

# Limited to Endodontics Newsletter

**LTE**

Limited To

A Practice Of Endodontic Specialists

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## LOCATING CANALS IN ENDODONTIC THERAPY

The success of endodontic treatment is dependent upon the removal of irritants from within the root canal system. As the numbers of retreatments and the age of our patients has increased, the ability to locate canals has become more challenging.

In our attempt to provide optimal patient care, the following factors should be considered in this regard; How many canals might the tooth I'm working on have in the general population? Do I have the appropriate well angulated radiographs before and during treatment? Do I know where I am internally so that perforations and the removal of unnecessary tooth structure will be avoided? Am I using sufficient magnification and illumination?

Let us examine these areas illustrating specific cases to show how we can enhance our ability to locate canals.

Many studies have been done revealing the complex anatomy of the root canal system. In an evaluation of 2800 teeth, Sert and Bayirli<sup>1</sup> recognized 23 types of canal configurations. Knowing the possibilities, we must anticipate that a tooth may have more canals than what appears radiographically (Fig. 1).

As endodontists, we know that mandibular anteriors can have 2 canals, bicuspid can have 3 canals, the MB root of maxillary molars usually has more than one canal (Fig. 2), and that the roots of

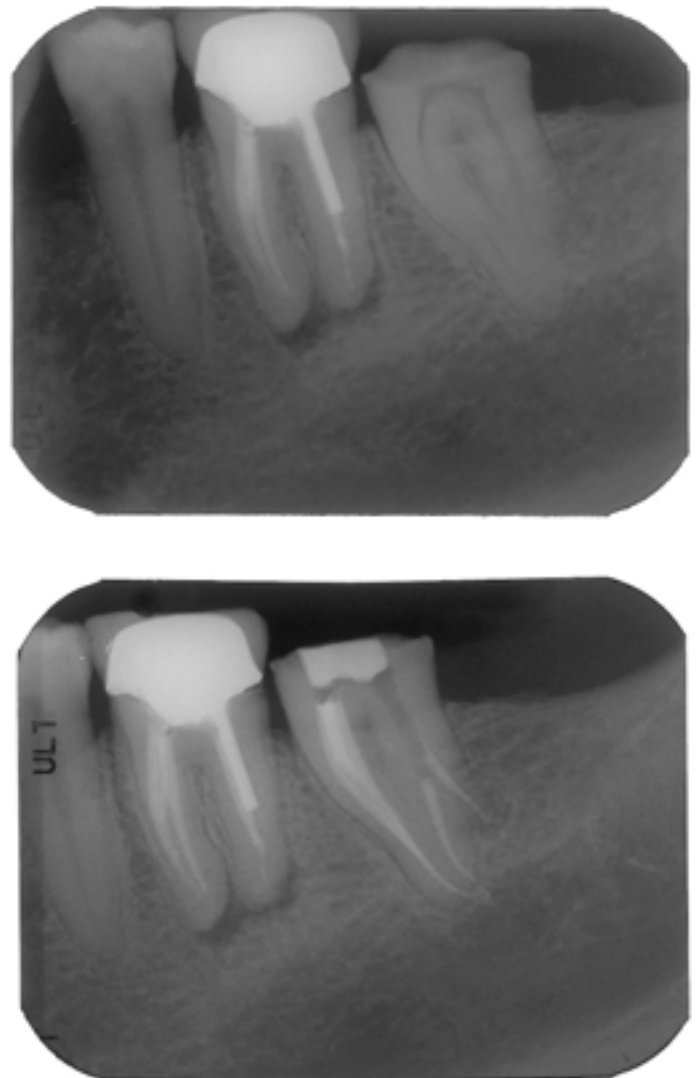
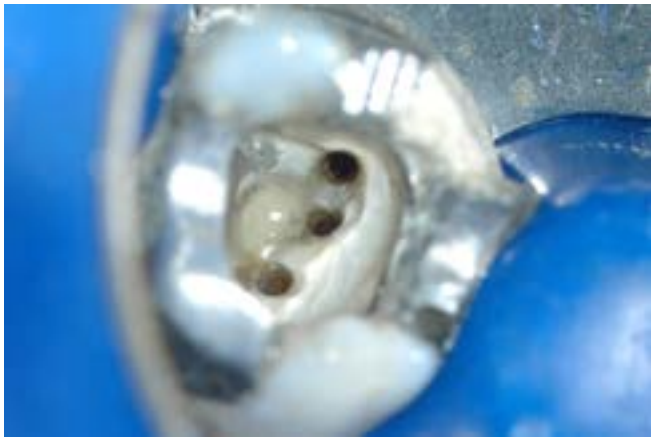


