described with varying degrees of success. The indications for root coverage are esthetic /cosmetic demands, root hypersensitivity and management of shallow root carious lesions and cervical abrasions. The Subepithelial connective tissue graft with coronally advanced flap is considered as a gold standard for root coverage. However, releasing incisions in the treatment may jeopardize the aesthetic outcome. Also the patient's fear for conventional approach flap surgery can be a neglecting factor to avoid root coverage procedures in practice. In order to overcome these disadvantages and to meet clinical needs, less invasive procedures that fulfill the esthetic demands of patients were proposed. Treatment has evolved to minimally invasive surgical techniques, allowing lower morbidity and patient's postoperative discomfort.

Minimally invasive surgical technique (MIST) was developed using surgical microscopes and microsurgical instruments. Periodontal microsurgery is described as 'refinement in existing basic surgical techniques that are made possible by the use of surgical microscope and subsequent improved visual acuity' (Shanelec 1992). Microsurgery is defined as a procedure performed under magnification using microscope (Daniel in 1979). It is also defined as a methodology with modification and refinement of existing surgical techniques using magnification to improve visualization (Serafin in 1980).^[1] This review focuses on various recent minimal invasive surgical techniques for root coverage and their advantages over conventional techniques.

Conventional techniques for root coverage

Conventional techniques for the management of gingival recession includes coronally advanced flap, laterally positioned flap, double papilla flap, semilunar flap with free gingival graft (FGG), Subepithelial connective tissue graft (CTG),platelet rich fibrin (PRF), Guided tissue regeneration (GTR) and Alloderm.

Limitations of conventional techniques

The ultimate aim of periodontal surgery is to alleviate or eliminate the degeneration associated with progressive periodontal disease. The integral part of conventional periodontal surgery is access the periodontal defect for debridement in order to accomplish the treatment's goal. Conventional surgery / macro surgery is defined as those surgical procedures performed with the unaided eye, without the assistance of magnification. Although periodontal surgery practiced today may be relegated to a lesser role in the future.

The conventional surgeries have some limitations involves, larger area including more soft and hard tissue manipulation which results in greater postoperative edema, inflammation, and pain. Healing is by secondary intention and it requires more time. Tissue is injured more by crushing than manipulation, which hampers healing. More bleeding with reduced and inadequate visualization and magnification (loupes) of the surgical site for the operator. To overcome these limitations, to meet patient's expectations and to achieve desired therapeutic goals an advanced surgical technique is needed.

Advantages of mist

Over the past decade, increases in surgical refinement of various periodontal procedures have been introduced in the field of periodontology. Increase in visual acuity provides detailed surgical skills which help in better refinement. Consistent successful guided tissue regeneration, crown lengthening, gingival augmentation procedures, ridge augmentation, osseous resection, and dental implants demand clinical expertise that challenges the technical skills of periodontal surgeon to the limits beyond the normal visual acuity. Thus, periodontal microsurgery has evolved to overcome above limitations. The emergence of magnification promises to improve the clinical concepts of periodontal surgery. Microsurgery has been an indispensable asset in medicine for many years & the recent application of its principle to various fields in dentistry like periodontal surgery has been extremely valuable.^[2]

Instrumentation used in mist

Minimally invasive surgical technique (MIST) is a technique which uses microscope at a magnification exceeding 10x that increases the visual acuity. Magnification, illumination, and refined surgical skills by instruments constitute microsurgical triad (Belcher et al. 2001), the improvement of which is a requirement for accuracy in surgical interventions.

Magnification systems: There are a numerous types of simple and complex magnifying systems are available, which includes three types of magnification loupes and operating microscope. Magnification system used in dentistry mostly is magnification loupes which include Simple, Compound and Prism loupes. Thus, the periodontal procedures usually need loupes of 4x to 5x which can provide an effective combination of magnification, field size, and depth of focus.

Illumination: Fibrotic coaxial illumination is a major advantage of the operating microscope over surgical loupes. It efficiently helps in removal of deposits in moderate to deep periodontal pockets. Halogen lamps are now gaining importance in the field of dentistry.

