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Use of Microscopes and Other Magnification Techniques

AAE Position Statement

Background

The AAE is dedicated to excellence in the art and science of endodontics and to the highest standards of patient care. Successful endodontics depends on a number of factors. The abilities and knowledge of the endodontist, including training and experience, are of primary importance. However, endodontic procedures are performed in the realm of fractions of millimeters, demanding great precision of observation and operation. Clinical and fine motor skills are enhanced by use of appropriate lighting and magnification devices that improve visualization of all aspects of the operative field.

Advances in endodontics in the past two decades have given endodontists important new tools to save natural dentition. In the early 1990s, operating microscopes (OM) were introduced into endodontic practice and endodontic residency programs. By providing both intense focused light as well as a high degree of magnification, the OM has become an important part of the armamentarium for many endodontists. The OM enables endodontists to resolve treatment challenges previously unrecognized or untreatable.

Since the early 1990s, training in microscopes has become an important component of endodontic education, and their use is now universally taught at the graduate level in all Commission on Dental Accreditation-approved endodontic specialty programs. Also, microscopes are now widely used in private practice. A 2007 survey of 1,091 endodontists indicated that 90 percent of endodontists have access to and use the OM in their practice, a dramatic increase from 52 percent in use in 1999.

The AAE was an early proponent of training in microscopes for endodontic residents and successfully advocated that CODA include a microscope

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proficiency standard (4.9.j) to the CODA educational standards for endodontic programs in 1998. Standard 4.9.j was revised by CODA in 2005 by substituting “use of **magnification techniques**” for the previously phrased “use of **microscopes**,” and adding an intent statement that the standard is designed “to ensure that residents are trained in use of instruments that provide magnification and illumination of the operative field beyond that of magnifying eyewear, including operating microscope, orascope or other developing technologies.” The standard also raised the “level of knowledge” that a program must provide in magnification from “understanding” to “in-depth” which is the highest of the three levels of knowledge.

Outcomes studies: magnification techniques

There is not a large body of clinical research comparing endodontic outcomes based on magnification techniques, and the research that exists involves relatively small sample sizes. The challenge of designing such studies lies in the many variables encountered in performing non-surgical endodontic procedures. These variables include the skill of the practitioner; the morphology of the tooth, the type of irrigant used, the size of the lesion present, various anatomical aberrancies that may exist within the tooth, and many other complicating factors. Recall examinations are also a problem with these studies.

Use of Microscopes in Endodontics: General

The following procedures benefit from the use of the microscope:

- locating hidden canals that have been obstructed by calcifications and reduced in size;
- removing materials such as solid obturation materials (silver points and carrier-based materials), posts or separated instruments;
- removing canal obstructions;
- assisting in access preparation to avoid unnecessary destruction of mineralized tissue,
- repairing biological and iatrogenic perforations;
- locating cracks and fractures that are neither visible to the naked eye nor palpable with an endodontic explorer; and
- facilitating all aspects of endodontic surgery, particularly in root-end resection and placement of retrofilling material.

Additional benefits of the OM include the facilitation of enhanced photographic documentation and improved positioning ergonomics for the operator

Conclusion

The OM is an important addition to the armamentarium of modern endodontics. It helps set the bar of excellence at the highest level. The AAE mission statement encourages its members to pursue professional advancement through “the implementation of technological advancements into clinical practice as they are introduced to and accepted by the specialty.”

The introduction of new technologies into any area of health care involves a transition period where individual practitioners evaluate the cost and benefit of integrating the new technology into their practices. For endodontists who were trained without microscopes, this varies based on a number of factors, including stage of career and time required for training in the new technology. Current graduates of endodontic residency programs immediately employ the use of OM's upon their transition from education to clinical practice.

Recognizing these differences, the AAE encourages all practicing AAE members to learn about the benefits of microscopes in patient care and pursue training if they determine it will benefit their practice. The AAE anticipates that over the next 10 years, as endodontists trained without microscopes retire, the percent of endodontists using microscopes in private practice will approach 100 percent. Universal adoption of the OM is a function of time.

Advances in endodontics over the past 20 years have been widespread and far-reaching. Endodontists now help patients retain teeth that would have been extracted in the past. The AAE expects that advances in magnification technologies and other treatment modalities will continue to improve endodontic outcomes in the years to come. The position of the AAE is that the microscope is an integral and important part of the performance of modern endodontic techniques.

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