Figure 1. The distal bifurcates at mid-root

mandibular molars are often ribbon shaped and complex (Fig. 3).



*MB1 MB2 and MB3 orifices*

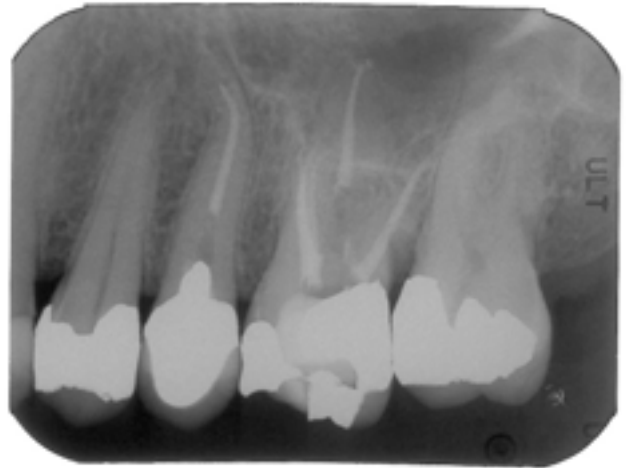
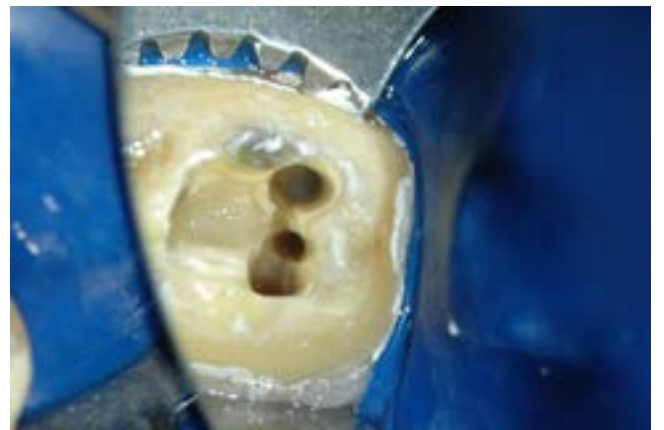


