Treating a calcified mandibular molar: A modern-day protocol

Author_ Dr Rafaël Michiels, Belgium


Fig. 1


Fig. 2


Fig. 3

Fig. 1_Diagnostic radiograph.
Fig. 2_Placement of rubber dam and AutoMatrix.
Fig. 3_Calcified tissue in the pulp chamber.

_Endodontics has evolved enormously over the last few decades. However, the basic principles from the past still apply today. The following case report gives an example of the manner in which the old principles are applied with newer techniques, devices and materials.

_History and diagnosis

A 37-year-old female patient was referred to our practice for a problem with her lower right second mandibular molar (tooth #31). She had no health issues, and was given an ASA score of 1. The referring dentist opened the tooth because of an acute pulpitis due to an extensive carious lesion disto-lingually. She had difficulty locating the mesial canals because the pulp chamber was heavily calcified. She had placed calcium hydroxide upon the orifices of the canals and sealed the tooth with a cotton pellet and a temporary restoration. The patient had no clinical symptoms when she presented to our office for treatment.

_Treatment and discussion

A diagnostic radiograph (Fig. 1), which is essential in determining the treatment strategy, was taken to visualise the extent of the lesion and the anatomy of the roots. The patient was then anesthetised by a lower alveolar nerve block with 4% articaine, 0.01 mg/ml epinephrine (Septanest Special, Septodont).

The temporary filling and cotton pellet were removed, exposing a large carious lesion. In order to facilitate the temporary restoration after treatment, an AutoMatrix (DENTSPLY Caulk) was placed. This also enabled better isolation. The tooth was then isolated with a rubber dam (Coltène/Whaledent; Fig. 2).

Isolation, which is one of the fundamental principles in endodontics, is more than 100 years old. In 1864 already, Sanford C. Barnum developed the rubber dam, which was generally accepted as a necessity in achieving good isolation and better prognosis.[1]

The first step in the treatment of a tooth [...] is the adjustment of rubber dam over the diseased tooth to preclude the possibility of the entrance of germs in the oral secretions into the pulp chamber. This should be the invariable rule.[2]

However, a recent survey found that only 3.4% of general dental practitioners use the rubber dam in their endodontic routine.[3]

Visualisation and magnification can help clinicians greatly in cases like the one presented here. Without the use of a surgical operating microscope (OM), it is very difficult to locate canals in the presence of a great deal of calcification. "You cannot treat what you cannot see" is a quote that is regularly heard and that hits the nail right on the head.

In this case, visualisation and magnification were obtained through the OM (OPMI pico, Carl Zeiss). Photographs were taken with a Canon PowerShot A650 IS (Canon) mounted on the FlexioStill adapter (Carl Zeiss).

I removed the carious dentine with LN burs (DENTSPLY Maillefer). There was a great deal of calcified tissue in the pulp chamber (Fig. 3), which I also removed with LN burs. The calcium hydroxide was easily removed with 10% citric acid.

After a clean opening cavity had been created, the actual root-canal treatment was begun. Two mesial canals were located and coronally pre-flared with ProTaper SX (DENTSPLY Maillefer; Fig. 4). Working length was determined with an ISO size 10 K-file (DENTSPLY Maillefer; Table I) and the Root ZX mini apex locator (J. Morita Europe). A glide path was then established with K-Flexofiles sizes 15 and 20.

Cleaning was performed with 3% NaOCl, which was ultrasonically activated with an Irrisafe tip (Satelec) several times throughout the procedure. The ultrasonic activation of the irrigating solution results in more effective removal of organic tissue, debris and planktonic bacteria.[4] It is a very easy and inexpensive procedure and should be incorporated in every endodontic routine.

Shaping was done with ProTaper files S1, S2 and F1 in the mesial canals and ProTaper file F2 in the distal canal, giving the canal sufficient taper but a small apical diameter. Many controversies exist about shaping the apical diameter. I prefer an apical diameter of at

