



Case Report

Journal of Dental Science, Oral and Maxillofacial Research

Broken file: bypass or ultrasonic removal technique

Brigui Fouad, Amira Kikly, Ameni Chadlia Belghith, Wided Glii, Lobna Faour Hodroj, Nabiha Douki Zbidi University of Monastir, Dental Faculty of Monastir, Research Laboratory LR12ES11 Department of Dentistry, university hospital, Sahloul, Tunisia

Correspondence: Nabiha Douki Zbidi, University of Monastir, Dental Faculty of Monastir, Research Laboratory LR12ES11 Department of Dentistry, University hospital, Sahloul, Tunisia, Email nabiha.douki@gmail.com

Received: May 01, 2023 | Published: May 03, 2023

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Abstract

Separated instrument is probably the most difficult endodontic accident to manage, it can occur at any stage of rootcanal cleaning and shaping.

Aim: This article reports the management of an intracanal separated NiTi instruments under operating microscope using ultrasonic and bypass technique, than dissect the criteria of indications of two techniques.

Observation: a first clinical case about 21-year-old patient referred following an instrumental fracture(H file) at the level of the 2nd left mandibular molar (37), the radiographic examination reveals the presence of a 4mm instrument which blocks the apical third of the M°B root presenting radiologically a clear X-ray image covering the apex of this root. In order to be able to instrument and decontaminate the part of the canal beyond the instrumental fracture, we decided to remove this instrument from the canal using ultrasonic technique under operative microscope. The second clinical case is about a 31-year-old patient in good general condition consult at the dental medicine department Sahloul hospital following dyschromia of the 4 mandibular incisors after

Introduction

Separated instrument is probably the most difficult endodontic accident to manage, it can occur at any stage of root canal cleaning and shaping. The prognosis depends on the degree of contamination of the canal at the moment of separation and the presence of apical pathology, also a broken file within the root canal may block the access to the apical third.¹ When the fragment prevents the necessary instrumentation and decontamination of the root canal, an attempt for its removal or bypass should be considered. Their management may require prolonged chair time and effort from the dentist and sometimes can be impossible.²

This article reports the management of an intracanal separated NiTi instruments under operating microscope using ultrasonic and bypass technique, than dissect the criteria of indications of two techniques.

Observation

First Case report

21-year-old patient in good general condition referred to the dental medicine department of Sahloul hospital following an instrumental fracture (H file) at the level of the 2nd left mandibular molar (37)

on clinical examination, the patient reported having spontaneous pain 2 days after the onset of theinstrumental fracture.

The radiographic examination (Figure 1) reveals the presence of a 4mm instrument which blocks the apical third of the M°B root

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an old trauma 4 years ago. Unfortunately, an instrumental fracture (S2 of PROTAPER next) of 3 mm had occurred at the middle third of the root during endodontic treatment, we decide to bypass the broken file to continue shaping and disinfection of the root canal.

Discussion: The influence of instrument fracture on the consequence of endodontic treatment and the choice of therapeutic procedure relies upon on various factors. An effect, Treatment of cases with intracanal separated instrument can range from conservative, where the choices includes either bypass of the fragment, removal of the fragment or retaining it with instrumentation and obturation coronally to the fragment, to surgical. First, it is necessary if it is a vital or non-vital tooth. Second, atwhat stage of cleaning and shaping of a contaminated canal did the instrument fracture show up.

Conclusion: other techniques are being developed which try to be softer towards the root walls compared to the ultrasonic technique which seems very aggressive to the tooth. These techniques enrich our therapeutic arsenal and must be taken into consideration.

presenting radiologically a clear X-ray image covering the apex of this root.



Figure I Pre-operative radiograph.

In front of this periapical lesion, we were obliged to push canal disinfection and disorganize the biofilm which adheres to the root walls essential for the healing of periapex. The instrumental fracture in this case constitutes a real obstacle to the success of the endodontic treatment of this tooth. In order to be able to instrument and decontaminate the part of the canal beyond the instrumental fracture, we decided to have this instrument removed from the canal.

In order to be able to instrument and decontaminate the part of the canal beyond the instrumental fracture, we decided to remove this instrument from the canal.

Briefly, rubber dam isolation and access cavity allowing for straightline access were performed (Figure 2).

Citation: Fouad B, Kikly A, Belghith AC, et al. Broken file: bypass or ultrasonic removal technique. *J Dent Maxillofacial* Res. (2023);6(2): 33–36. DOI: 10.30881/jdsomr:00060



Figure 2 Access cavity.

Gates Glidden burs / ultrasonic diamond tips are used to enlarge the canal to a funnel shape coronal to the instrument fragment to allow visualization of the broken instrument with the operating microscope (Figure 3).



Figure 3 Enlargement of the coronalpart above the instrument.

After that, we created the so-called staging platform. Typically, a modified size 3 Gates Glidden/ diamond ultrasonic insert was required to provide sufficient space around the instrument to allow the introduction of ultrasonic tips. (Figure 4).