Figure 2. The MB root has 3 canals all having separate apical foramina



*distal orifice*



*MB1 MB2 and ML orifices*

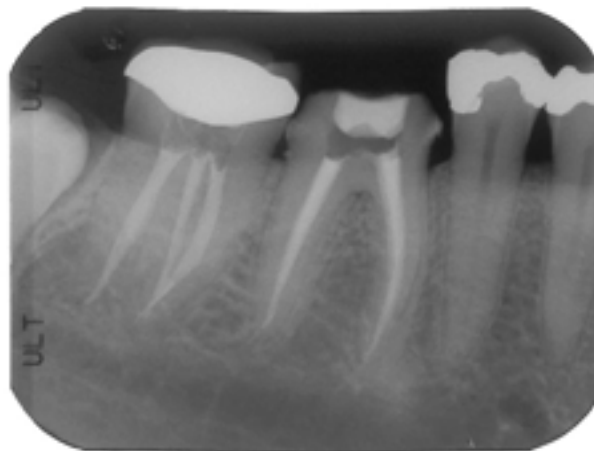
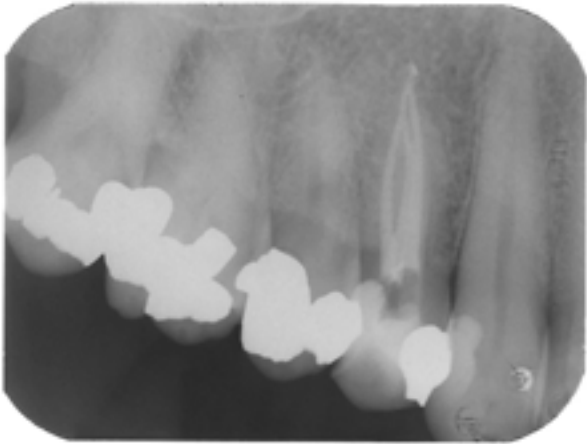
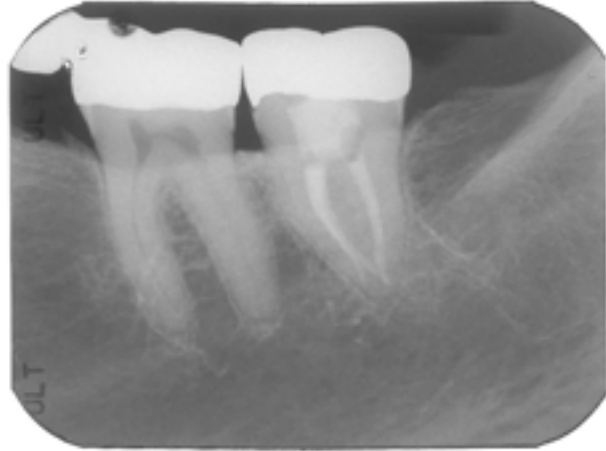


Figure 3. Tooth #30 has a figure 8 shaped distal and 3 mesial canals. The canals in each root have a common apical foramen.

Canals can be located from within the orifice of an existing canal (Fig. 4). Canals must be explored and probed with a file slightly bent at the tip to feel for any irregularity which may reveal another space to clean. Although nickel-titanium rotary instrumentation has enhanced our ability to machine a circumferential circular opening, mastery of hand instruments is necessary to detect the recesses and branches inherent in many canal



*Buccal canal bifurcated near orifice*



ML canal located off of MB at mid-root. MB joins distal

Figure 4. Canals are often located below the orifice of another canal systems.

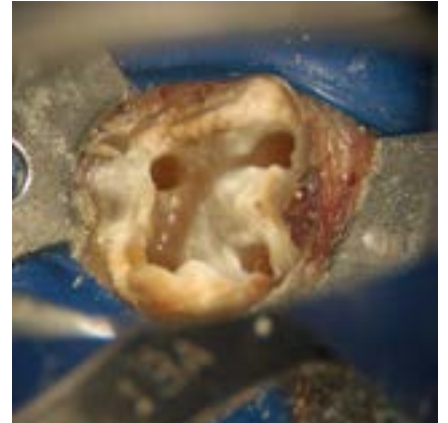
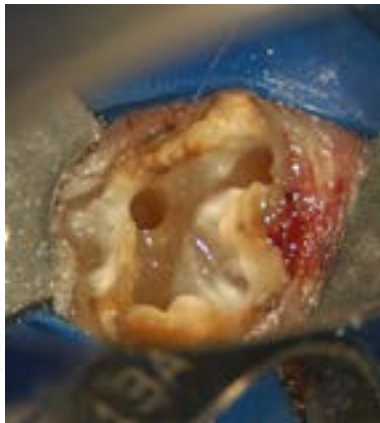


Figure 5 Symmetry of orifices in tooth #32. Three canals had been located in the center photograph. Another canal should be present. The fourth (ML) canal was located as evident in the right photograph

Proper orientation within the access opening is critical for finding canals and avoiding unnecessary tooth loss. Orifices should be symmetrically located. A tooth with one canal should have its orifice in the center and one with multiple canals should have the orifices dividing the cross-sectional plane evenly (Fig. 5).

Likewise, the location of a file radiographically should divide the root evenly. If not, suspect another canal (Fig. 6).

