

Using the Microscope in Conventional Endodontic Treatment



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Innovations in endodontic technology have been responsible for many revolutionary changes that have occurred over the last 10 to 15 years. Improved instrumentation and obturation products used judiciously have elevated the quality of root canal therapy. While these advances represent improvements over preexisting systems, the surgical operating microscope (SOM) has, more importantly, given the operator the visual opportunity to achieve outcomes that otherwise were previously impossible to accomplish or that may have resulted in a reduced prognosis.

Tactile dexterity is a required skill necessary for excellence in treatment, but it has limitations. While some have said, “you can’t treat what you can’t see,” we know that our fingers can negotiate files into spaces we cannot see. When manual dexterity is combined with visual ability, the results can be extraordinary.

The SOM was introduced in 1981 by Apotheker^{1,2} but did not gain widespread acceptance because it was poorly configured and ergonomically difficult to use.³ In 1992, Gary Carr introduced an ergonomically configured microscope for endodontics⁴ and started training endodontists in its use at his Pacific Endodontic Research Foundation in San Diego, California. As Carr stated, “the operating microscope provides the ability to have commanding visual control over the operating field.” The practice of endodontics has never been the same, as most who have used it would agree that it has elevated the standard of care to a much higher level. There are now training facilities to educate dentists in not only endodontics, but in restorative and periodontal surgical techniques worldwide.

The SOM generally operates in a magnification range of 3X to 32X, utilizing a halogen or xenon coaxial light source (parallel to the line of sight). While I have tried loupes up to 4.5X with supplemental light sources, there is no comparison to the SOM. One is immediately brought into the pulp chamber and any straight-line view into a canal with intimate visual acuity.

The SOM provides the ability, through nonaggressive access openings, to discern subtle differences in color changes of tooth structure that become the necessary road map for discovering anatomical structures harboring the source of current and future pathology. Simply said, many canals cannot be located without this microscope. One cannot merely look at an X-ray and tell if its use may be indicated, as many canals cannot be seen radiographically.

With the SOM, complexly shaped canals can be more easily obturated; posts and separated instruments can be more easily removed; cracks, canal cleanliness, and microleakage (through the use of a caries detector) can be seen; and biological and mechanical defects such as resorptions and perforations can be repaired.

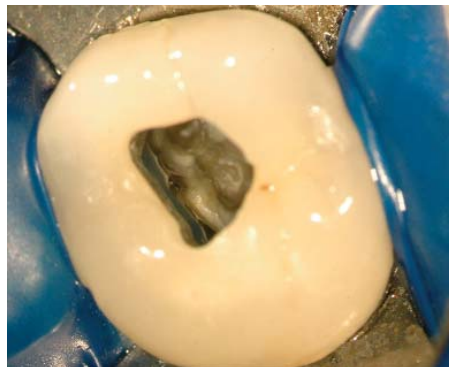
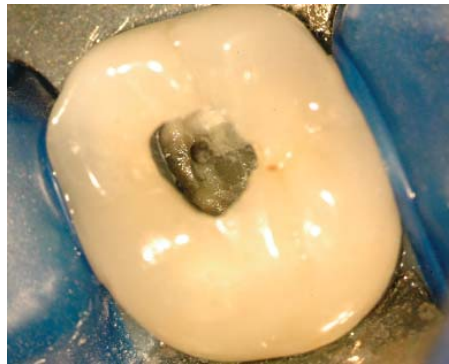


Figure 1. After locating the MB1 canal, incremental drilling of the chamber floor reveals the MB2 orifice.

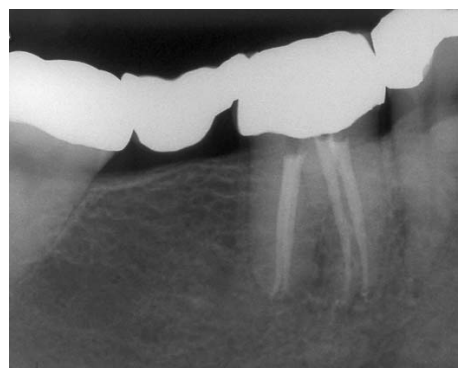


Figure 2. The SOM shows the obturation of a figure-8-shaped distal canal that bifurcates close to the apex.

