Innovations

Review article on periodontal microsurgery for root coverage procedures

Dr.Savithri.N.K[1]
Dr.Sangeetha Subramanian[2]
Dr.Ponnudurai Prakash Gnana[3]
Dr.Devapriya Appukuttan[4]
Dr.JasmineCrena M[5]
Dr.V.Santhosh Devanathan[6]

[1]Postgraduate Student, Department of Periodontics, SRM Dental College and Hospital, Ramapuram,Chennai
[2]Professor, Department of Periodontics, SRM Dental College and Hospital, Ramapuram,Chennai
[3]Professor, Department of Periodontics, SRM Dental College and Hospital, Ramapuram,Chennai
[4]Professor, Department of Periodontics, SRM Dental College and Hospital, Ramapuram,Chennai
[5]Senior lecturer,Department of Periodontics, SRM Dental College and Hospital, Ramapuram,Chennai
[6]Reader,Department of Periodontics, SRM Dental College and Hospital, Ramapuram,Chennai
Corresponding Authors:**Dr.Savithri.N.K, MDS**

Abstract
Treatment modalities addressing both biologic and esthetic demands are most often expected from today's periodontal practice. New technologies, instruments, and surgical techniques are necessary to help clinician ensure the best results and satisfy thepatient's expectations. Microsurgical equipments help to enhance normal vision through magnification along with favourable lighting enabling to perform precise periodontal surgical procedures. With increasing awareness and the desire to get the besttreatment among patients, these magnificent magnifying tools come handy for an innovative periodontal micro-surgeon. The application of magnification to Periodontics promises to change clinical concepts of periodontal surgical care. As recent developments in medicine have shown, magnification and microsurgery can greatly impact clinical practice Improvement in esthetics is a major indication for periodontal plastic microsurgery.

Keywords-1.*connective tissue graft, 2.gingival recession, 3.microsurgery, 4.microsurgical approach, 5.root coverage*

Introduction

One of the most common esthetic concerns associated with the periodontal disease is the gingival recession. Unlike other periodontal conditions that are unnoticed or unrecognized, gingival recession is clinically detectable and the changes are well noticed and reported by the patient to the dentist is of significant concern. In order to achieve optimum root coverage and desirable soft tissue aesthetics, certain factors such as the removal of the etiologic agent, the evaluation of the degree and extent of tissue involvement and, most importantly, the selection and cautious implementation of the appropriate surgical procedure are significant.

New technologies, instruments, and surgical techniques are essential to help clinician ensure the best results and satisfy the patient's expectations. In that context, Microsurgical approachhelps the clinician to perform precise periodontal surgical procedures especially the root coverage procedures.With increasing awareness and the desire to get the best treatment among patients, these magnificent magnifying tools come convenient for an innovative periodontal micro-surgeon.

Periodontal microsurgery

Over the past decade, the field of periodontics has seen increasing surgical refinement of many procedures. Successful periodontal surgical procedures demand high clinical expertise that challenges the technical skills of the periodontists to the edge of visual acuity and beyond. The inception of surgical operating microscope, microsurgical techniques and instruments is a significant stride to accomplish this goal.

Shanelac and Tibettes introduced microsurgery to periodontics in 1990s.[1] It is indeed an enhancement of basic surgical techniques made possible using surgical microscope which yields better visual acuity. Microsurgical triad include 3 elements which are magnification, illumination, and instruments as reported by Belcher et al in 2001.[2] The principle of microsurgery is that it modulates the clinical outcomes favorably by the refinement of motor and surgical skills, primary and passive wound closure as well as reduce tissue damage with the application of microsurgical instrumentation.[3] The periodontal microsurgery thus far offered more predictable therapeutic outcomes, less invasive procedure with better patient comfort, faster healing, superior cosmetic results and more patient acceptance. Compared to traditional surgical techniques, the endpoint visual appearance of the modern microsurgical procedure is much greater. In that milieu, Periodontal plastic surgery has seen mounting enhancement in several surgical techniques and these incredible advancements aim to fulfil the expectations of the patients.

Modern periodontology is closely to both plastic surgery and esthetic dentistry. Periodontal plastic microsurgery incorporates the use of a surgical microscope in an attempt to increase visibility, thereby minimizing soft tissue trauma and enhancing clinical results. An important factor in acceptance of microsurgery is the significant decrease in morbidity. The reduced trauma and relative painlessness that microsurgery offers an appealing alternative to major surgery. The use of surgical operating microscope, microsurgical instruments has opened a new era in periodontal plastic surgery.