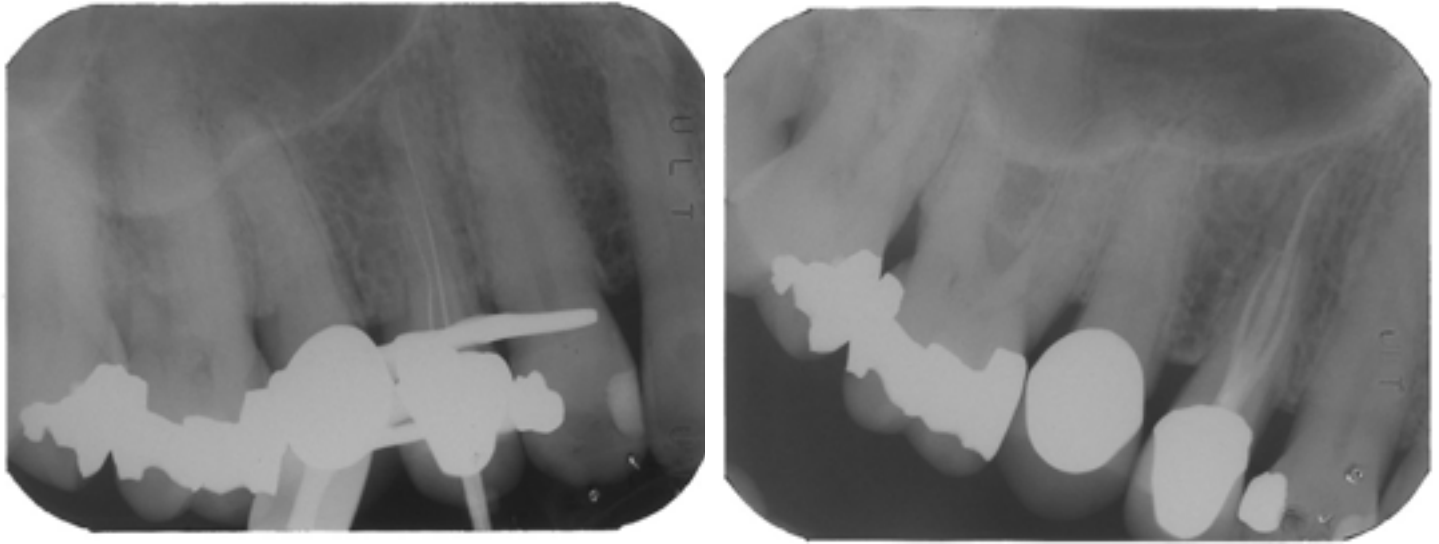


Figure 6. The lack of symmetry in the guidefile radiograph suggests the presence of another canal

When looking for calcified canals, it can be difficult to orient oneself as one goes deeper. It can be helpful to place an opaque object at the present location, remove the rubber dam, and take a parallel, right angle radiograph to see how close to the canal and/or lateral aspects of the tooth one is (Fig.7).

