# Microsurgery: A Periodontal Perspective

Dr. Madhulika Banerjee[1], Dr. Neelam Das[2], Dr. Janardhana Amaranath B.J.[3], Dr. Shruti Gupta[4]

[1]*PG Student, Department of Periodontology, Rama Dental College Hospital & Research Centre, Kanpur (UP) 208024;*

[2]*Assistant Professor, Department of Periodontology, Rama Dental College Hospital & Research Centre, Kanpur (UP) 208024*

[3]*Professor and Head, Department of Periodontology, Rama Dental College Hospital & Research Centre, Kanpur (UP) 208024;*

[4]*Associate Professor, Department of Periodontology, Rama Dental College Hospital & Research Centre, Kanpur (UP) 208024*

## Abstract

In today's periodontal practise, surgical procedures are being refined more and more to satisfy patients' biologic and aesthetic needs. Surgical methods and instruments are required for these new technologies. The range of the clinician's visual acuity limit tests their technical skills. Periodontal microsurgery enhances normal vision through magnification and a good lighting system, which improves the results of basic periodontal surgical procedures. In terms of passive wound closure and lessened tissue trauma, it provides improved outcomes that are not possible with conventional surgery. This review's objective is to provide a basic understanding of periodontal microsurgery, including the function of magnification, microsurgical equipment, and applications.

**Keywords:** Periodontal microsurgery, loupes, magnification, ergonomics

## Introduction

In the last few decades, concepts and methods in dental sciences have undergone a great deal of change. Although the use of surgical operating microscopes and loupes to achieve magnification to perform various procedures in different disciplines of the medical and surgical field is widely praised, its incorporation in dentistry, particularly periodontics, needs to be addressed on a more comprehensive level. In the minds of many dental professionals, microsurgery is an interesting concept. Periodontal microsurgery is the refinement of basic surgical techniques made possible by the improvement in visual 1 acuity gained with the use of surgical microscope.[1] In 1979, Daniel defined microsurgery in broad terms as surgery performed under magnification by the microscope.[2] In 1980, microsurgery was described by Sera fin as a methodology- a modification and refinement of existing surgical techniques using magnification to improve visualization, with applications to all specialties.[3]

As a treatment philosophy, microsurgery incorporates three different principles: [4]

1. Improvement of motor skills, thereby enhancing surgical ability.
2. An emphasis on passive wound closure with exact primary opposition of the wound edge.
3. The application of micro-surgical instrumentation and suturing to reduce tissue trauma.

Magnification in periodontics has the potential to alter how periodontal surgical care is thought of clinically. The patients now demand wise counsel and meticulous care. They readily accept innovations that provide more dependable, more aesthetically pleasing, and safer results. Another benefit is that their inconvenience, anxiety, and discomfort are lessened.

This review article highlights on the importance of microsurgery in the field of periodontics.

## Evolution of Microsurgery

Dentistry has borrowed microsurgery from medical science. Carl Nylen (1921), father of microsurgery, used surgical operating microscope for the treatment of otosclerotic deafness. [5] Apotheker and Jako are given the credit to first introduce the microscope to dentistry in 1978. In periodontics, it was introduced by Shanelec and Tibbetts who presented a 1 2 continuing education course on periodontal microsurgery at the annual meeting of the American Academy of Periodontology in 1993. [6]

## Principles of Microsurgery

Major principles of microsurgery include improvement of motor skills, an emphasis on passive wound closure with exact primary opposition of the wound edge and, the application of micro-surgical instrumentation and suturing to reduce tissue trauma. [7] To improve motor skills a micro-surgeon should have minimal tremors, a relaxed state of mind, good body comfort and posture, a well-supported hand, and a stable instrument holding position. The surgeon must be seated upright with the legs extending forward and with both feet flat on the floor. If the patient's head is assumed in the 12 o'clock position in front of and perpendicular to micro-surgeon's chest, the most precise rotary suturing movement for a right-handed person is from the 2 o'clock to the 7 o'clock position, while for left-handed people it is from the 10 o'clock to the 4 o'clock position. The wrist should be stabilized by resting on a flat surface, angled in a dorsiflexion position at approximately 20 degrees. By doing so more accurate, finely controlled finger movements can be accomplished as the muscle tremor is reduced. The most used precision grip in microsurgery is the pen grip or internal precision grip, which gives greater stability than any other hand grip. [8]

## Microsurgical Triad

Operating microscope renders three unambiguous benefits of illumination, magnification, and increased precision in delivery of surgical skills, collectively known as microsurgical triad as shown in Figure 1. Illumination achieved through fiberoptic technology has improved the methods of focusing light on specific areas and is a standard feature of surgical operating microscopes.

Magnification, the second component of the microsurgical triad, can be achieved using the loupes and the operating microscope. Both types of optical magnification have their own advantages and limitations.[7] Loupes can be simple, compound, or prism in design. These are available in the form of eyeglasses or attached to a headset.

