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Research Paper

Microsurgery in Periodontics-A Review

Medical Science

KEYWORDS : Magnification by Microscope, Illumination & Microsurgical Instruments, increased pricision.

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ABSTRACT

Periodontal microsurgery is the refinement of basic surgical techniques made possible by the improved visual acuity gained with the use of the surgical microscope. In the hands of trained and experienced clinician, microsurgery offers enhanced out come not possible with traditional macrosurgery.

Introduction:

The word microscope comes from Greek words- Micros means small Skopein means to view.

- Microsurgery was broadly defined by **Daniel. R. K. in 1979** as surgery performed under magnification provided by microscope.[1]
- **Serafin 1980** described microsurgery as methodology a modification & refinement of existing surgical techniques using magnification to improve visualization that had implications & applications to all specialties.[2]
- **Dennis.A.Shanelec & L.S.Tibbets** defined Microsurgery as a refinement in surgical technique by which visual acuity is increased using a microscope at magnification exceeding 10 x. Although loupes improve normal vision microsurgery is also an ergonomic methodology in which surgical manipulations are improved through motor coordination. In addition increasing clinical accuracy the microscope is important for diagnostic and non-surgical procedures in Periodontics.[3]

Concepts In Microsurgery:

1. The Microsurgical Triad –

Kim et al in 2001 reported three elements **i.e. Magnification , Illumination and Instruments which is called the Microsurgical Triad,** the improvement of which is a prerequisite for improved accuracy in surgical intervention .Without any one of these ,microsurgery is not possible . [4]

Magnification

Characteristics of magnifiers and magnification:

- The Power of Magnification : This is the ability of the lens to increase the visual size of the object. X denotes the number of times the visual size has been increased
- Working Distance or the Focal Length : It is the distance measured from the eye lens location to the object in vision.
- Field of View : This is the area of the object that can be seen through the magnifier. The larger the power the lesser the field of view.
- Depth of Field : The distance that a magnifier can be moved from an object and still have the object in focus; the higher the power, the shorter the depth of field. Distortions of image is known as aberrations. Aberrations in loupes are usually of two kinds, Chromatic and Spherical

Loupes

The most common magnification system used in dentistry is MAGNIFICATION LOUPES. Loupes are fundamentally two monocular microscopes, with side-by-side lenses, angled to focus on an object. The magnified image that is formed, has stereoscopic properties that are created by the use of convergent lens systems. Although loupes are widely used, their major disadvantage is that the eyes must converge to view an image, which can result in eye strain, fatigue and even vision changes with the prolonged use of poorly fitted loupes. For most periodontal procedures, loupes of 4.0 x to 5.0 x provide an effective combination of magnification, field size, and depth of focus.[5]

Three types of loupes are commonly used. **Fig- 1**

1. Simple loupes.
2. Compound loupes.
3. Prism loupes.

Adjusting Magnifying Loupes

Loupes are worn in a fixed position relative to the eye, presenting different problems in adjustment. Well adjusted loupes position the exit pupil right in the middle of the iris. If the exit pupil misses the centre and hits the edge of the iris, a crescent shaped portion of the field of view is cut-off and light is reduced. A clinician cannot simply move his head relative to the loupes and adjust this error. Instead, the clinician has to move the loupes relative to the eyes. If the error is small, and does not cause double vision, it may not be noticed. Uncorrected, the eyes will attempt to accommodate the error by converging, dilating and focusing. This causes fatigue of the ciliary and extraocular muscles and results in rapid eyestrain.

Choice Of Loupes

For the use in periodontal surgery, an adjustable, sealed prism loupe with high quality coated lenses offering a magnification between 4X and 4.5X, either head band or front frame mounted, with a suitable working distance and a large field of view, seems to be instrument of choice.[6]

Surgical Microscope[4]

A basic surgical microscope for dentistry should have the following configuration :

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- Eyepieces with 12.5X reticule.
- Objective lens 200 - 250 mm
- Binocular inclinable at 180 degree
- Magnification with five step manual changer or power zoom magnification changer
- Fibreoptic illumination system
- Audiovisual accessories (e.g. video camera)
- Documentation

Loupes Versus Operating Microscopes[7,8]

Loupes and optical microscope have some common features which include :

- Both loupes and the operating microscope improve visual acuity and are beneficial in enhancing periodontist's ergonomic comfort and efficiency by increasing the optical working distance.
- A multitude of eye, neck, shoulder, and back problems that are common to dentists assuming a shorter working distance to increase visual acuity without magnification, may be eliminated by using the surgical microscope.
- Increasing the normal working distance by 6 to 8 inches has been shown to improve vastly the postural ergonomics and eye strain of industrial workers.

