**RECENT ADVANCES OF MAGNIFICATION IN DENTISTRY**

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**ABSTRACT**

Oral operating field a challenge for dentists to work while maintaining musculoskeletal health. In recent years many studies have been executed to improve visualization of the operating field and the use of magnification systems has been recommended for providing additional benefits. Magnification in general is considered one of the great revolutions in science, and specifically in dentistry.

Keywords- magnification, dentistry, loupes

**INTRODUCTION**

The art of dentistry is based on precision. The microscope and other forms of magnification fill that need, especially for accomplishing endodontic procedures.

-J Esthet Restor Dent

Both microscopes and loupes have been widely adopted by dentists. Magnification can be divided into low-magnification (2x-8x), mid-magnification (8x-16x), and high-magnification (16x- 25x). Microscopes provide adjustable magnification (magnification range 4x-25x), while most loupes provide fixed magnification (magnification range 2.5x-6x).

**RECENT ADVENCES**

ENDOSCOPES

Early endoscopists such as Hippocrates in 377 BC used primitive tube-like instruments for endoscopy[1]. With major advances in the field of medicine, a breakthrough in optical quality was achieved in 1960 by an English physician, Hopkins, who created a rod lens series that led to important advancements in the field of view, magnification, and focal length of the endoscope, resulting in a clearer image[2].

The field of endoscopy has expanded further with the introduction of the dental endoscope. The use of rod-lens endoscope in endodontics was first reported in literature in 1979[3]. It was helpful in diagnosing dental fractures.

The Modular endoscope system (Sialotechnology Ltd., Ashkelon, Israel) being based on modern technology of microendoscopes is used in small channel organs (salivary gland ductal system, tear canals) and is designed to enable the practitioner to work inside the root canal with magnification and instrument access[4].

ORASCOPE

The recently introduced flexible fiberoptic orascope is recommended for intracanal visualization, has a .8mm tip diameter, 0º lens, and a working portion that is 15mm in length. The term orascopy describes the use of either the rigid rod-lens endoscope or the flexible orascope in the oral cavity[5]. Orascopic endodontics is the use of orascopy for visualization in conventional and surgical endodontic treatment[6].

The difference between an endoscope and an orascope is that:

an orascope is made of fibre-optics

an endoscope is made up of glass rods.

ENDODONTIC VISUALIZATION SYSTEM

The recently introduced Endodontic Visualization System (EVS) (JEDMED Instrument Company, St Louis, MO, USA) incorporates both endoscopy and orascopy into one unit. The EVS system allows for two methods of documentation[7]. The camera head used in the EVS system is an S-video camera and, as such, documentation is usually accomplished by recording streaming video onto tape or digitized to DVD[8].

DENTAL LOUPES

Dental loupes have been the most common form of magnification used in apical surgery. Loupes are essentially two monocular microscopes with lenses mounted side by side and angled inward (convergent optics) to focus on an object[9].Magnifying telescopes sometimes are called "loupes."

There are three types of binocular magnifying loupes:

(1) a diopter, flat-plane, single-lens loupe,

(2) a surgical telescope with a Galileian system configuration (two lens system),

(3) a surgical telescope with a Keplarian system configuration (prism roof design that folds the path of light)[10].

OPERATING MICROSCOPE

Surgical Operating Microscopewas used first introduced to otolaryngology around 1950, then to neurosurgery in the 1960s, and to endodontics in the early 1990s[11]. Most microscopes can be configured to magnifications up to 40X and beyond but limitations in depth of field and field of view make it impractical.Clearly, if a task can be seen better it can be performed better. Fractures, POEs, and canal isthmuses can be readily seen and dealt accordingly[12].

**CONCLUSION**

The introduction of microsurgical principles in dentistry, many areas of dentistry have adopted them for better patient outcomes. Endodontics has developed new techniques for root canal treatment, to enhance the visualization of the surgical field. In this effort various magnification devices like surgical microscopes, endoscopes, and magnifying loupes have added advantage to the operator for better visualization. These are also associated with benefits for the patient in terms of improvement of clinical and radiographic outcomes.

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