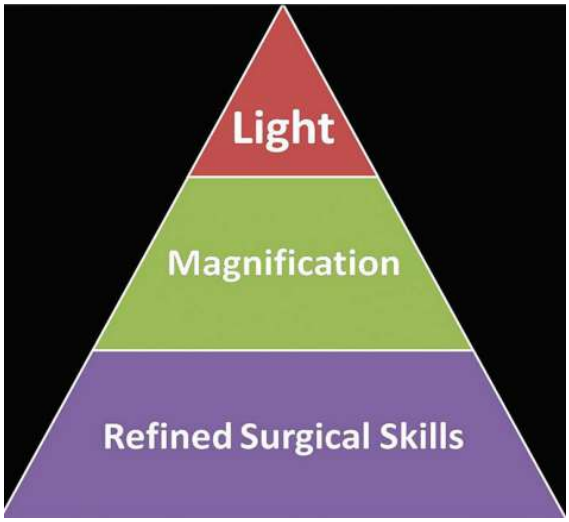


**Figure 1: Microsurgical triad**

## Ergonomics in Microsurgery

Operating surgeon must have a relaxed state of mind, good body comfort and posture, a well-supported hand, and a stable instrument-holding position. [7] To accomplish precise controlled movements of fingers, the ulnar surface of the forearm and wrist should be supported by resting on a flat surface, angled in a dorsiflexion position at approximately 20° to reduce muscle tremor originating from both the unintentional and intentional actions of the body. [9]

The most advocated precision grip for micro-surgical procedures is the pen grip or internal precision grip as shown in Figure 2, which provides a greater stability in comparison to any other hand grip due to the tripod formed by the fingers, while the middle finger holds the instrument.

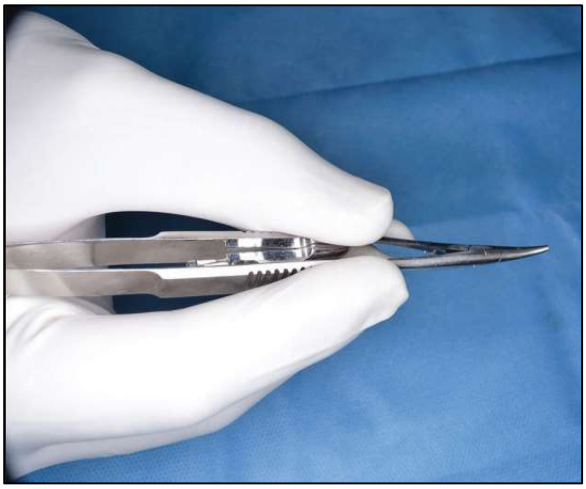

**Figure 2: Precision grip**

## Microsurgical Instruments

Smaller instruments can be used with more precision due to improved visual acuity. To aid in proper handling and for a high-precision movement, microsurgical instruments should be slightly top heavy, circular in cross-section, and approximately 18 cm in length.[10] Shorter instruments with a rectangular cross-sectional design do not allow precise manipulation and are not ideal for microsurgery.[7] Microsurgical instruments usually have a color-coated surface to avoid an unfavorable metallic flare due to the light of the microscope. Needle holders should have an appropriate working lock which does not surpass a locking force of 50 g (0.5 N) as low locking forces diminish the precision and high locking forces engender tremors as shown in Figure 3.[10] A basic set of microsurgical instruments comprises a microscalpel holder, needle holder, micro scissors, micro forceps, and elevators. Different types of blades used in ophthalmic surgery can also be used for periodontal microsurgery as shown in Figure 4.

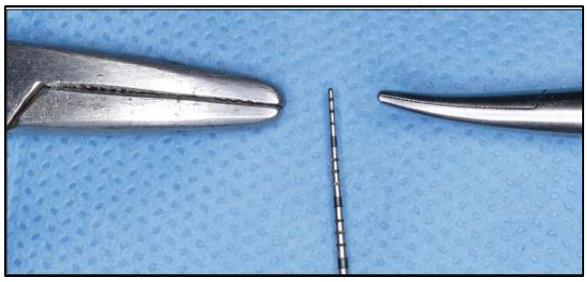

**Figure 3: Relative size of microsurgical and conventional needle holder**

**Figure 4: Periodontal microsurgical knives**

The advantage of these knives is their small size and extreme sharpness. [11] This enables clean, non-ragged incisions to achieve wound healing by primary intention. Needle holders, elevators, mirrors are downsized from those used for conventional periodontal surgery. Small tissue pieces can be removed more efficiently with micro Vannas scissors.[12] Slippage of the suture thread while tying a knot can be avoided using forceps with flat surfaced tips or needle holders with a surface roughened through the finely coated diamond grain.

## Microsurgery in Periodontics

Clinical expertise beyond the range of visual acuity is needed in periodontal plastic surgery, guided tissue regeneration, crown lengthening, ridge augmentation, implant placement etc. So, microsurgery is very important in periodontics.