Studies have demonstrated improved ascularization, enhanced mobility offlaps, and hence, possibility of obtainingprimary wound closure, less post-operativediscomfort, thus providing better estheticresults.[4,5] Further, thesuccessful use of the surgical microscope

inperiodontal surgery is less documented withonly few studies addressing the advantagesof the application of magnification toperiodontal surgery.

Microsurgical instruments

Microsurgical instruments are designed specifically tominimize trauma. These microsurgical instruments have to meet a very strict specification. An important characteristic of microsurgical instrument is their ability to make clean incision that allows primary intention healing of the wounds .Smaller instruments can be used with more precision due to improved visual acuity. Microsurgical instruments should be slightly heavy, circular in cross-section and long enough to aid in appropriate handling and for a high-precision movement.Shorter instruments with a rectangular cross-sectional design do not allow for precise handling and are not suitable for microsurgicalapproach. These must be lightweight, but also sufficiently robust to retain proper stability to avoid hand and arm muscle fatigue.

A basic set of periodontal microsurgery instrument kit comprises of:

- Knives and scalpel blades
- Microscissors
- Anatomic and surgical microforceps
- Micro needle holder
- Micro scalpel holder

Microsurgical sutures

One of the greatest advantages of microsurgery is passive wound closure. The desired outcome of microsurgery is meticulous primary apposition of the wound edge. Ideally, the incisions should be almost invisibleand precisely closed with minimal tissue damage and very less bleeding. A detailedunderstanding of the characteristicstissue handling and biological properties of various suture materials are essential to implement microsurgical principles in the periodontal surgical procedures.An ideal suture material should maintain its strength until the wound heals enough to withstand stress on its own and should be sterile, easy to handle, minimally reactive in the tissue, resistant to tissue shrinkage.The only variable element in an ideal suture material is its size and tensile strength, and the size and form of needleswaged onto the material to close the wound effectively in a way that facilitates optimal healing.Generally, sutures of size 6-0 and smaller are considered as microsurgical sutures. The suture material is extremely thin and not easily detectable by the naked eye.

Microsurgery for root coverage

In the last decade, a special emphasis has been focused on the design and performance of surgical procedures for root coverage.The utmost aim of root-coverage procedures is the complete coverage of the recession defect with excellent soft tissue esthetics and minimal post treatment probing depths as stated by Cairo et al.[6] Nowadays clinicians are challenged to accomplish such superior outcomes and therefore need a sound comprehensive decision-making process that is entirely based on scientific evidence to devise the treatment strategy. The search for a perfect root coverage technique has led to the development of several pioneering surgical procedures to achieve consistently better and more predictable outcomes. On

reviewing the literature, many studies have proved that microsurgical techniques provide a predictable means of improving the reliability of root coverage procedures with minimal patient discomfort.[7,8] The available evidences indicated that microsurgery enables complete root coverage in class I and class II marginal tissue recession defects, particularly with CTG. This can be due to extremely accurate incisions, flap elevation, and precisely closed wound which lead to primary wound healing.

In mucogingival surgeries, the damage to the tissues during surgery can be greatly reduced by atraumatic surgical approach and excellent visualization of the operative field. Therefore, this field of microsurgery enhances the normal vision by magnification and providing with sufficient lighting, leading to improvement in predictability, cosmetic result, and patient comfort levels over conventional periodontal surgicalprocedures.

Burkhardt r and Lang NP et al in 2005, evaluated the amount of wound healing following mucogingival surgical interventions using microsurgical and macrosurgical methods. CTG with double pellicle papilla flap was used to treat subjects with bilateral canine class I and II recessions. It was foundthat microsurgical approach for root coverage significantly improves the vascularization of the grafts and percentage of root coverage than conventional approach.[5]Similarly,Luca Francetti et al in 2005, evaluated if microsurgical approach could improve the outcome of treated sites with gingival recession when compared to traditional surgical method and concluded that there were significant differences in esthetic parameters in micro surgically treated group when compared with macro surgically treated group.[9] In 2010 ,Patrycia F. Andrade et al compared the macro and microsurgery techniques for root coverage using a coronally positioned flap associated with enamel matrix derivative and observed a statistically significant increase of width and thickness of keratinized tissue in microsurgical group.[10]

Sandro Bittencourt et al in 2012, compared amount of root coverage, postoperative morbidity, and aesthetic outcomes of subepithelial connective tissue graft (SCTG) technique with or without the use of a surgical microscope in the treatment of gingival recessions.[11] Based on the results, the authors concluded that both the approaches were able to produce root good amount of coverage; however, use of the surgical microscope was associated with added clinical benefits in the treatment of gingival recession defects.