Figure 1 shows that with a minimally invasive opening, the user is brought into intimate visual contact with the chamber floor. When dealing with the MB root of maxillary molars, one has to assume the presence of a second canal unless proven otherwise⁵ and that in approximately one-third of the time it is located below the chamber floor.⁶ By observing color changes in dentin, one can successfully locate canals which would otherwise not be found.

Figure 2 shows the obturation of a figure-8-shaped distal canal that bifurcates close to the apex. The user is brought so close to the operating field

that the value of this technology cannot be denied.

Figure 3 shows the presence of a crack along the chamber floor of tooth #2. Patients want to know if we have seen or encountered anything during treatment that may influence the prognosis. Addressing potential problems from the start goes a long way in dealing with disappointment in the future.

Figure 4 shows a retreatment performed on tooth #30 that was previously treated in Japan. After an access opening over the mesial root, round burs and ultrasonics were used to remove the resin around the large screw post in the MB



Figure 3. The arrow points to a crack on the chamber floor.

canal. The post was counterrotated with the Ruddle Post Removing Kit and the canal was negotiated to the apex with some degree of difficulty. There was no obturating material in the ML canal and I was able to get no further than what was previously instrumented. The SOM revealed an isthmus between both canals which was entered with an 08 file and negotiated to the apex. With enhanced vision a precise opening was employed to enter the mesial root canal system and the connection between both canals was easily observed. The treatment of the mid-mesial canal in lower molar endodontic therapy has become part of our mindset in treating these teeth.

These cases are just a few examples of how the SOM can enhance the practice of endodontics. It is the position of the American Association of Endodontists that “microscopes create the very necessary environment endodontists need to be meticulous and

uncompromisingly thorough in their treatment.”⁷ I would strongly encourage anyone performing endodontic treatment to take a course and see how this technology can enhance his or her ability to optimize patient care. ■

References

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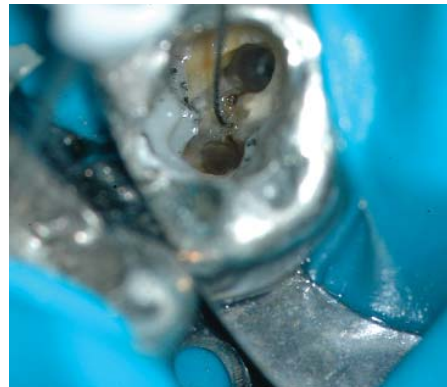
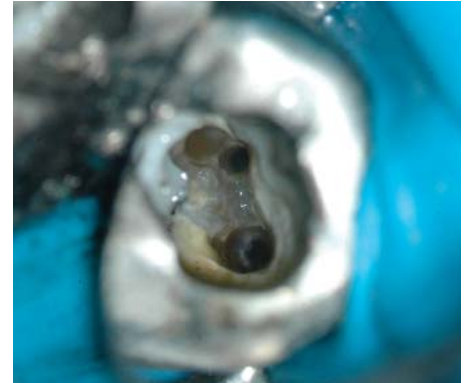
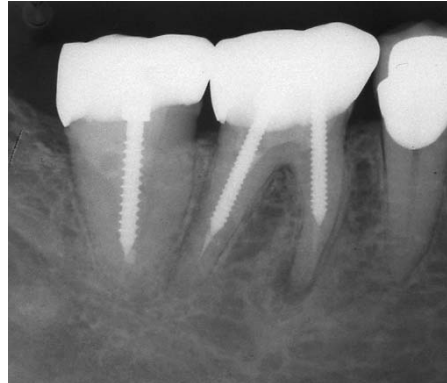


Figure 4. The SOM is used to retreat and locate the mid-mesial canal in tooth #30.



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