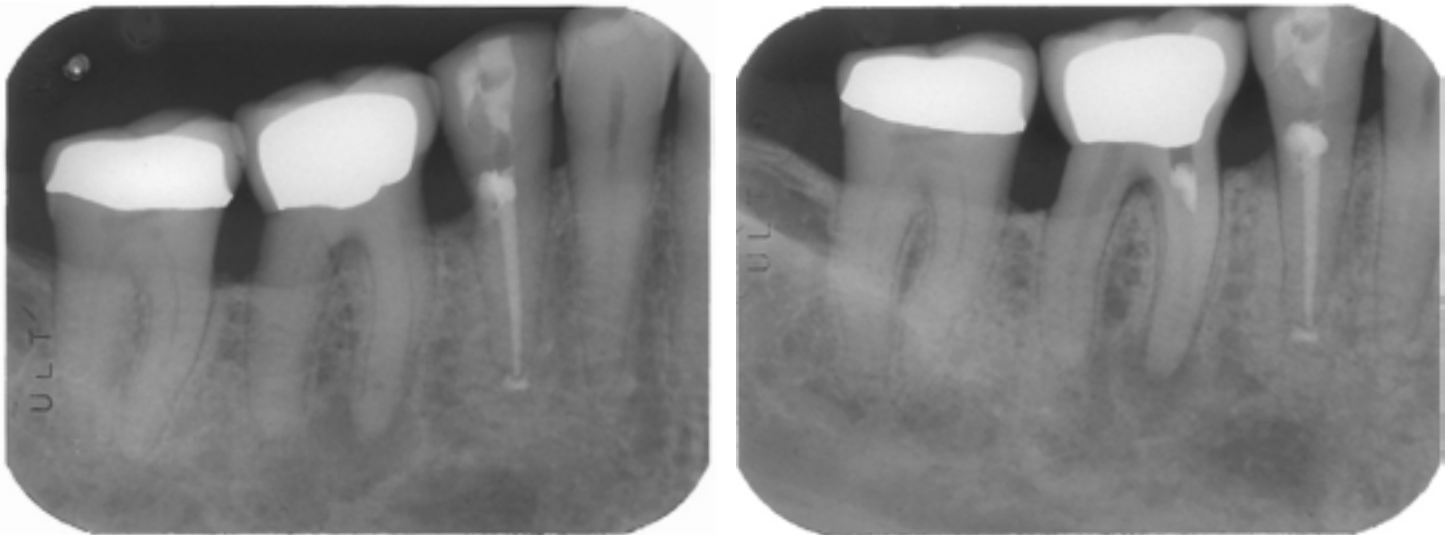


Figure 7. Calcified mesial canals. In the right radiograph, the MB canal has been located. Gutta percha placed looking for ML to assess location. The ML was located lingual to this depth

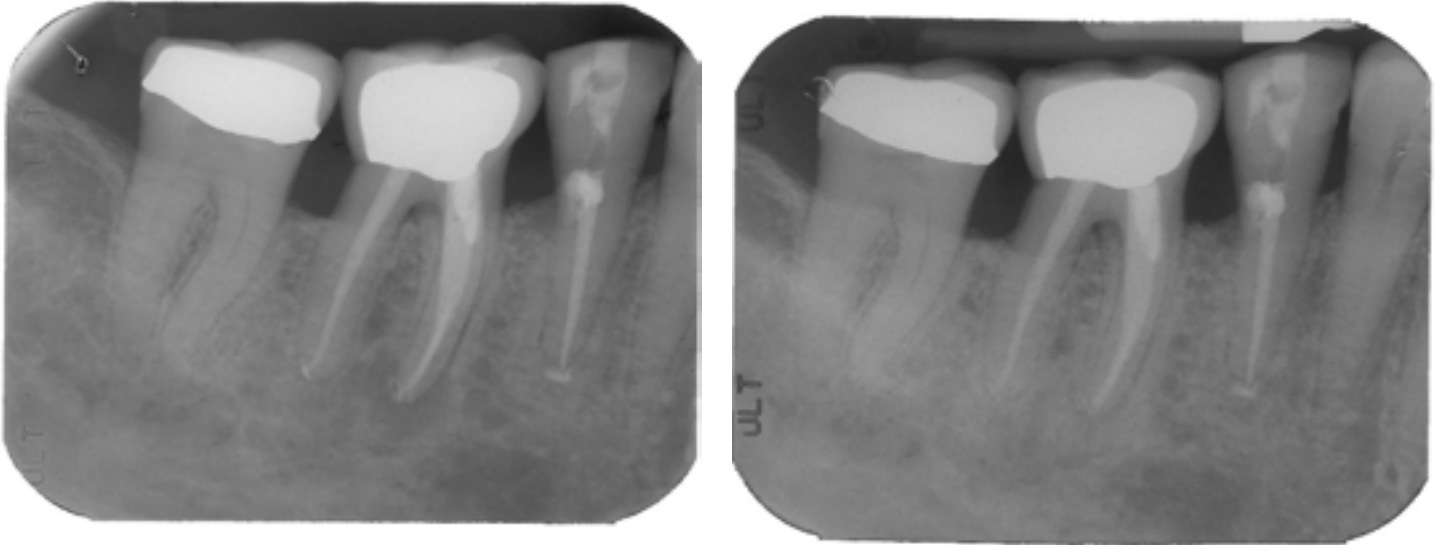


Figure 7. Eight month recall showing osseous regeneration in the right radiograph

Perhaps the most important aid in locating canals is with the use of the surgical operating microscope and understanding the significance of color changes in dentin as we progress apically. The microscope is essential in bringing the dentist into the operating field with intimate visual acuity while keeping the access cavity conservatively opened<sup>2</sup>. Subtle changes in the color of tooth structure become significant when trying to locate canals. Incrementally brushing the chamber floor and observing moist dentin is the necessary for finding calcified canals (Fig. 8).

