Masterclass in Clinical Practice

Endodontics

with
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The MB2 canal in Maxillary Molars - Part 3: Clinical Case Report

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Introduction

The maxillary first molar is often complex and challenging from an endodontic perspective due to the mesiobuccal root often presenting with a second (MB2) or even third canal. Studies have shown that MB2 is present in up to 90% of maxillary first molars, however, it is frequently overlooked due to its small diameter, challenging access, and variable positioning.[1,2] Missing MB2 is a common reason for post-treatment disease, emphasising the importance of thorough canal detection, canal negotiation and treatment planning. In Part 1 and Part 2 of this series we discussed in detail the clinical protocol for canal detection, canal negotiation and preparation.[3,4]

This masterclass delves into a clinical case report where cone beam computed tomography (CBCT) revealed an untreated MB2 canal on a first maxillary molar that resulted into a large periapical infection around the mesiobuccal root. The management strategy involved selective retreatment, focusing on evidence-based decision-making and the importance of CBCT and magnification in identifying missed anatomy.

Background on MB2 Anatomy

The mesiobuccal root of the maxillary first molar typically houses two canals, MB1 and MB2, which may share a common apical foramen or exit separately.[5] MB2 is often positioned palatally to MB1 and exhibits a narrower and more curved morphology. It is frequently concealed by dentinal shelves or developmental anomalies, making it challenging to locate with traditional radiography. Advanced imaging modalities, such as CBCT and magnification, have significantly improved the identification and management of MB2 canals.

Case Presentation

A 32-year-old female patient was referred for endodontic retreatment of tooth 16 to persistent periapical radiolucency (Figure 1). Clinical and radiographic evaluation revealed a zirconium crown and a well-sealed core with no pathology in the palatal root. A CBCT scan was performed, revealing an untreated MB2 canal (Figure 2) that resulted in apical pathology extending horizontally up to the sinus floor, vertically in a mesial direction to the root of the maxillary second premolar, and distally to the DB root of the tooth (Figure 3). It was suspected that the lesion was caused by the missed MB2 canal.

The zirconia crown was accessed to expose the pulp floor. A size yellow (008) EndoTracer bur (KOMET) was used under microscope magnification to selectively remove some of the dentine shelf next to the MB1 canal to expose the

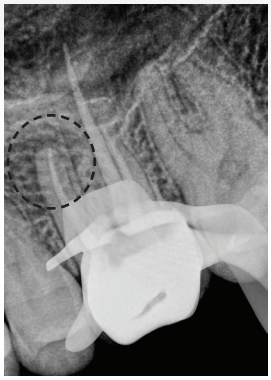

Figure 1: Maxillary right molar showing signs of periapical bone loss (dotted line)

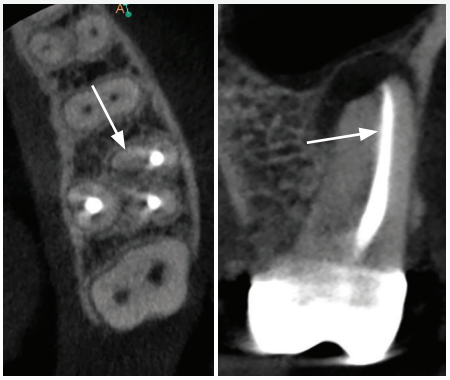

Figure 2: (a) Axial slice of the CBCT scan indicating an oval MB root (arrow) that usually indicates the possibility of a MB2 canal system; (b) Coronal slice of the CBCT scan indicating the off-centre position of the MB1 canal (arrow) - also indicative of the presence of a possible MB2 canal

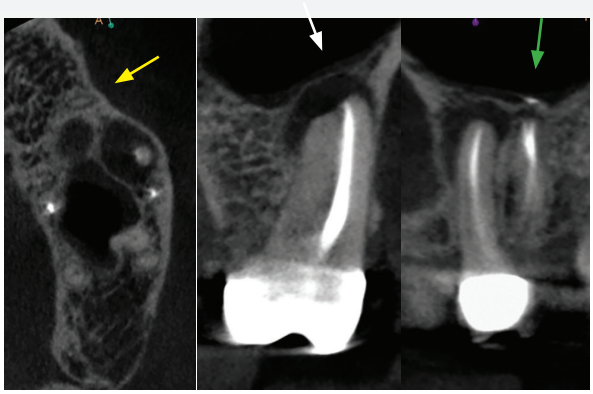

Figure 3: CBCT scan images showing that the apical pathology extending horizontally up to the sinus floor (white arrow), vertically in a mesial direction to the root of the maxillary second premolar (yellow arrow), and distally to the DB root of the tooth (green arrow)