Nejat nizam et al in 2015, assessed the clinical outcomes of macro and microsurgical approaches in the management of gingival recession using CTG with CPF.[4]Root coverage percentage was significantly higher in the microsurgical group compared with macrosurgical group at 2 years. Microsurgical approach for root coverageusing CTG with CPF can retain the clinical outcomes for a longer period than macrosurgical approach and healing appears to be more rapid using microsurgery, but aesthetic outcomes are similar for both the groups.In the same year,Jindal U et al compared the recession coverage outcomes using SCTG through microsurgical and microsurgical approach.[12] The results at 6 months showed that both the techniques demonstrated predictable mean root coverage; Hence, the authors concluded that the utilization of microscope enhances the clinical outcomes of recession management.

Jian Kang et al in 2015,[13]conducted a systematic review to estimate whether microsurgical approach gains superior result in root coverage compared to conventional surgical techniques. The number of sites exhibiting complete root coverage and superior esthetic outcomes were assessed. The RCTs included for the review demonstrated significant number of complete root coverage in the microsurgical group when treated

with SCTG. Based on the findings, they concluded that microsurgical technique in the treatment of GR may be effective in accomplishing complete root coverage with SCTG.

Suraj Pandey, D. S. Mehta et al in 2017, compared macrosurgical and microsurgical approach in performing the free rotated papilla autograft combined with coronally advanced flap for the management of gingival recession.[14]The results at 6 months indicated significant improvements in all clinical parameters in both the groups. However, no statistical significance was demonstrated between the 2 groups. Hence, they concluded that both surgical procedures were equally effective in the treatment of localized gingival recession and microsurgical approach may provide better outcomes when patient centered outcomes were considered.Likewise, Sweta Kumari Singh et al in 2017, compared the clinical outcomes of gingival recession using MCAF and root conditioning using 24% EDTA when done under magnification and without magnification.[15] None of the parameters showed statistically significant difference between the groups. However, the VAS scores were found to be significantly better in the test group at both 3rd and 7th day postoperatively.

The available evidence, stemming from the above studies indicate that complete root coverage can be more predictably achieved by SCTG performed with a microscope. This can be explained by accurately mapped incisions, finely elevated flaps, and precisely closed wound without tension leading to primary wound healing.

Discussion

The execution of microsurgery is technique sensitive and it has gained more rapid acceptance among periodontists now. Combining enhanced visual acuity with the use of specifically designed microsurgical instruments could allow for more atraumatic handling of the hard and soft tissues.it could be attributed due to the fact that the use of precise incision with minimal flap elevation followed by primary closure of the wound helps in gentle handling of the periodontal tissues. Since surgical trauma is minimized during surgery less cell necrosis occurs resulting in less inflammation and reduced pain. Without much incisions and tearing of the periosteum, healing can be faster and more uneventful with greater expression of growth factors.Hence the endpoint visual appearance of the typical microsurgical procedure is simply far superior to the end point appearance gained from conventional periodontal surgery. When integrating the new technology, lack of skill, training and practice can lead to physiological tremors resulting in an inappropriate delivery of surgical skills. Incorporation of smaller instrumentation, sutures and needles into this environment should allow clinicians to increase the precision of their surgical skills. Application of microsurgical principles achieves passive primary wound closure. The features which are mentioned above aim at the elimination of gaps and dead space at the wound edge and avoiding inflammatory phase of wound healing.

Today, the goal of periodontal plastic surgery is not only to achieve satisfactory clinical results, but also to develop minimum invasive techniques that enhance the wound healing, decrease postoperative discomfort, and increase patient satisfaction. The inception of the surgical operating microscope and microsurgical procedures is an important step to achieve this goal. Optical magnification has widened the horizons of periodontal surgical procedures. Microsurgery is not an independent discipline, but a technique that can be applied to different surgical disciplines. It is based on the fact

that the human hand, with appropriate training, is capable of performing finer movements than the naked eye is able to control.The microsurgical technique allows high-level of accuracy by which gentle handling of soft and hard tissues and extremely accurate wound closure are made possible through magnification and well planned and well executed surgical procedures.