Advantages of loupes

- Less expensive and initially easier to use.
- Loupes also tend to be less cumbersome in the operating field and are less likely to breech a clean operative field

Advantages of Prism Loupe

- Produces better magnification.
- Wider depth of field.
- Longer working distance.
- Larger field of view.
- Coaxial fiber-optic lighting is incorporated in the lens elements.
- Improve illumination

Advantages Of Operating Microscope

- Greater operator eye comfort because of the parallel viewing optics of the Galilean system as well as the range of variable magnification.
- Excellent coaxial fiberoptic illumination
- Countless accessories such as still and video cameras for case documentation.

Limitations of loupes[9]

- Lack of variable magnification, and that an individual light source may be required, particularly for magnification in the range of or greater than 4.0 diameters
- With loupes, each surface refraction in a lens results in a 4% loss in transmitted light because of reflection, unless antireflective coatings are in place to counteract this by allowing the lens to transmit light more effectively. Compound and prism loupes without the protective coating could have as much as a 50% reduction in brightness
- There is discomfort from the heavy weight which has to be borne by the surgeon's nose bridge and m any surgeons find it uncomfortable to wear for a long period of time
- Higher power magnification often influences posture negatively

Limitations of operating microscope

- Restricted area of vision and loss of depth
- Loss of visual reference points
- Special training required
- Expensive

Benefits Of Microscopes In Periodontics [4]

- Accurate wound closure
- Little damage to the tissues
- Ergonomic
- Eliminates patient pain and morbidity
- Perceived more favorably

Microsurgical instruments

Specially designed to minimize trauma, Circular in cross section permits precise rotational movement. Manufactured of titanium for strength, lightness & non-magnetic characteristics

Diagnostic Instruments –

8Surgical Instruments -

- Set Of Minicurettes - Fig-2
- Castroviejo Needle Holder - Fig-3
- Laschal Microscissors - Fig-3
- Several types of ophthalmic knives such as crescent, lamellar, blade breaker sclera and spoon knife.

Microsurgial Suture Needle -

- Comes in various sizes (diameters and length) and shapes (straight or curved), and also with different point types (rounded, cutting, or blunt).
- As in the case of suture thread, the type of needle used depends on the procedure and tissue to be sutured; generally, needles with a diameter of less than 0.15 mm are used for microsurgery.

Microsurgial Suture Materials -

- Gauges of 9-0 (0.03 mm) to 12-0 (0.001 mm) are generally used for microsurgery.
- Suture thread may be absorbable or non-absorbable, natural (made of silk, gut, linen, or other natural material) or synthetic .

Illumination[10]

- Fiber optic illumination technology is used.
- Fiber optic sources of light can be attached to hand pieces, scalers, instruments and magnification loupes.
- Johnson et al (1989) demonstrated that fiber optic illumination/ transillumination is beneficial in removing deposits in moderate to deep periodontal pockets.

Microsurgical Indications

In Periodontal Surgery

- Horizontal augmentation
- Vertical augmentation
- Guided tissue regeneration (GTR) [11]
- Guided bone regeneration (GBR) [11]

In Mucogingival Surgery

- Accurate split thickness flaps
- Double papilla flaps
- Apical or coronal repositioned flaps
- Connective tissue grafts
- Pedicle or sliding flaps
- Papilla reconstruction.[12]
- Minimal invasive surgery (MIS) for regeneration.[13]

In Implant Surgery

- All phases of implant treatment may be performed using a microscope.[3]
- Sinus lift procedure - One of the novel applications of microsurgery.[14]
- Surgical Tooth Extraction.[2]
- Implant placement in extraction sockets.[15]

Conclusion

Microsurgery offers new opportunities to enhance therapeutic results, improved cosmetics, rapid healing, minimal discomfort, enhanced patients acceptance. Future perspective, for surgeons who perform periodontal surgery, the improved visual acuity

and ergonomics provided by magnification opens new possibilities for periodontics that can improve therapeutic results for variety of procedures. Microsurgical Periodontics is technique-sensitive and more demanding than periodontal macrosurgery. It results in more rapid healing as it is less invasive and less traumatic. Future Periodontics will see increasing use of magnfication in all areas of practice.

Figures

Fig 1 Loupes

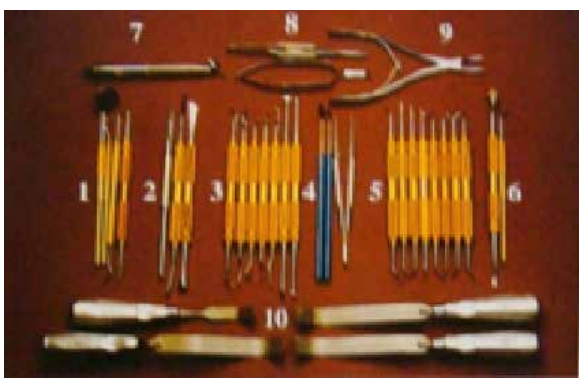

Fig-2 Mini Currents Set

Fig-3 Costroviejo Needle Holder Laschal Microscissors

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