Surgical instruments: Knives and scalpel blades: Crescent knives are used for intra-sulcular procedures. To undermine the lateral sulcular region to prepare placement of connective tissue grafts using a Sulcular, non-relief technique usually spoon knives are often preferred. Blades include mini crescent microsurgical blade. **Needles:** Use of sharpest needles, reverse cutting needles with precision tips or spatula needle with micro tips are preferred to prevent tissue trauma. In order to gain well results 3/8"circular needles used for various periodontal surgical procedures.

Suture material: 6-0 and 7-0sutures are mostly used in microsurgery.

Others: Micro scissors, Micro forceps, Micro needle holder

Indications: It includes

1. Single or multiple recessions (Miller's class I,II,III)

2. Isolated, usually interproximal defect that does not extend significantly beyond interproximal site.

3. Defect that extends to buccal and/or lingual from interproximal area.

4. MIST can be used for patients who have many isolated defects, so long as the incision at one site does not connect with incisions at other sites to become a continuous incision.

Contraindications

Generalized horizontal bone loss or multiple interconnected vertical defects are thought to be contraindicated for MIST and are best handled with more traditional surgical approaches.

The drawbacks includes, demanding and techniquesensitive, cost incurred to establish a microsurgical set up is also high, magnification systems used also pose some difficulties including restricted area of vision, loss of depth of field as magnification increases, and loss of visual reference points, experienced team approach mandates microsurgery and is time-consuming to develop and physiologic tremor control of finer movements intraoperatively and a steep learning curve are required for clinical proficiency.^[3]

Review of literature

Success rate of root coverage procedure depends on factors such as dexterity of surgeon , excellent visualization of the operating field, and of course an Atraumatic surgical approach . All these factors can be fulfilled using a microsurgical instruments and techniques. There are factors influencing the degree of coverage such as root preparation, delicate tissue handling, tissue thickness and meticulous plaque control have to be controlled in order to maximize treatment outcomes. Thus, various authors introduced minimally invasive surgical procedures over years to attain demands of periodontal surgery.

Takei et al (1985) introduced Conventional papilla preservation flap technique to keep the papilla intact in areas with more than 3 mm interdental spaces. This technique uses Sulcular incisions around each tooth with no incision being made through the interdental papilla facially, but the lingual/palatal flap involves a Sulcular incision along each tooth with a semilunar incision made across each interdental papilla that dips apically from the line angles of the tooth so that the papillary incision line angle is at least 5 mm from the gingival margin allowing the interdental tissues to be dissected from the lingual or palatal aspect so that it can be elevated intact with facial flap.^[4]

Cortellini et al (1995) proposed this design as a modification of conventional papilla preservation flap. A horizontal incision is traced in the buccal gingiva of the interdental space at the base of the papilla, and the papilla is elevated toward the palatal aspect. It is mostly indicated for thick interdental papilla in wide interdental spaces.^[5]

Cortellini et al (1999) further modified as Simplified papilla preservation flap so that it was suitable for narrow interdental spaces (≤ 2 mm). An oblique incision placed

instead of horizontal incision which is traced across the buccal aspect of the interdental papilla, and thepapilla is elevated toward the palatal aspect.^[6]

Recent mist for root coverage

- 1. A): Vestibular incision subperiosteal tunnel access (VIST
- 2. Zadeh et al 2011 introduced this approach which begins with a vestibular access incision placed mesial to the site to be treated. The incision is made through the periosteum to elevate and create a subperiosteal tunnel using microsurgical periosteal elevator. The tunnel has to extend at least one or two teeth beyond the teeth requiring root coverage to mobilize gingival margins and facilitate coronal repositioning. This allows the easy placement of any membrane and advancement of complex coronally and stabilized in the new position with a coronally anchored suturing technique with composite.Finally, the midline incision is then approximated and sutured.^[7]



Figure 1:vestibular incision sub periosteal tunnel access) 9.2. Modified Vestibular Incision Sub periosteal Tunnel Access (M-VISTA)