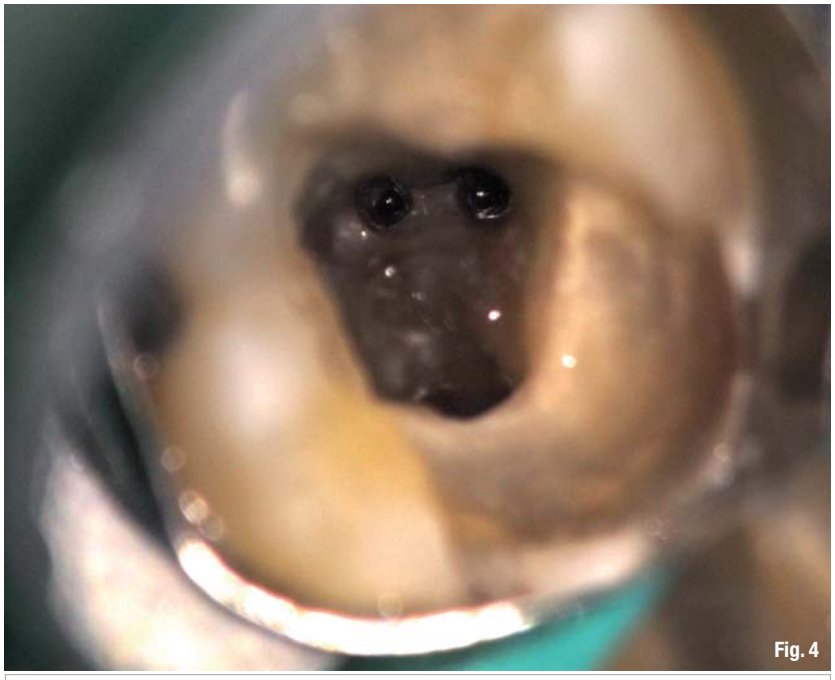
Fig. 4

Size in mm	Working length	MAF	Reference point
Oral D	21.5 mm	35	DB cusp
MB	21.5 mm	30	MB cusp
ML	22.5 mm	30	ML cusp

Table I

Fig. 4_Locating the mesial canals.
Table I_Working lengths and apical diameters of the canals.

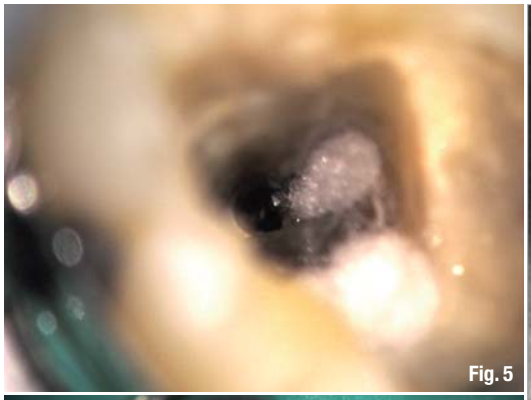
Fig. 5


Fig. 6

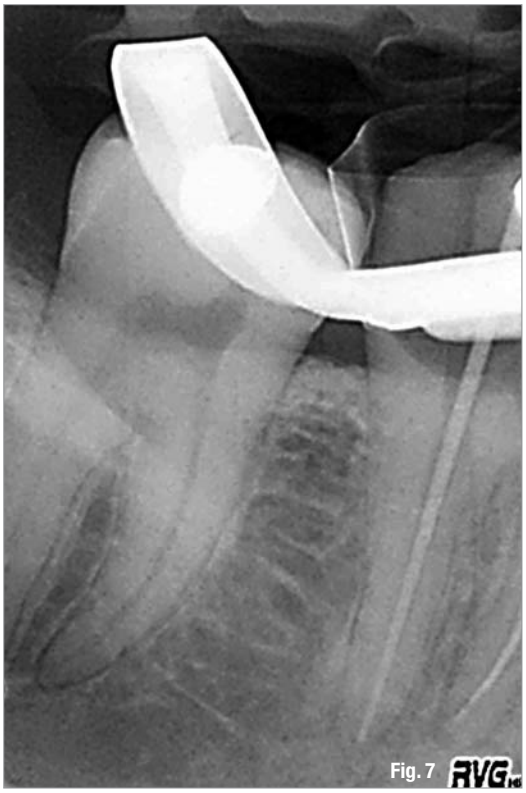
Fig. 7

Fig. 5_Fractured Irrisafe tip.
Fig. 6_Removed Irrisafe tip.
Fig. 7_Confirmation radiograph.


Fig. 8


Fig. 9

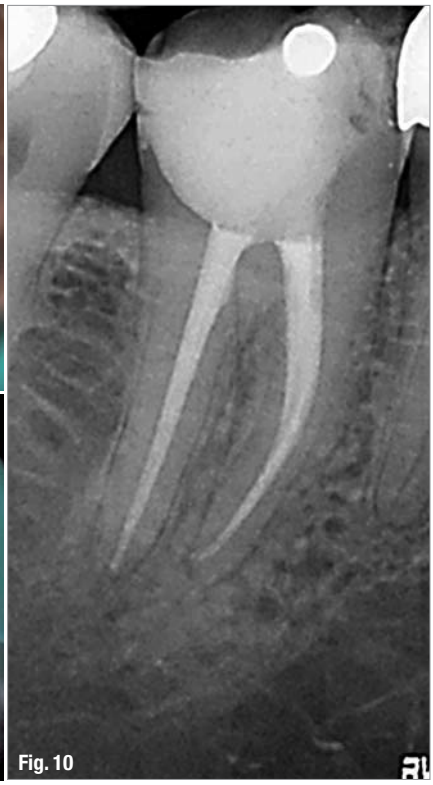
Fig. 10


Fig. 11

Fig. 8_Obturation of the isthmus.
Fig. 9_Pulp chamber after obturation and removal of excess sealer.
Fig. 10_Final radiograph.
Fig. 11_Final position.

least a size 30 because I rinse with a 30-gauge irrigation needle. That way, the NaOCl comes into direct contact with the apical dentine.[5] This results in a significantly better removal of debris from the apical part of the root.[6] In order to achieve a bigger apical diameter, a ProFile size 30.06 (DENTSPLY Maillefer) was taken to working length in the mesial canals and a ProFile size 35.06 in the distal canal. Utilising an ISO size 10 K-file, patency was maintained in all three canals throughout the entire treatment.

