Review Article

Periodontal Microsurgery: An Overview

Maytreyee R1, Jain P1, Hamid H1, Narang S2, Jain K3
1PG student, 2 Professor 3 Reader Department of Periodontology, Peoples College of Dental Sciences & Research Centre, Bhopal (M.P.)

Abstract: In recent years, periodontics has seen increasing application of procedures requiring progressively more intricate surgical skills. These demands are mostly met owing to a minimally invasive surgical approach. This has led to the introduction of the Microscope into precision dental practice which is one of the greatest advances seen in modern dentistry. Periodontal microsurgery is in its early stage, but will more likely play a pivotal role in the near future. It is a skill that requires practice to achieve proficiency. The small scale of microsurgery presents special challenges in dexterity and perception. Its execution is technique sensitive and more demanding than are conventional periodontal procedures. As the benefits of the microscope are realized, it will be applied more universally. There are many indications in which periodontal microsurgery can be beneficial. It appears to be a natural evolution for the specialty of periodontics.

Key words: Periodontal microsurgery, history of microsurgery, microsurgical traits, loups,

Introduction

The main aim of a surgical intervention is no longer only the survival of the patient or one of his organs, but the effort to preserve maximum amount of function and to improve patient comfort. These demands are mostly met owing to a minimally invasive surgical approach.1

The term microscope is derived from the Greek word ‘MICROS’ which mean ‘Small’ and ‘SKOPEIN’ which means ‘To View’.2,8 Microsurgery is broadly defined as “surgery performed under magnification provided by the microscope”.3,9 Periodontal microsurgery is the refinements of basic surgical techniques made possible by the use of the surgical microscope and subsequent improved visual acuity.4

History Of Microsurgery

In 1694, Amsterdam merchant Anton van Leeuwenhook constructed the first compound lens microscope.5In 1848, Carl Zeiss, a machinist, working with Ernst Abbe, a physicist revolutionized lens crafting. Lenses became predictable and standardized.1 Carl Nylen, who is considered the father of microsurgery, was first to use a binocular microscope for ear surgery in 1921.6 By the 1960s, microsurgery had become the standard in ophthalmology and neurosurgery and was spreading rapidly to other surgical disciplines. In the Oral Surgery field, Leblanc JP and Van Boven RW, laid the foundations and used nerve microsuturing nerve repair techniques to treat traumatic injuries to the lower dental nerve. In 1993, Shanelec & Tibbetts presented a continuing-education course on periodontal microsurgery at the annual meeting of the American Academy of Periodontology which led to the development of centers devoted to teaching periodontal microsurgery. Belcher wrote an article in 2001 summarizing the benefits and potential usages of the surgical microscope in periodontal therapy.1

PRINCIPLES OF MICROSURGERY

As a treatment philosophy, microsurgery incorporates three important principles:

1. Improvement of motor skills, thereby enhancing surgical ability.
2. As emphasis on passive wound closure with exact primary apposition of wound edges.

The application of microsurgical instrumentation and suturing to reduce tissue trauma.7
Microsurgical Traids

There are three elements of microsurgery:
1. Magnification
2. Illumination
3. Instrument

Magnification

Loupes: Loupes are two monocular microscopes with side by- side lenses angled to focus on one single object. They can further be classified as single-lens magnifiers (clip-on, flip-up, jeweller’s glasses) or multi-lens telescopic loupes.

- **Telescopic loupes**: Telescopic loupes either compound or prism loupes on the other hand, offer improved ergonomic posture as well as significant advancements in optical performance.

- **Compound Loupes**: It consists of multiple lenses with intervening air spaces, which allows an adjustment of magnification, working distance, and depth of the field without excessive increase in size or weight.

- **Prism loupes**: They are prism loupes which are actually low-power telescopes, and the most optically advanced type of loupe magnification available. They contain Pechan or Schmidt prisms that lengthen the light path through a series of mirror reflections within the loupes. For the use in periodontal surgery, an adjustable, sealed prism loupe with high-quality, coated lenses offering a magnification between 4× and 4.5×.

- **Operating microscope**: The surgical microscope consists of a complicated system of lenses that allows stereoscopic vision at a magnification of approximately 4–40×. The optical unit of the microscope includes the following components:
  1. Magnification charger
  2. Objective lenses
  3. Binocular tubes

4. Eyepieces
5. Lightning unit
6 Additional attachments

Loupes versus operating microscope

**Advantages of loupes:**
- Ergonomic benefits of an increased working distance from the viewing object as well a increased visual acuity.
- Loupes are less expensive and initially easier to use
- They are also less cumbersome in the operating field and less likely to breach a clean operating field.