BabakNajafi et al 2018 modified VISTA by placing intrasulcular incisions which were placed on mid facial surfaces from one line angle to the other of each tooth, avoiding the papillae. Gentle sub periosteal tunnel

Page 3.

elevation was performed using periosteal elevators and secured using a modified horizontal mattress anchoring technique with composite. Finally, the small vertical incisions were sutured with simple interrupted sutures.^[8]



Figure 2: Modified vestibular incision subperiosteal tunnel access)

Pinhole surgical technique (PST)

Chao et al 2012. This technique includes placement of minimal horizontal incision of 2 to 3mm in the alveolar mucosa near the base of vestibule,apical to the recipient sites. Transmucosal papillae elevators were inserted to the entry incision to elevate a full thickness flap. The entry incision left unsutured to heal by primary intention.^[9]



Figure 3:pinhole surgical technique)

Gum Drop Technique (GDT)

Delia Tuttle et al 2018. This procedure is initiated by placement of holes in the gingiva 3mm apical to the mucogingival line using a small gum piercing instrument in three spots on the arch. After elevation Platelet-derived plasma growth factors (PDGF) are introduced into the gum piercing through the holes with syringe. Advanced platelet rich fibrin (A-PRF) membranes are introduced through the gum piercingsto position the elevated gingival tissue in a coronal direction coveringthe gingival recession. Composite is bonded to the proximal contacts in order to providefixation points for the sutures to be placed.^[10]



Figure 4: gum drop technique

Discussion

MIST has a high potential for achieving and maintaining primary closure leading to less contamination from oral environment. The preservation of soft-tissue height and contour leads to minimal gingival recession which meets the demands of patients and clinician in the esthetic zone. These features might be attributed to decreased tissue manipulation, lessened overall trauma, and enhanced blood supply to the surgical sites.

Chen Chang-Kai et al2014 presented a case report on multiple upper anterior gingival recessions using a novel

Page

VISTA Technique with platelet derived growth factor (PDGF) and Connective tissue graft. This novel technique gives better wound healing, clot stability and less scar formation. Author also concluded that VISTA Technique is a reliable technique for root coverage with long follow ups.^[11]

C Lee et al2015 presented a case report on use of Modified VISTA technique with a deficiency in both dimensions around a single tooth implanted-supported restoration in the anterior maxilla. In this technique there is an increase in tissue height and width.^[12]

HomayounZadeh et al 2015in his case report for the management of single and multiple recession defects in maxillary anterior region has successfully demonstrated the stable and long term follow ups of two millers Class I and Class II gingival recession defect treated with VISTA Technique. It is also advantageous in aesthetic zone.^[7]

Shantipriyareddy et al2016 managed the multiple gingival recessions using VISTA technique with platelet rich fibrin (PRF) and with Connective tissue graft. Both the groups were followed for a period of 6 months. The author concluded that multiple recessions can be successfully managed by the use of PRF and CTG along with VISTA Technique.^[13]

Surbhi Garg et al 2017presented a case series in the management of multiple gingival recessions using VISTA technique with and without Platelet Rich Fibrin. Author concluded that VISTA is well -situated technique for management of class I gingival recession were as addition of PRF to VISTA technique in Class III Multiple gingival recession defects produces a better outcomes in terms of Recession depth reduction and gain in clinical attachment loss (CAL).^[14]

Alfonso Gil et al2018 conducted a retrospective pilot study in the treatment of multiple gingival recession defects using VISTA Technique. In this study the author has examined the initial and final outcome of root coverage of procedure in patients with multiple recession defects using VISTA Technique utilizing digital analysis. This present study identified the positive and negative site specific characteristic which may predict the outcome of the surgery. Negatively influenced site specific characteristic include root prominence, depth and width of recession and interdental tissue loss.^[15]

Raja Rajeshwariet al2018 presented a case series to evaluate the efficacy of VISTA Technique in the management of multiple millers Class I and class II gingival recession defects. The study concluded that VISTA Technique augmented with collagen membrane, bioactive glass and PRF shows predictable results in management of multiple recession defects.^[16]

