Removal of a fractured instrument: Two case reports

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Fractured instruments pose a challenge to every endodontist. The difficulty in the retrieval of these instruments ranges from surprisingly easy to downright impossible. The clinical outcome of cases with fractured instruments depends on several factors, such as the position of the instrument in the canal, the type of material, the instrument size and canal anatomy. Failure in retrieval of the fractured instrument does not automatically result in failure of the case. One can still try to bypass the instrument, choose a surgical approach, or even wait and see. However, if we bear ‘nothing ventured, nothing gained’ in mind, then we should always at least try to retrieve the fractured instrument.

Case I

A 27-year-old female patient was referred to our practice. She was in good health and had an American Society of Anesthesiologists (ASA) score of 1. The patient had some mild clinical symptoms on tooth #30 due to apical periodontitis. She had been told, by the referring dentist, that there was a fractured instrument in her tooth and that the instrument had to be removed first in order to allow for decent retreatment.

Before starting with the treatment, a new diagnostic radiograph was taken. In this case, the diagnostic radiograph (Fig. 1) showed not one but two broken instruments in the mesial root, one in each mesial canal. Thereafter, the tooth was isolated with the rubber dam and the coronal filling was removed. Straight-line access was established, as this is imperative in order to be able to reach and see the fractured instruments. Gates-Glidden burs (DENTSPLY Maillefer) were used to enlarge the mesial orifices coronally.

One-and-a-half hours after starting the treatment, the fragment had been loosened but was still stuck in the canal. We decided to leave it in place for the time being and made a new appointment. Calcium hydroxide paste (UltraCal XS, Ultradent) was put into the coronal part of the mesial canals and the tooth was sealed with glass-ionomer cement (Fuji IX GP Fast, GC) and a cotton pellet. During the next visit, the tooth was again isolated and opened. The calcium hydroxide paste was removed, using 10% EDTA, and the fractured instruments were retrieved. The tooth was then restored with a point seal and a glass-ionomer cement restoration.

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citric acid and passive ultrasonics with the IBIRISAFE tip (Satelec). Again, ultrasonics were used to retrieve the instrument. After five minutes, the fragment in the mesio-buccal canal was removed. Another five minutes later, the instrument in the mesio-lingual canal was also removed. While removing the instrument in the mesio-buccal canal was very time-consuming, removing the instrument from the mesio-lingual canal was surprisingly easy. This clearly highlights the above-mentioned difficulty range of instrument retrieval.

After the removal of both instruments, working length was determined in both mesial canals with the electronic apex locator (Root ZX Mini, Morita). A glide path was established and the mesial canals were initially shaped with a ProTaper SX (DENTSPLY Maillefer). Copious irrigation was performed using 5% sodium hypochlorite. Next, the gutta-percha in the distal canal was removed with a size 40.06 ProFile (DENTSPLY Maillefer) and tug-back was confirmed. The separated instrument can be very difficult to retrieve.

Obturation was performed according to the continuous wave of condensation technique with the Elements Obturation Unit (SybronEndo). After obturation (Fig. 5), a temporary restoration of glass-ionomer cement was placed (Fujix IX GP Fast). Final radiographs (Figs. 6 & 7) were taken, both parallel and angled. The radiographs show two completely separated mesial canals; hence, instrument removal in both canals was favourable. The prognosis of this case was good and the patient was referred to her general dentist for a definitive coronal restoration.

__Case II__

A 19-year-old male patient was referred to our practice. He was in good health and had an ASA score of 1. The referring dentist had fractured a small instrument—most likely a size 10 or 15 K-file, according to his referral letter—while performing root-canal treatment on tooth #4. The root-canal treatment was necessary because of a trauma that the patient suffered. The buccal cusp had fractured and the pulp was exposed.

A new diagnostic radiograph (Fig. 8) was taken, which showed the fragment approx. 5mm from the apex. The tooth was isolated with a rubber dam and access was gained through the temporary restorations, which were placed by the referring dentist. After opening, the remnants of calcium hydroxide paste were removed with 10% citric acid and passive ultrasonics. The fractured instrument could be visualised immediately (Fig. 9), because the canal was very large in the middle and coronal part.

This allowed a very conservaive and tissue-saving approach. Given the position in the canal and the shape of the canal, a deep apical split of the canal was suspected. After probing with small K-files, a patent palatal was confirmed. The instrument was fractured in the buccal canal.

A titanium ProUltra tip #8 (DENTSPLY Maillefer) was used to loosen the instrument. In the meantime, copious irrigation with 5% sodium hypochlorite was performed.

The fragmented instrument was retrieved (Fig. 16) and after determining working length (Fig. 11), shaping with rotary nickel-titanium instruments (Twisted Files, SybronEndo) was started. Both canals were shaped to a size 25.08 Twisted File. The master apical file was kept small due to the deep split (Fig. 12) and the tension felt while shaping, thus minimising new instrument fracture. Apical finish- ing was carried out with size 25 K-files. Smear-layer removal was performed with a rinse of 10 % citric acid. A final wash of the canal was carried out with sterile saline. Tapered gutta-percha cones were then fitted and tug-back was confirmed (Fig. 15).

Topsedge was used as a root-canal sealer. Both canals were obturated according to the con- tinuous wave of condensa-
tion technique with the Elements Obturation Unit. After obturation (Figs. 14 & 15), a temporary restoration in glass-ionomer cement was placed together with a cotton pellet, which was soaked in an alcohol and chlorhexidine mixture first and then air-dried after it had been placed in the access cavity.

Final radiographs (Figs. 16 & 17) were taken, both parallel and angled. The prognosis of this case was good and the patient was referred to his general dentis
tist for a definitive coronal restoration.

__Conclusion__

In the end, removal of a fractured instrument can be very difficult and it may take a long time to accomplish. Dr Marga Rees once said on the ROOTS forum that she was being taught that endodontics is all about the three Ps: Passion, Persistence and Patience. This hits the nail right on the head as far as instrument retrieval is concerned.

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

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**About the author**

Dr Rafael Michiels graduated from the Department of Den- tistry at Ghent University, Bel- gium, in 2006. In 2008, he com- pleted the three-year postgradu- ate programme in Endodontics at the University of Ghent. He works in two private practices located in Aalst and in the Department of Dentistry at Ghent University, Belgium. He can be contacted at rafael.michiels@gmail.com and via his website: www.ontemoven.be.