1. ***Esthetic Surgical Procedures-*** Periodontal plastic surgery is "technique-sensitive" and more demanding than other periodontal procedures. Microsurgery has wide implications including the rotational, free gingival, double papilla, and the sub-epithelial connective tissue grafts for the coverage since it causes minimal trauma and enhances the wound healing process.[1]
2. ***Root coverage-*** Accurate diagnosis with microsurgical techniques makes complete root coverage extremely predictable in Class I and Class II marginal tissue recessions. Partial root coverage results achieved in Class III & Class IV marginal recession with conventional surgery can also be greatly enhanced using microsurgery. According to studies, the use of microsurgical technique depicted a greater increase in width of keratinized tissue and thickness of keratinized tissue as compared to the macro- surgical techniques performed.[13]
3. ***Implants-*** All phases of implant treatment may be performed using a microscope. Studies show that motor coordination and accuracy is generally increased when surgeons use a microscope. Although no studies establish that microsurgery reduces postoperative pain following extraction or implant placement, there is a strong theoretical rationale to suggest that less surgical trauma results in less pain and faster healing, and that microsurgery leads to those ends.[14]
4. ***Root visualization and preparation-*** Success of periodontal therapy depends on visual access to the root surface for removing the residual calculus, treating the pathologically altered root

surface, and achieving a clean and smooth root surface. Clinical and research studies with stereomicroscopy have demonstrated that the root planning is more effective when done under greater magnification and enhances periodontal regeneration.[15]

## Drawbacks of Microsurgery in Periodontics

As we upgrade our surgical maneuvers with the aid of microsurgical concepts, there are a few shortcomings of this modus operandi, which need to be considered before its application. It is much more demanding and technique-sensitive; the 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. An experienced team approach mandates microsurgery and is time-consuming to develop. Physiologic tremor control for finer movements intraoperatively and a steep learning curve are required for clinical proficiency. [16]

## Conclusion

For surgical procedures, periodontal microsurgery is unquestionably necessary. Those who put forth the effort and take the time to become proficient in microsurgical principles and techniques have access to a whole new world thanks to the improved visual acuity that magnification provides. The promising periodontal microsurgery will open new avenues for enhancing the therapeutic outcomes of various periodontal operations.

## References


1. Tibbetts LS, Shanelec D. Periodontal microsurgery. Dent Clin North Am 1998; 42: 339- 59.
2. Daniel RK. Microsurgery: Through the looking glass. N Engl J Med 1979; 300: 1251-7.
3. Serafin D. Microsurgery: Past, present, and future. Plast Reconstr Surg 1980; 66: 781-5
4. Acland R. Practice Manual for Microvascular Surgery, ed 2. St Louis: CV Mosby, 1989.
5. Shah C, Shah S, Modi D. Microsurgery in periodontics Revisited. Journal of research and advancement in dentistry 2012; 1(3).
6. Shanelec DA, Tibetts LS. A perspective on the future of periodontal microsurgery. Periodontol 2000 1996; 11: 58-64.
7. Tibbets LS, Shanelec D.P. Principles and Practice Of Periodontal Microsurgery Int J Microdent 2009;1:13–24.
8. Barraquer JI. The history of microsurgery in ocular surgery. J Microsurg 1980; 11: 288-299.
9. Barraquer JI. The history of the microscope in ocular surgery. J Microsurg 1980; 1: 288-99.
10. Burkhardt R, Lang NP. Periodontal plastic microsurgery. In: Lindhe J, Lang NP, Karring T, editors. Clinical Periodontology and Implant Dentistry. 5th ed. Oxford, USA: Blackwell Munksgaard; 2008. p. 1029-44.
11. Belcher JM. A perspective on periodontal microsurgery. Int J Periodontics Restorative Dent 2001; 21: 191-6.
12. Belcher JM. Periodontal microsurgery. In: Dibart S, Karima M, editors. Practical Periodontal Plastic Surgery. Oxford, USA: Blackwell Munksgaard; 2006. p. 15-22.
13. Burkhardt R, Lang NP. Coverage of localized gingival recessions: Comparison of micro- and macro surgical techniques. J Clin Periodontol 2005; 32:287-93.
14. Shanelec DA. Optical principles of loupes. J Calif Dent Assoc 1992; 20: 25 32.
15. Francetti L, Del Fabbro M, Calace S, Testori T, Weinstein RL. Microsurgical treatment of gingival recession: A controlled clinical study. Int J Periodontics Restorative Dent 2005; 25: 181 8.
16. Buncke JH Jr., Chater NL, Szabo Z. The Manual of Microvascular Surgery. San Francisco, California: Ralph K. Daves Medical Center, Microsurgical Unit; 1975. P.


To cite this article Microsurgery: A Periodontal Perspective: Dr. Madhulika Banerjee, Dr. Neelam Das, Dr. Janardhana Amaranath B.J., Dr. Shruti Gupta, Rama Univ. J. Dent. Sci. 2022 September; 9 (3):13-15