Saeed Sadat Mansouri et al 2019 presented a RCT to compare the clinical efficacy of VISTA technique with the CAF (Coronally advanced flap) in the management of miller s class I and class II gingival recession. Mean root coverage was 70.69% in VISTA group and 67.22 % in CAF group and the complete root coverage obtained was 50% in VISTA group and 33 % in CAF group. The author has concluded that VISTA can be used as a substitute for CAF in the management for recession coverage as it is minimally invasive and enhances root coverage, keratinized tissue width and clinical attachment gain.^[17]

AnirbanChatterjeeet al 2019 managed the multiple gingival recessions with the VISTA technique. Two cases included were class I and class II gingival recession with a Recession depth of 2 to 4mm. Author has concluded that the VISTA Technique can be used successfully in the management of multiple gingival recessions. After 6 months of follow-up,noticed 91% of root coverage achieved in the case series.^[18]

Sarvanan et al 2017. In a series of five cases with 18 recession sites which were treated with a minimally invasive Pinhole Surgical Technique resulted in root coverage of about 96.7% after 6-month follow-up with minimal complications.^[19]

Manvi Chandra Agarwal et al 2020 This case series of 20 sites with Miller's class I and II recession showed that the mean root cover age obtained was 87% at 6-month follow-up using pinhole surgical technique. The reduction in Recession depth and width was also found to be statistically significant when compared to baseline values.^[20]

MidhunKishor S et al 2021 reported 90% root coverage following 6 months of surgery with 4-5 mm recession depth reduction using Gum Drop surgical technique can an effective technique for the management of Class III Miller's type of gingival recession.^[21]

This technique allows for minimization of soft-tissue trauma by using much smaller surgical incision than standard surgical procedure and also the gentle handling of tissue leads to less postsurgical complications such as pain, swelling, and flap dehiscence. The advantages of MIST includes less tissue trauma, patient anxiety, Atraumatic tissue management by using microsurgical instruments and sutures, accurate primary wound closure, increased diagnostic skills, minimally invasive, improved cosmetic results, increased surgical quality and effectiveness of root debridement results in greater predictability of Regeneration and cosmetic procedures, improved documentation.

According to the review, disadvantages of MIST, in general, are related to the fact that it requires special expensive equipment and training, slightly longer duration. Defiance to newer techniques has also been a disadvantage which can be attributed to normal human behavior. Additionally it also includes the need for educational requirements in the prospect of surgical technique and Understanding of optics, long adjustment period for clinical proficiency; initial increased surgical time, high patient cost, limited surgical access.

Conclusion

Minimally invasive surgical techniques for root coverage provides a new opportunity for the successful management of mucogingival deformities that enhances the patient's comfort and esthetic demands which is the ultimate goal of periodontal plastic surgery. Reports indicate that the use of the surgical microscope helped considerably less invasive surgical incisions and flap reflections in periodontics. Its credentials includes improved esthetics, faster healing, minimal discomfort, and enhanced patient's acceptance. The improved visual acuity provided by magnification opens a whole new world to those who make the effort and take the time to become proficient in microsurgical principles and procedures. Periodontics of the future will see increasing use of magnification in all areas of practice, including implantology.

References

- Serafin D. Microsurgery: Past, present and future. PlastReconstr Surg. 1980;66:781–785.
- Leonard S, Tibbetts, DDS, MSD, Dennis Shanelec, DDS. Principles and practice of periodontal microsurgery. International journal of micro dentistry 2009;1:13 24.
- Doepu D. DS, Mehta, vidhiMunjal Periodontal Microsurgery - A Must for Peno Aesthetics Indian Journal of Oral Sciences, 2014,5(3):103-108
- Takei HH, Han TJ, Carranza FA Jr, Kenney EB, Lekovic V. Flap technique for periodontal bone implants. Papilla preservation technique. J Periodontol 1985; 56:204–210.

