Removing the Mystery of the Calcified MB2
by John Khademi

7:30am: Greet, anesthesia, rubber dam

Pre-op radiograph

7:45am: Start case

This picture taken at 8:02 is the rough, preliminary outline form appropriate for a maxillary molar, well extended to the MB line angle, and often coming close to the MB cusp tip. It is mostly in the mesial 1/2 of the tooth.

The preliminary outline form represents an approximation of the general size, shape and location of the expected pulpal space when the patient was young. The access is Strategically Extended Endodontic (SEE access--Pannkuk) is then modified on an “as-needed” basis to incorporate extensions to remove pulp stones, trough out fins and grooves and gain SLA to the canals, or Points of Negotiation (PON’s).

Note the whitish areas that are the visual clues as to the locations of the pulpal remnants.
“The MB2 can be located along the path connecting the MB orifice and the Palatal orifice. It can either locate next to the MB1 or half way between the two orifices. If it is next to the MB1 more than likely the two will join together. If it is half way in between, you are looking at two separate canals. Use a sharp explorer to probe along the path to locate the opening.”

“There is no simple, easy way [to find the MB2], that is the problem. They are there in over 40 to 50% of Max 1st molars and many of the second molars, so just keep looking.”

As the line connecting the MB to the P shows, the above quotes from other endodontists show the traditional thinking and teaching of the location of the MB2 canal has been centered along the line connecting the MB to the P. This leads to a dramatically reduced chance of finding, let alone negotiating this portion of the complex MB canal system. This thinking could not be more wrong, and is at the heart of countless clinicians frustrations in dealing with this anatomy. Before even considering picking up a file, the MB2 orifice must be moved mesially.

These are unknown potential Points of Negotiation (PON’s). We don’t yet know which of these are blind and dead-ended, which are fins, and which will eventually dive down the canal system. Any root can contain as few as one, and as many as four PON’s. The most common pattern in a maxillary first molar is MB/MB2, DB and P for a total of four. Then next most common is five, with MB/MB2, DB/DB2, and P, or MB/MB2/MB3, DB and P. Six is the next most common with MB/MB2/MB3, DB/DB2 and P. The least common pattern is MB, DB and P. In other words, if you have more three canaled maxillary molars than six canaled maxillary molars, there is a lot of anatomy being left untreated. Ask any endodontist what the most common failure is, and why.
Using your BUC-1 ultrasonic tip, you almost “lead” or “follow where you expect” the white lines to go, which are the residual pulp or pulpal space remnants. This is a bit of an art form. It requires an understanding of typical canal anatomy and patterns and locations of PON’s, reading the color map on the pulpal floor, high magnification (microscope), a light touch and a decade of practice doesn’t hurt either. Comparing with the picture before, you can see some “white dots” which hint at PONS, with some more faint lines connecting them. Notice that the number of arrows is less than in the previous picture as the nooks and cranies and fins start to fade, and the “canals” start their dive down the roots. Also note that the dots are beginning to be a bit mesial of the imaginary line connecting the MB to the P.

This is a closeup of the MB system. Again, note that there are some heavier “white dots” connected with some residual lines. Also note the difference in dentin color between pulpal floor dentin, and chamber wall dentin.
Again, the “search” is really not a search, but it is a very intentional, deliberate, predictable process, in contrast with the quotes cited earlier. As the PON’s move mesially, they may bump into the mesial wall of the preliminary outline form. The outline form is strategically extended by notching the wall to allow continued following of the white lines or dots, in this case, what is appearing to be an MB2 and MB3 (blue arrows). Again, note the difference in natural pulpal floor color, which is darker grayish/almost greenish, and pulp chamber wall which is more yellowish, and tertiary dentin on the pulpal floor which is whitish (green arrow). You can use your BUC-1 to slowly and gently cut/sand the notches in dentin, or use your LAAxxess diamond if there is porcelain, gold, enamel or dentin that needs to be cut (blue arrows). You can also see the DB/DB2 (red arrows). You can use your BUC-2 to sand away this whitish dentin that can be obscuring additional anatomy (green arrow).

Again, ultrasonics like the BUC-1,2,3 are used in a light sanding or brushing fashion, with an air-only Stroko micro-irrigator to blow away the dust, evacuated by a high-volume suction. Discoloration of the dentin means you are pressing too hard or trying too work to fast. In endodontics, speed is always the enemy.

At this point, it has been 43 minutes since we greeted this patient, and I have yet to insert a file in the tooth. The canals are chased, without picking up a file, until they begin their dive down the root. Only then is it time to pick up a file.

8:02am: First access shot of the rough, preliminary outline form
8:10am: Second access shot
8:13am: Third access shot

In this series of three pictures from the initial access, to some preliminary “chasing” to nearly complete “chasing,” note the movement of the MBx orifices from dead along the imaginary line connecting the MB to the P, to somewhat mesial, to markedly mesial. The time from picking up the hand piece to the first picture is 17 minutes. The time between the first picture and the third is 11 minutes. In other words, the access took 28 minutes, more than double the “preparation” time.
9:03am: Prepared. Elapsed time to negotiate and determine length in six places, and create a glide path suitable for automated instruments was 38 minutes. Actual preparation time with rotary NiTi was 12 minutes.

The MB stayed separate, and the MB2/MB3 preparations eventually joined and became an oblong, as did the DB/DB2. This is the final outline form, and you can see the notching or fluting to gain SLA to the mesial-buccal canal system.

9:23am: Obturated. time to fit and cement cones, downpack, backfill, clean chamber, etch and apply All-Bond2 was 20 minutes

I fit cones in the MB, MB3, DB and P. Accessory cones were placed in the MB2 and DB2 areas. Downpack with System-B with subsequent packing of the apical segment, and backfilling with Obtura.

A bit of a fisheye view of the overall access outline form, and a more closeup view. Cleaned up, primed and ready for restorative materials.
Final. Treatment time for this one-step Nec/AAP molar was 2 uninterrupted hours. Preparation sizes were MB/MB2/MB3=33/.06, DB/DB2=33/.06, P=43/.06. These seemingly “odd” preparation sizes are arrived at by taking .06 shaped instruments past the apex by .5mm. Radially landed instruments, such as ProFile GT’s are very safe to take long, and this is a common practice among endodontists. Say a 30 tipped instrument with an .06 shape is taken past the apex by .5mm. The taper of the instrument means it gets larger by a size 6 file for every mm of length. Therefore a 1/2 mm of length makes it larger by a size 3. Therefore if it is a 30 tip, and gets extended by .5mm, this becomes 30tip + (.5mm * size6/mm) = 33.