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The World of Oral Cavity Through the Eye of the Loupe

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Abstract:- The purpose of this article is to make the reader familiar with the purpose and benefits of loupes in the field of dentistry. Loupes work by the mechanism of magnification, magnification is significant increase in size particularly by use of lenses. Working in the oral cavity puts significant stress on the dental professional's eyesight, posture and effectiveness of working for longer duration. With the use of magnification tools such as loupes a dental professional's work can improve significantly by improving the visual field and musculoskeletal quality.

Keywords:- *Dental Professionals; Loupes; Posture; Magnification; Field Visibility; Musculoskeletal Disorder; Lenses; Lens System; Efficiency.*

I. INTRODUCTION

A loupe is a type of magnifying devices used to see things more closely. It is a form of a modified microscope. It uses two system of lenses namely Galilean and Kepler's optical system.[1] Improving diagnostic skills and quality of care is the most significant benefit of dental loupes. Dental loupes significantly help improve occupational diseases and quality of care of dental staff.[2] Lately, in clinical dentistry, dentists are now practicing a higher level of microscope-assisted precision dentistry. Dental loupes have significantly changed the way dental surgeries can be performed. The microsurgical techniques have made possible and accessible results that were unimaginable before.[3] In response to concerns regarding visual, musculoskeletal and postural quality, oral health professionals should consider loupes to improve ergonomic positioning and enhance their clinical view and improve the quality of care they provide to their patients. [4]

II. BENEFITS OF USING MAGNIFICATION

- Magnification helps improve visualization of finer faults during the investigative phase which would not be so exact and effective with just the naked eye.
- As a clinician ages, his/her eyesight also ages and the need for compensation for presbyopia also increases significantly which is easily fulfilled by the use of loupes.[5]
- With the use of magnification, the quality of care being provided to the patient increases significantly.
- Magnification prominently reduces the strain on the eyes and the neck of the clinician as a result increasing their stamina to work for longer period of time comfortably.[6]

III. TYPES OF MAGNIFICATION LOUPES AVAILABLE

A) Two Optical Systems Are Available:[7]
- *Galilean Loupes*
- *Prismatic or Keplerian Loupes*

- *Galilean Loupes:*
- These are used for 2x-2.5x magnification.
- These loupes use two or more lenses to focus the image.
- These are more appropriate for beginners as the magnification provided by these lenses is not much larger so a beginner will not have a problem adjusting their eye to the magnification.
- Comparatively light weight.
- They produce a halo effect at the periphery of the visual field, which is not liked by the clinician.

- *Prismatic or Kelperian Loupes:*
- These loupes have multiple lenses to provide better focus and clarity to the clinician.
- Since they have more lenses and hence provide superior magnification, they are more expensive comparatively.
- If a clinician uses prescription glasses, these can be mounted on the loupes.
- Can be worn as a headband.
- Provide superior magnification.
- These loupes make available a wider view of the field and greater depth.

B) Three Designs Available Are:[8]
- *TTL or Through -the-Lens*
- *Flip-Up*
- *Through-the-Flip*

- *TTL or Through-the-Lens*
- These loupes are placed closer to the clinicians' eyes.
- They provide a large field of view.
- These are fixed and eliminate the need to make constant adjustments.
- Prescription glasses can also be added to the loupes.

- *Flip-Up*
- These loupes allow adjusting the angle.
- Their setting can be changed based on sitting or standing position of the clinician.
- They can be removed in between the procedure to allow for a clear view if needed.

➢ *Through-the-Flip*

- These loupes combine the through-the-lens and flip-up designs.
- These are the most commonly used loupes in dentistry.

IV. APPLICATION OF LOUPES IN DIFFERENT BRANCHES OF DENTISTRY

➢ *Endodontics*

The use of loupes in endodontics is in both investigative and treatment phase. They help during examination to identify carious structures which would otherwise stay hidden from the naked eye. During cavity preparation it helps distinguish between secondary and tertiary dentin. It aids in root canal treatment to inspect the calcified canal orifice. Magnification makes it easier to retrieve broken instruments and perforation repair.[9]

➢ *Periodontics*

The use of magnifying tools like surgical prism loupes has significantly altered periodontal surgery. The procedures are now less invasive because of the improved magnification of the site of the surgery.[10] procedures like root debridement under illumination and magnification is more effective with less post operative pain and healing index. Clinical effectiveness for periodontal regeneration of intrabody defects is better through the microsurgical approach, also there is improved treatment of isolated or multiple intrabody defects and minimal trauma.[11]

➢ *Oral Surgery*

Magnification is important for use in all surgical procedures for impacted teeth, mucogingival surgical procedures. Recently microscopic dentistry has been used in surgical treatment of injuries and lesions of the sensitive areas of the oral cavity.[12]

If proper care is not given regarding the lingual flap during lower molar and premolar level oral surgical treatment, or during the surgery of third molars, the lingual nerve and dental nerve are vulnerable to harm, by implementing loupes this can easily be prevented.[13]

➢ *Implant Dentistry*

The specialized field of implant dentistry is a developing field with lots of room for creativity. All phases of implant dentistry can involve the use of loupes. The new age of microsurgical operations will usurp the era of excruciating and traumatic tooth loss, constant replacement of an anterior tooth that is declining, etc, with the use of cutting-edge magnifying tools.[14]

➢ *Orthodontics*

In orthodontic practice, optically improved vision achieved through the appropriate level of magnification is crucial. The orthodontists now employ ceramics, lingual appliance, self-ligating devices and thinner bracket systems with magnifying loupes.[15]

V. CONCLUSION

Magnification devices are commonly used by dental professionals during RCT and extraction. Its believed, its use can lead to an improved ergonomic, postural and psychological state of dental professionals.[16] Magnification devices, age of the dentist, eyesight, all directly influence the visual performance in the dental working distance.[17]magnification loupes enhance the posture of the dentist and makes exploring. Investigating and treatment much easier.[18]

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