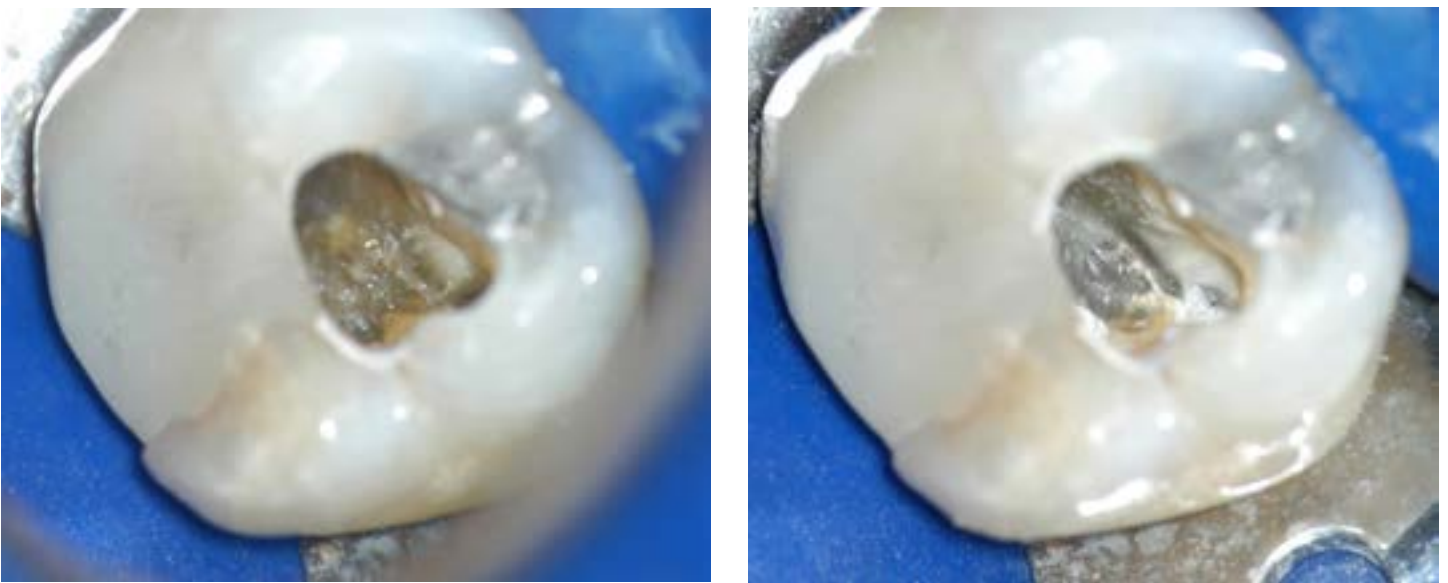


Figure 8. Before brushing the floor left, and brushing, right, before moistening dentin in tooth #3