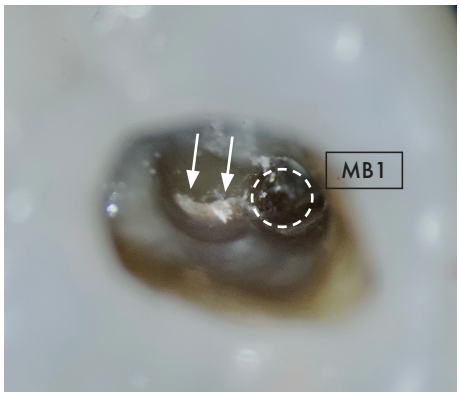

Figure 4: Developmental groove (arrows) that was filled with necrotic debris after troughing with EndoTracer burs (KOMET)

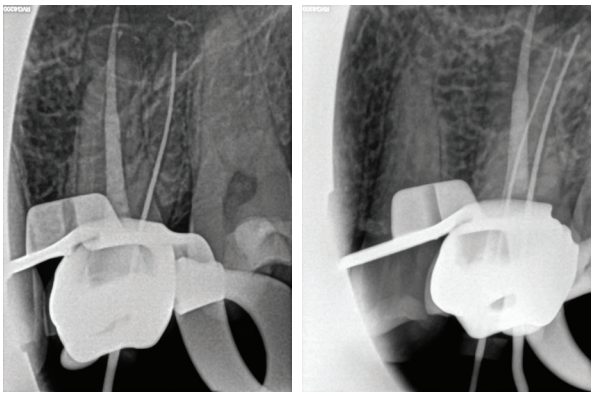

Figure 5: Periapical length determination radiographs confirming the working length in (a) distobuccal root canal and (b) mesiobuccal 1 and 2 root canal systems

developmental groove that was filled with necrotic debris (Figure 4).

After further troughing with the smaller size white (006) EndoTracer bur (Komet) the orifice of patent MB2 canal was located with a Micro-opener (Dentsply Sirona). The previous root canal obturation material was removed from the MB and DB root canal systems using Gutta Solve (Septodont) and a size 15 Hedstrom file (Dentsply Sirona).

Selective retreatment was undertaken, targeting the mesiobuccal and distobuccal roots while leaving the palatal root untreated. The rationale for this approach includes:

1. Absence of pathology in the palatal root.
2. Adequate obturation and coronal seal in the palatal root.
3. Preservation of tooth structure and minimization of procedural risks.

Selective retreatment is indicated when:

- Persistent pathology is localised to specific canals.
- Previously treated canals exhibit adequate obturation and coronal sealing.
- CBCT or clinical evaluation confirms the presence of missed anatomy limited to specific roots.

Conversely, selective retreatment is contraindicated when:

- Multiple canals exhibit signs of failure or inadequate obturation.

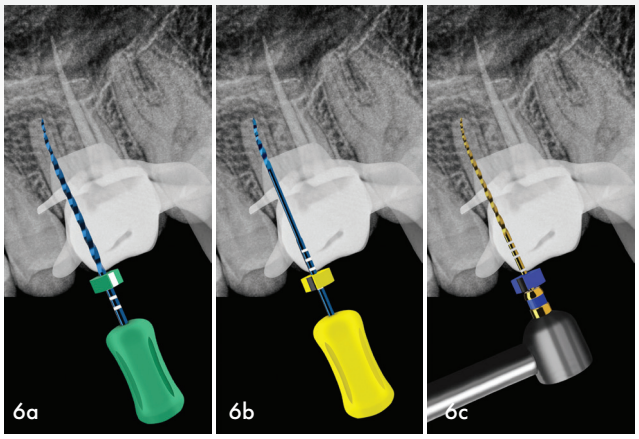

Figure 6: (a) MB1 canal were prepared with ProTaper Ultimate FX hand instrument; (b) ProTaper Ultimate FXL hand instruments; (c) MB2 canal prepared using a size F3 ProTaper Ultimate instrument

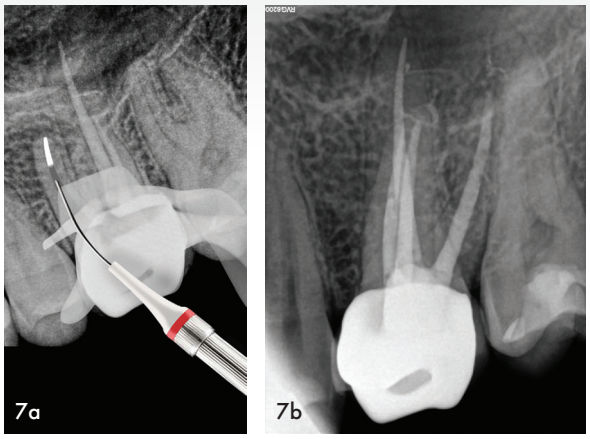

Figure 7: (a) Six-millimetre plug of ProRoot MTA (Dentsply Sirona) were packed in the apical portions of the MB canal to close the open and damaged apices using the MAP system; (b) Coronal aspects of the MB1 and DB canals were obturated with AH Plus Bioceramic cement and heated gutta-percha and the MB2 canal was obturated using AH Plus Bioceramic cement and an F3 ProTaper Ultimate gutta-percha cone

