

Dental Operating Microscope: The Third Dimension in Dentistry

Vineet RV*

Department of Conservative Dentistry & Endodontics, Sree Mookambika Institute of Dental Sciences, India

Submission: January 07, 2016; **Published:** January 11, 2016

***Corresponding author:** Dr. Vineet R.V, MDS, Assistant Professor, Department of Conservative Dentistry & Endodontics, Sree Mookambika Institute of Dental Sciences, , Kulasekharam, Kanyakumari District, Tamil Nadu, India, Tel: 9020449368; Email: dr.vrv@rediffmail.com

Editorial

The field of dentistry has seen an explosion of scientific developments over the last 30 years in the fundamental concepts, technologies, instruments and materials. These developments have improved the precision and predictability of dental treatment procedures. The most important revolution has been the introduction of the dental operating microscope. The tremendous visual acuity offered by the operating microscope revolutionized the discipline of endodontics. Dr. Gary Carr is considered as the pioneer of microscopic endodontics. The use of operating microscope has transformed the traditional blindfolded "tactile-based" endodontics to highly predictable "vision-based" endodontics [1]. Human eye has an inherent ability to resolve or distinguish two separate entities that are at least 0.2mm, apart. Dental operating microscope can raise the resolving limit to about 0.006 mm, thus the resolution of human eye improves dramatically. This enhanced resolving power is extremely beneficial in producing precision dentistry. Restorative dentists, periodontists and endodontists routinely perform procedures requiring resolution well beyond the 0.2 mm limit. Crown margin preparation, scaling procedures, incisions, root canal treatment, caries removal, furcation and perforation repair, post placement or removal, bone and soft tissue grafting procedures are the common dental procedures that demand tolerances well beyond the 0.2 mm limit [2]. The operating microscope is an invaluable tool in conventional endodontics. The enhanced visualization and high-powered magnification allows endodontists to identify microscopic blemish, color alteration, microscopic amounts of chalky white demineralization around the grooves, and tiny amounts of flaking of darkened carious tooth structure within the crevices of these grooves. Treatments also can be performed with a greater level of precision, thereby reducing the occurrence of failures [3]. Operating microscope enables dentist to assess the marginal integrity of restorations

and to detect cracks or fractures. The ability to visualize the root canal system in fine detail provides the opportunity to investigate more thoroughly and to clean and shape it more efficiently. It also allows an assessment to be made of the dryness of the canal before obturation and the distribution of sealer on the root canal wall during obturation [4]. During instrumentation with operating microscope, the improved ability to see specific canals allows endodontists to maneuver instruments into canal openings with greater efficiency, to detect tiny amounts of purulence or blood draining through canals or see any tiny amounts of necrotic pulp material that were not removed during canal instrumentation. So it is possible for an endodontist to determine if all canals are accessed and instrumented properly when a direct view might be difficult without removing excessive amounts of coronal tooth structure [5]. Locating hidden canals, localization and treatment of highly complex anatomical variations, identification and removal of canal obliterations and calcifications, perforation repair procedures and removal of fractured posts and endodontic instruments from the canal are the other uses of operating microscope in non-surgical endodontics. Incorporating microscopic approach in surgical endodontics, conceptualized by Prof. S Kim enables careful examination of the apical segment of the root end and perform an atraumatic, moderated bevel apical resection procedures and permit a coaxial ultrasonic preparation into the root, better management of the bone structures thereby making minimally invasive retrograde cavity preparation and retrograde filling of the canal system and all its branches along the longitudinal axis of the root easy to perform [2]. Microsurgical flap design and Surgical soft-tissue management is also greatly enhanced by a microscopic approach, leading to faster healing, less traumatic soft-tissue management, and the advent of microsurgical suturing techniques that minimize trauma and lead to rapid, primary intention wound healing and fewer post-operative pain and complications as well as much better prognosis

than traditional procedures [6]. The use of dental operating microscope in conventional and surgical endodontics offers a number of advantages for improved patient care. Today perhaps 20% of all endodontists use these microscopes and the number is growing rapidly. While the use of microscope is not yet the standard of care in endodontics the momentum is building towards that goal. In fact it is likely that within a few years' microscopes will be a critical component in the endodontic armamentarium. Also the use of operating microscope is gradually extending to other disciplines of dentistry as well. Indeed the modern dental microscopes have modified the way we look and are subsequently changing the way dentistry is practiced world over.

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