Conclusion

;From the abovementioned data,it can be concluded that periodontalmicrosurgery is an evolution of conventional surgical techniques that permits reduced trauma to the patients. Microsurgery offers new possibilities to improve periodontal care in a variety of ways. Its benefits include improved cosmetics, rapid healing, minimal discomfort, and enhanced patient acceptance.Altogether,the microsurgical approach for root coverage procedure improves the patient centered outcomes way better than conventional procedure.

References

1. *Tibbetts LS, Shanelec DA. An overview of periodontal microsurgery. CurrOpin Periodontol. 1994;187–93.*
2. *Belcher JM. A perspective on periodontal microsurgery. Int J Periodontics Restorative Dent. 2001 Apr;21(2):191–6.*
3. *Burkhardt R, Hürzeler MB. Utilization of the surgical microscope for advanced plastic periodontal surgery. Practical periodontics and aesthetic dentistry: PPAD. 2000 Mar;12(2):171-80.*
4. *Nizam N, Bengisu O, Sönmez Ş. Micro-and macrosurgical techniques in the coverage of gingival recession using connective tissue graft: 2 years follow-up. Journal of Esthetic and Restorative Dentistry. 2015 Mar;27(2):71-83.*
5. *Burkhardt R, Lang NP. Coverage of localized gingival recessions: comparison of micro- and macrosurgical techniques. J Clin Periodontol. 2005 Mar;32(3):287–93.*
6. *Cairo F, Pagliaro U, Nieri M. Treatment of gingival recession with coronally advanced flap procedures: a systematic review. J Clin Periodontol. 2008 Sep;35(8 Suppl):136–62*
7. *Cortellini P, Tonetti MS. Microsurgical approach to periodontal regeneration. Initial evaluation in a case cohort. Journal of Periodontology. 2001 Apr 1;72(4):559-69.*
8. *Wachtel H, Schenk G, Böhm S, Weng D, Zuhr O, Hürzeler MB. Microsurgical access flap and enamel matrix derivative for the treatment of periodontal intrabony defects: a controlled clinical study. Journal of Clinical Periodontology. 2003 Jun;30(6):496-504.*
9. *Francetti L, Del Fabbro M, Calace S, Testori T, Weinstein RL. Microsurgical treatment of gingival recession: a controlled clinical study. International Journal of Periodontics & Restorative Dentistry. 2005 Apr 1;25(2).*
10. *Andrade PF, Grisi MF, Marcaccini AM, Fernandes PG, Reino DM, Souza SL, Taba Jr M, Palioto DB, Novaes Jr AB. Comparison between micro-and macrosurgical techniques for the treatment of localized gingival recessions using coronally positioned flaps and enamel matrix derivative. Journal of periodontology. 2010 Nov;81(11):1572-9.*

11. *Bittencourt S, Ribeiro ÉD, Sallum EA, Nociti FH, Casati MZ. Surgical microscope may enhance root coverage with subepithelial connective tissue graft: A randomized-controlled clinical trial. Journal of periodontology. 2012 Jun 1;83(6):721-30.*

12. *Jindal U, Pandit N, Bali D, Malik R, Gugnani S. Comparative evaluation of recession coverage with sub-epithelial connective tissue graft using macrosurgical and microsurgical approaches: A randomized split mouth study. Journal of Indian Society of Periodontology. 2015 Mar;19(2):203.*

13. *Kang J, Meng S, Li C, Luo Z, Guo S, Wu Y. Microsurgery for root coverage: A systematic review. Pakistan journal of medical sciences. 2015 Sep;31(5):1263.*

14. *Pandey, S. and Mehta, D.S., 2013. Treatment of localized gingival recession using the free rotated papilla autograft combined with coronally advanced flap by conventional (macrosurgery) and surgery under magnification (microsurgical) technique: A comparative clinical study. Journal of Indian Society of Periodontology, 17(6), p.765.*

15. *Singh SK, Sharma N, Malhotra S, Dodwad V, Vaish S, Singh DK. Coverage of localized gingival recession using coronally advanced flap: A comparison between microsurgical and macrosurgical techniques. Indian Journal of Dental Sciences. 2017 Apr 1;9(2):88.*

Corresponding E mail id: ***savithri.krishnan0@gmail.com***