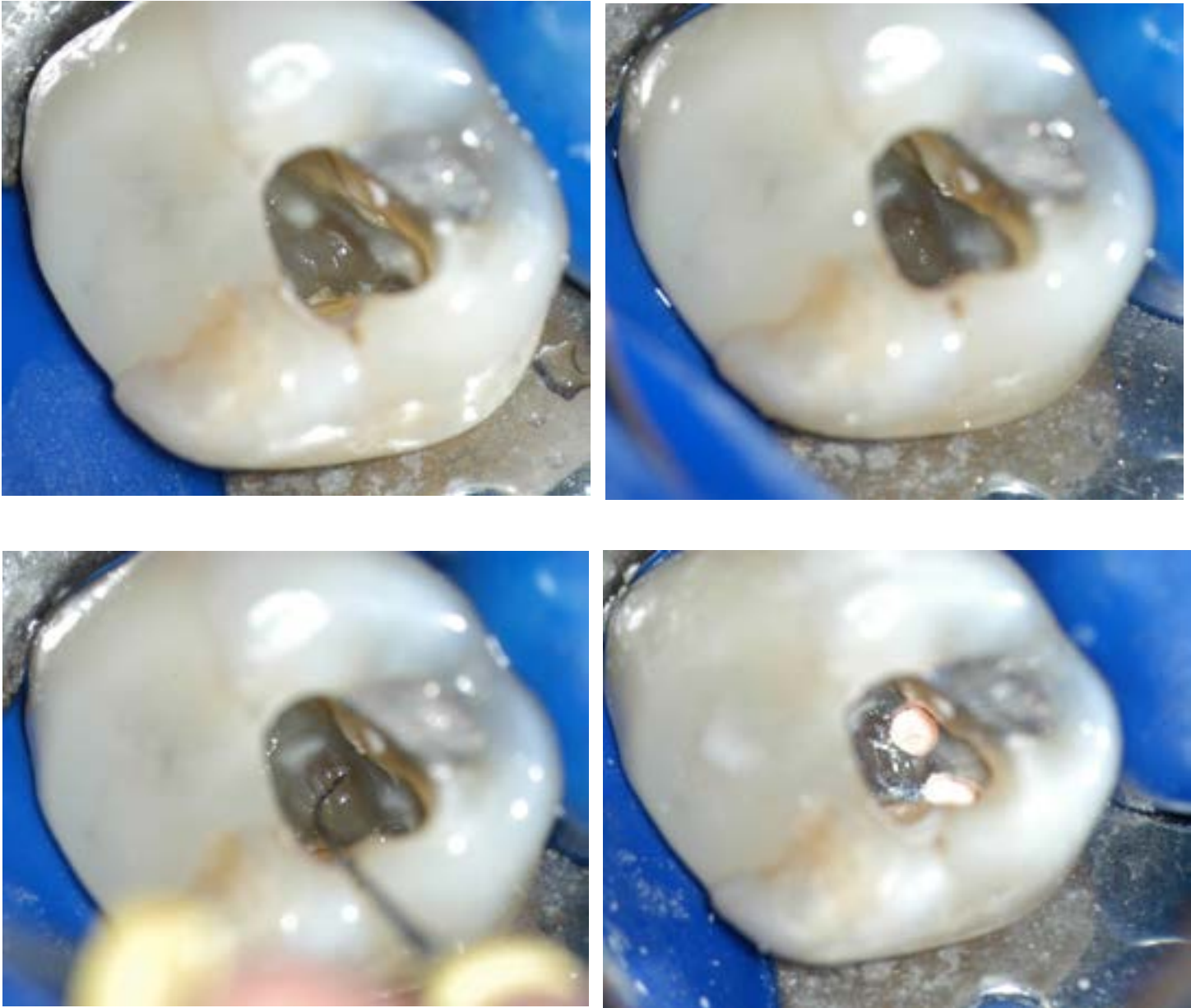


Figure 8. In the top left image the floor was brushed slightly more and moistened. Notice the dramatic change in the anatomical detail revealed when the dentin is wet. Depth increased slightly, top right, and MB2 canal located, bottom left. Note minimally invasive access opening. MB canals obturated, bottom right.

This is especially critical in locating the MB2 canal in maxillary molars, where that canal is located below the chamber floor in approximately one-third of the time<sup>3</sup>.

Endodontic therapy, like other aspects of dentistry, requires meticulous attention to detail. Discovering the complex anatomy often present can be a difficult and time consuming process, not something that can always be done in one visit. Every endodontic procedure has it's own time requirement necessary to achieve the optimum result.

## References

1. Sert S, Bayirli GS. Evaluation of the root canal configurations of the mandibular and maxillary permanent teeth by gender in the Turkish population. *J Endodon* 2004; 30:391-398.
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3. Kulid JC, Peters DD. Incidence and configuration of canal systems in the mesiobuccal root of maxillary first and second molars. *J Endodon* 1990; 16:311-317.

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