The dental microscope for general dentistry

By Craig S. Kohler, DDS, MBA, MAGD

The dental microscope is an outstanding tool. Every general dentist should consider incorporating the ability to have multiple magnifications in his or her office. The following case studies illustrate their effectiveness.

I use the microscope every time I touch a tooth with a burr. The photos shown here are snapshots of procedures that have been videotaped.

The videos have been edited and can be found on www.YouTube.com under the case name. Go to www.YouTube.com and search for “craig.kohler” and the name of the case.

Case No. 1: Removal of amalgam stain and micro crack discovery

Summary of original treatment expectations: Patient needs a simple two-surface silver amalgam filling, #3 MO replaced. The patient would like to have a tooth-colored restoration.

The silver amalgam is removed and carious tooth structure is found as well as extensive staining from the old silver filling (Fig. 1a). An intraoral sandblaster (Danville Engineering MicroEtcher IIa) was used to remove the stain and decay.

The stain at the gingival margin was more difficult to remove and a second application of the sandblaster removed it (Fig. 1b). Upon close inspection of the preparation, there was a small crack found in the enamel at the gingival margin and another crack under the mesial buccal cusp (Figs. 1c, 1d).

The dentist can evaluate and discuss the options that the patient has regarding the restoration of the tooth. If the patient can see the situation, he or she can make a more informed decision.

Possible future problems can be traced back to the original stress fractures in the tooth if the patient elects to have a simple filling placed.

This patient decided to have the simple filling and was willing to risk possible tooth fracture and sensitivity. In my office, a full crown is considered over treatment, but a conservative ceramic onlay with proper occlusal guidance may be the best enduring restoration (Figs. 1e, 1f).

A gold onlay has the clinical history to last the longest, but it would not satisfy the esthetic demands of most patients in my demographic area.

Case No. 2: Removal of an old tooth colored filling that had severe decay

Summary of original treatment expectations: A 14-year-old female with a history of bad dental experiences at her pediatric dentist has decay on her lower right molar (#30).

The tooth has a silver amalgam with decalcification on the margins, and there is a large occlusal composite that appears intact visually. She is apprehensive about treatment (Fig. 2a).

The silver filling is removed and there is extensive decay (Fig. 2b). The tooth-colored composite is difficult to distinguish from dentin. The dental microscope enlarges the area so that all of the old composite and decay can be removed.

As more dentists are using composite that blends with the dentin, the removal of the entire old filling is getting more difficult to discern. In this case, there was decay behind most of the composite filling. A sandblaster and a slow-speed round burr removed the composite. Decay detector identified the active caries and illustrated to the patient and her mother the seriousness of the situation (Fig. 2c).

The final filling was a temporary measure and the patient can expect endodontic therapy someday in her future (Fig. 2d).

The necessity of vigilant recalls is...
understood and the patient returns to the office for three other similar problems on her other first molars. This case is an example of a patient who was a difficult management problem; however, she learned to appreciate the value of a dentist and patient working together to get a good result.

The dental microscope enlarged the field of view for treatment and documented the experience so the patient could take ownership of her dental problems.

Case No. 3: Crown buildup and preparation for a gold crown

Summary of original treatment expectations: The upper left molar, #15, had the palatal margin of a gold onlay breakdown (Fig. 3a). There was extensive decay. The onlay was removed and a core buildup placed. Then the tooth was prepared for a future gold crown, which was seated.

The extensive decay under a filling led to the need for a core build up. The dental microscope was used to refine the margins of the preparations. Notice the magnification (10x to 12x) that allowed the buildup tooth margin to be refined. The white buildup material could clearly be seen, which allowed the margin of the buildup to be placed above the crown margin (Fig. 3b).

The preparation was also adjusted at similar high magnification and two slots were placed in the buildup to increase retention for the crown. The impression was sent to the dental laboratory, Opus One Laboratories in Agoura Hills, Calif.

At the delivery appointment, the temporary was removed and the residual temporary cement was sandblasted away. The crown was checked for fit and occlusion and was cemented with Relyx Unicem cement by 3M ESPE. The delivery appointment took about 15 to 20 minutes.

In my office, a tooth that needs an extensive buildup typically takes 30 minutes. The preparation and impression appointment time is 45 to 60 minutes. My initial learning curve took about two months to feel comfortable in using the microscope for most dental procedures.
Case No. 4: #31, severely cracked tooth with no pain

Summary of problem: A patient had an ordinary Class I filling on the lower right second molar, #31. There was a stress fracture line on the distal marginal ridge, and there was no pain. The initial filling can be seen on www.YouTube.com under the title for this case.

Upon removal of the silver amalgam, there was a stress fracture that could be seen under high magnification, 10x to 12x (Fig. 4). This fracture line originated on the distal marginal ridge, but continued on the floor of the dentin until 1/3 of the tooth was involved.

The patient understood the need to restore the tooth with a crown. There was a discussion about other occlusal issues that may have led to the creation of the crack in the first place.

The patient understood the possibility of tooth loss or need for endodontic therapy even with a crown. He was fully informed and understood that the crack could get worse with a simple filling, which could lead to tooth loss.

A final word
The dental microscope was introduced to dentistry in the late 1970s.

The cost, ergonomics and the perception of a steep learning curve has kept this useful tool from being implemented by the general dentist.

The four simple cases presented here illustrate how using multiple magnifications allows the general dentist to exceed his or her ability to see beyond one’s eyesight or loop magnification.