**Disadvantages of Loupes:**
- Include fixed magnification or a lack of magnification variability.
- Potential need for additional light for magnification levels of 4.0 or greater.
- Eyes must converge to view an image, which can result in eyestrain, fatigue, and even vision changes with prolonged use of poorly fitted loupes.
- As the length of the loupe increases to provide for more magnification, the weight of the lens also increases which becomes more uncomfortable.

**Advantages of Operating Microscope:**
- It offers versatility due to an extended range of variable magnification from 2.5 to 20 and to excellent coaxial fiber-optic, shadow-free illumination.
- Availability of numerous accessories for digital still and video image case documentation.
- Increased operator eye comfort due to the parallel viewing optics provided by the Galilean system.

**Disadvantages of Operating Microscope:**
- Can be more cumbersome to use.
- More expensive
• Difficult to master the technique to use.¹

**Illumination**

Most of the manufacturers offer collateral lighting systems or suitable fixing options which are helpful, particularly for higher magnification in the range of 4× and more.⁷ It should be realized that each surface refraction in a lens will result in a 4% loss in transmitted light due to reflection. In telescopic loupes, this could amount to as much as 50% reduction in brightness. Antireflective coatings have been developed to counteract this effect by allowing lenses to transmit light more efficiently.⁸

**Clinical Physiology:**

**Hand control**

**Physiologic Tremor:** Physiologic tremor is the uncontrolled movement arising from both the intended and unintended actions of our bodies. There are several factors that can influence a surgeon’s physiologic tremor, including anxiety, recent exercise, alcohol, smoking, caffeine, heavy meals, hypoglycemia, and medication usage.

**Hand Grips:** The most commonly used precision grip in microsurgery is the pen grip or internal precision grip in which the thumb and index and middle fingers are used as a tripod. The forearm should be slightly supine, positioning the knuckles away so that the ulnar border of hand, wrist, and the elbow are all well supported, allowing the weight of the hand to be on the ulnar border. The middle finger should rest firmly and directly on either the working surface supporting the hand or indirectly on the ring finger and middle finger holds the instrument.

**Instruments**

Proper instrumentation is fundamental for microsurgical intervention. As the instruments are primarily manipulated by the thumb, index and middle finger, their handles should be round, yet provide traction so that finely controlled rotating movements can be executed. The rotating movement of the hand from two o’clock to seven o’clock (for right-handed persons) is the most precise movement the human body is able to perform.⁷ Microsurgical instruments are much smaller, often by tenfold.¹ They are either made of Titanium or surgical stainless steel. A basic set of periodontal microsurgery instrument kit comprises of:

• Knives and scalp bladel blades
• Micro scissors
• Anatomic and surgical microforceps
• Micro needle holder
• Micro scalp holder

**Knives and scalpel blades:** The knives most commonly used in periodontal microsurgery are those used in ophthalmic surgery or plastic surgery:

1. Blade Breaker Knife
2. Crescent Knife
3. Mini crescent Knife
4. Spoon Knife
5. Lamellar Knife

The crescent knife can be used for intrasulcular procedures. The spoon knife is often used to undermine into the lateral sulcular region in preparation for placement of connective tissue grafts using a sulcular, nonrelief technique. Scalpel blades include mini crescent microsurgical blade. Microsurgical incisions are established at a 90-degree angle to the surface using ophthalmic microsurgical scalpels.

**Microscissors:** These are used for the dissection of tissues, blood vessels, and nerves. The most commonly used microscissors are 14 cm and 18 cm long.

**Microforceps:** They are used to handle minute tissues without damaging them and to hold fine sutures while tying knots.

**Needles:** For periodontal microsurgery, the 3/8” circular needle generally ensures optimum results.

**Suture Material:** Although 4-0 or 5-0 sutures are typically used in Periodontics, in periodontal
microsurgery 6-0 and 7-0 sutures are appropriate.

Conclusion

Although clinical studies are lacking and research is needed, the increase in visual acuity provided by the surgical operating microscope should enhance the periodontist’s delivery of surgical skills. Periodontal microsurgery is in its early stage, but will more likely play a pivotal role in the near future. It is a skill that requires practice to achieve proficiency. The small scale of microsurgery presents special challenges in dexterity and perception.

Thus, this review is an insight to the delicate details of the historical, technical and clinical aspect of periodontal microsurgery. The instrumentation, ergonomics, advantages as well as disadvantages have been taken up. We have also discussed about the various clinical aspects of the application of periodontal microsurgery. To conclude, we can say that periodontal microsurgery can be a revolution in dentistry, if applied properly.

References:


Corresponding Author:

Dr. Rochira Maytreyee, People’s College Of Dental Sciences & Research Centre, Bhopal
Email id: rochira.maytreyee19@gmail.com