After the canals had been shaped, they were rinsed with 10% citric acid, which was ultrasonically activated three times for 20 seconds with an Irrisafe tip. During the third activation, the tip fractured and became stuck in the isthmus between the mesial canals. Cotton pellets were placed in the mesiolingual and distal canal to prevent the instrument from falling into the canals during its retrieval (Fig. 5). Retrieval was done with another Irrisafe tip (Fig. 6). A final rinse was performed with 3% NaOCl, which was heated with a few bursts with System B (SybronEndo). Finally, cone pumping was performed with size 06 tapered gutta-percha cones. The literature refers to cone pumping as manual dynamic irrigation that has proven to be more effective than regular irrigation.[7]

A confirmation radiograph was then taken with gutta-percha master cones (DENTSPLY Maillefer) in place (Fig. 7). The canals were dried with paper points (Roeko).

Obturation was performed with a hybrid technique in which cold lateral condensation was used to fill the apical 4 mm. Thereafter, the System B needle was taken 4 mm short of working length into the canal. Backfill was performed with the Elements Extruder in small increments of 2 mm each time to reduce shrinkage. TopSeal (DENTSPLY Maillefer) was used as a sealer. During the backfill, I could see the isthmus being obturated with gutta-percha (Fig. 8), which is a desirable result. Were tissue to have been left in the isthmus, it may have led to failure. After obturation, excess sealer in the pulp chamber was removed with 96% alcohol (Fig. 9). A temporary restoration was then placed with Fuji IX GP Fast A2 (GC Europe).

Final radiographs (Figs. 10 & 11) were taken and the patient was sent home with instructions regarding possible post-operative discomfort and a prescription for 400 mg ibuprofen.

_Conclusion

In the past, there were several revolutions in the field of endodontics, such as isolating with the rubber dam, cleaning with NaOCl and shaping with rotary instruments. Today, we still make use of these principles and are developing them further in order to make treatment easier and safer and to gain more favourable outcomes._

Editorial note: A list of references is available from the publisher.

_contact roots

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CONCEPT

Since root canal infection is the cause of apical periodontitis, the biological aim of endodontic treatment is the prevention or elimination of root canal microbes.

Consistent success in endodontics requires high technical skill in order to achieve a biological aim. It is well established that in order to remove enough microbes from the root canal to ensure predictable success, the apical third of the canal must be instrumented to certain minimum sizes.

Most instrumentation systems require an additional step to achieve minimum sizes in the apical third of the canal. This results in additional files, time and expense for the practitioner.

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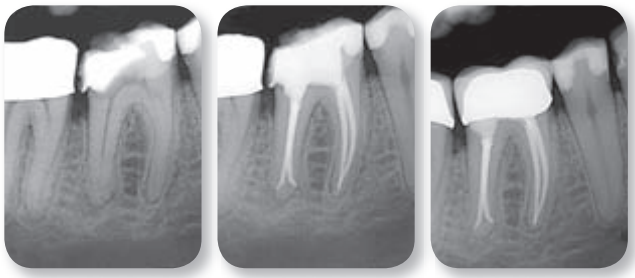
SELECTED CASES

Dr. Gilberto Debelian (Norway)

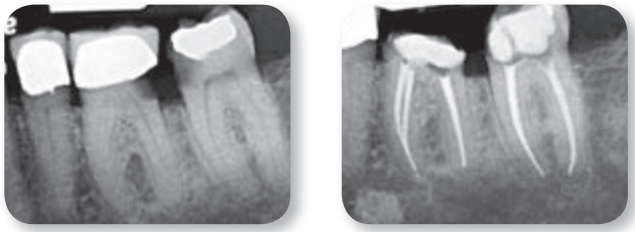


Pre-op | Post-op | 1 y. follow-up

Tooth 46
Dx: Chr. apical periodontitis
Tx: Pulpectomy

Treatment Details:
MB & ML: BR4 35/.04
DB & DL: BR6 50/.04

Dr. Martin Trope (USA)



Pre-op | Post-op

Teeth 36 and 37
Dx: Symptomatic pulpitis
Tx: Pulpectomy

Treatment Details:
MB & ML: BR5 40/.04
DB & DL: BR6 50/.04

More details and information on
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