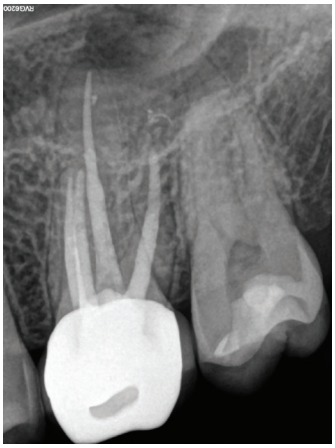

Figure 8: Periapical follow-up radiograph at one-year follow up showing good periapical healing.

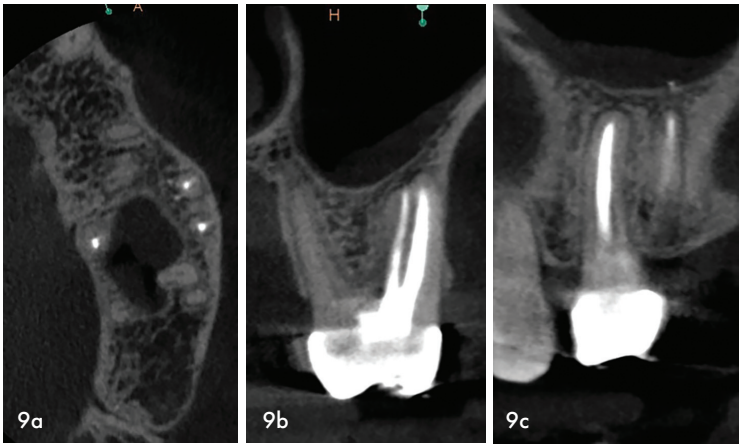

Figure 9: Postoperative axial(a), coronal (b) and sagittal (c) slices CBCT scan images showing excellent healing after one year.

• Coronal seal integrity is compromised.
• The presence of procedural errors, such as ledges or perforations, warrants complete retreatment.

Selective retreatment is a viable option in cases with localised pathology, provided thorough evaluation and advanced imaging support the decision.[6,7]

After the removal of the obturation material, length determination was done with an electronic apex locator and confirmed radiographically (Figure 5).

It was noted that the apices of the MB1 and DB roots lacked apical resistance for new obturation material. These canals were then prepared to allow the placement of MTA using ProTaper Ultimate FX and FXL hand instruments from Dentsply Sirona (Figure 6a, b). A reproducible micro glide path was prepared in the MB2 canal using a size 10 K-file before the glide path was enlarged with a ProTaper Ultimate Slider. The canal preparation in the MB2 canal was completed using the ProTaper Ultimate Shaper, F1, F2 and F3 instruments (Figure 6c). The canals were irrigated with a heated sodium hypochlorite solution, and calcium hydroxide was placed as an intracanal medicament.

At a subsequent visit, two months later, the intracanal

medicament was removed, and the canals were irrigated with 17% EDTA and heated sodium hypochlorite using the Endovac system (Kerr Endodontics). Six-millimetre plugs of ProRoot MTA (Dentsply Sirona) were packed in the apical portions of the MB and DB canals to close the open and damaged apices using the MAP system (Produits Dentaires, Switzerland) as seen in Figure 5. The coronal aspects of these canals were obturated with AH Plus Bioceramic cement and heated gutta-percha, delivered with the Gutta Smart System from Dentsply Sirona. The MB2 canal was obturated using AH Plus Bioceramic cement and an F3 ProTaper Ultimate gutta-percha cone, utilising the continuous wave of condensation technique with the Gutta Smart System. The access was closed with Smart Dentine Replacement (SDR) (Dentsply Sirona) and composite resin.

A one-year postoperative follow up periapical radiograph (Figure 8) and CBCT scan (Figure 9) revealed complete healing of the apical pathology.

Conclusion

Addressing missed MB2 canals requires a meticulous approach, combining advanced imaging with sound clinical judgment. Selective retreatment can be a conservative and effective strategy, provided it is guided by thorough evaluation and evidence-based principles. MTA plugs should be considered when adequate apical seal cannot be established after endodontic retreatment, especially in roots associated with pericapical pathology. This case underscores the importance of CBCT and magnification in endodontic diagnostics and highlights the value of selective retreatment in managing complex cases.

References

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