- Cortellini P, Prato GP, Tonetti MS. The modified papilla preservation technique. A new surgical approach for interproximal regenerative procedures. J Periodontol 1995; 66:261–266.
- Cortellini P, Prato GP, Tonetti MS. The simplified papilla preservation flap. A novel surgical approach for the management of soft tissues in regenerative procedures. Int J Periodontics Restorative Dent 1999;19:589–599.
- Zadeh HH. Minimally invasive treatment of maxillary anterior gingival recession defects by vestibular incision subperiosteal tunnel access and platelet derived growth factor BB. International Journal of Periodontics and Restorative Dentistry. 2011;31(6):653.
- Babak Najafi et al Periodontal Regenerative Treatment of Intrabony Defects in the Esthetic Zone Using Modified Vestibular Incision Subperiosteal Tunnel Access (M-VISTA). The International Journal of Periodontics & Restorative Dentistry 2018;42:54-62
- Chao JC. A novel approach to root coverage: the pinhole surgical technique. Int J Periodontics Restorative Dent. 2012 Oct;32(5):521-31.
- Tuttle D, Kurtzman G, Bernotti AL. Gum Drop Technique: Minimally Invasive Soft-Tissue Platelet-Rich Plasma Grafting for Marginal Soft-Tissue Recession. CompendContinEduc Dent. 2018 May;39(5):e9-e12.
- 11. Kai C C, Chang C, Roberts E. Class III with Multiple Gingival Recession: Vestibular Incision
- Subperiosteal Tunnel Acces s (VISTA) and Platelet -Derived Growth Factor BB. International Journal of Orthodontics and Implantlogy 2014;35:22-36.
- 13. Lee CT, Hamalian T, Schulze-Späte U. Minimally invasive treatment of soft tissue deficiency around an

implant-supported restoration in the esthetic zone: modified VISTA technique case report. Journal of Oral Implantology. 2015 Feb; 41(1):71-6.

- 14. Reddy S, Prasad MG, Bhowmik N, Singh S, Pandit H, Vimal SK. Vestibular incision subperiosteal tunnelaccess (VISTA) with platelet rich fibrin (PRF) andconnective tissue graft (CTG) in the management ofmultiple gingival recession-A case series. Int J ApplDent Sci. 2016;2:34-7.
- 15. Santamaria MP, Neves FL Garg S, Arora SA, Chhina S, Singh P. Multiple gingival recession coverage treated with vestibular incision subperiosteal tunnel access approach with or without platelet -rich fibrin-A case series.Contemporary clinical dentistry. 2017 Jul; 8(3):464.
- 16. Gil A, Bakhshalian N, Min S, Zadeh HH. Treatment of multiple recession defects with vestibular incision subperiosteal tunnel access (VISTA): A retrospective pilot study utilizing digital analysis. Journal of Esthetic and Restorative Dentistry. 2018 Nov;30(6):572-9.
- 17. Kumar TA, Gowda TM, Mehta DS, Kumar A. Management of Multiple Gingival Recessions with theVISTA Technique: An 18-Month Clinical Case Series.International Journal of Periodontics & RestorativeDentistry. 2018 Mar 1; 38(2).
- 18. Mansouri SS, Moghaddas O, Torabi N, Ghafari K. Vestibular incisional subperiosteal tunnel accessversus coronally advanced flap with connective tissuegraft for root coverage of Miller's class I and IIgingival recession: A randomized clinical trial.Journal of Advanced Periodontology & Implant Dentistry. 2019 Aug 31; 11(1):12-20.
- 19. Chatterjee A, Sharma E, Gundanavar G, Subbaiah SK. Treatment of multiple gingival recessions withvista

technique: A case series. Journal of Indian Society of Periodontology. 2015 Mar; 19(2):232.

- 20. Reddy SSP. Pinhole Surgical Technique for treatment of marginal tissue recession: A case series. J Indian Soc Periodontol. 2017 Nov-Dec;21(6):507-511.
- Agarwal MC, Kumar G, Manjunath RG, Karthikeyan SS, Gummaluri SS. Pinhole surgical technique – A novel minimally invasive approach for treatment of multiple gingival recession defects: A case series. ContempClin Dent 2020;11:97-100.
- 22. Midhun Kishor S, Management of Miller's Class III Gingival Recession by Gum Drop Technique: A Case Report. Case Rep Dent Sci 2(2): 38-41.