Figure 4 Creating of stagingplatform around instrument.

Fine ultrasonic tips (ET25/ET20; Satelect Corp) were then used to trephine 2mm around the broken file. Subsequently using the tip of the insert the instrument is vibrated with ultrasonic waves counterclockwise inorder to raise it outside the root canal. (Figure 5).



Figure 5 ET25/ ultrasonic diamondtips/ removed broken file.

A retro alveolar X-ray is then performed to ensure the complete elimination of the fractured instrument and the patency of the canal (Figure 6). Once the canal is again permeabilized, canal shaping and disinfection are reset. Cone fit and postoperative radiographs were performed showing the complete release and obturation of the canal (Figure 7&8).



Figure 6 Per-operative X-ray.



Figure 7 Cone fit X-ray.



Figure 8 Postoperative X-ray.

Second case report

A 31-year-old patient in good general condition consult at the dental medicine department sahloul hospital following dyschromia of the 4 mandibular incisors after an old trauma 4 years ago. The clinical examination reveals that the pulp sensitivity test is negative on the 4 incisors with a normal periodontal probing.

Our therapeutic decision was to perform internal whitening after endodontic treatment of 4 incisors.

Unfortunately, following the non-elimination of the dentinal overhang at the level of 32, an instrumental fracture (S2of PROTAPER next) of 3 mm had occurred at the middle third of the root.

The first step consisted in the elimination of the dentinal overhang with Gates forests in order to create a direct access to the third apical. A new pre-curved K8 or K10 file is inserted into the canal to check for a hook. at this stage, abundant irrigation (NaOCL) allows the ascent of debris and the ease of progression of the instrument. EDTA also acts as a lubricant and softens parietal dentin.

Once found, the resulting passage is shaped and enlarged with larger diameter files.

for working length determination, the apex locator may give false readings since the fractured instrument is a conductive alloy, so we instrumented the canal according to the predetermined length and the exact value was determined with accuracy after the realization of X-ray file in place and the cone fit radiograph. (Figure 9) after abundant irrigation and ultrasonic activation of 5% NAOCL and 17% EDTA, the obturation was performed and a postoperative X-ray shows that the instrument was well contoured and coated (Figure 10).



Figure 9 Cone fit radiograph.



Figure 10 Postoperative radiograph.

Discussion

Intracanal separation of instruments usually compromise the outcome of endodontic treatment and reduce the chances of successful retreatment. In such cases, prognosis is better when separation of an instrument occurs in the later stages of preparation close to the working length.¹

The influence of instrument fracture on the consequence of endodontic treatment and the choice of therapeutic procedure relies upon on various factors. En effect, Treatment of cases with intracanal separated instrument can range from conservative, where the choices includes either bypass of the fragment, removal of the fragment or retaining it with instrumentation and obturation coronally to the fragment, to surgical.² First, it is necessary if it is a vital or non-vital tooth. Second, at what stage of cleaning and shaping of a contaminated canal did the instrument fracture show up.³

If we are in front of a vital tooth (pulpitis or prosthetic reasons), the most important criteria to be analyzed faceto a broken file is the possibility of viewing the instrument under an operating microscope with minimum damage to the canal walls. if possible, removal of the instrument is preferred to maximize root canal disinfection essential to the success of any endodontic treatment.³

About this topic, a comparative study conducted by Kalin. K compared the success rate of the ultrasonic and bypass technique with fractured instruments, he concluded that the ultrasonic technique for broken instruments removal systematically shows acceptable clinical success rates when the fragments are located inside the root canal curvature. The possibility for safe straightening of the root canal to achieve visibility to the fragment is a most important factor for the success. Bypass shows significantly lower success rates than ultrasonics, but in cases of lack of visibility to the fragment, it is the only alternative.⁴

⁵Solomonov Michael' proposes for a vital tooth to act according to the root canal third where the instrument is fractured.³ He suggests abstaining and sealing the canal with a hot vertical compaction technique if the instrument is fractured at the apical third. If at the level of the middle third, the best technique is to have the instrument bypassed but if it is at the coronal level, you must try to remove it with minimum damage to the dentin. He argument his procedure saying, reduction of root strength can lead to vertical root fracture⁵ which accounts for 11% of endodontic failure.⁶ Therefore, before sacrificing the dentin while trying to remove separated instrument all treatment consideration should be taken into account

if we are faced with an infected tooth, our strategy depends on two main factors: when the instrument fracture occurred and the position of the instrument.

If the canal was instrumented and disinfected, there is no reason to remove the instrument and weaken the roots (second clinical case). Except in rare cases of fracture at the level of the coronary third after canal disinfection (opner: SX/endoflare...) it is necessary to try to remove this instrument in order to be able to sealthe canal.

If the instrumental fracture occurred before any attempt at instrumentation and significant disinfection of the canal, we are faced to the worst situation (first clinical case).

Then, if the situation of the instrument, its section, its length, and the section of the root canal allow a bypass, a disinfection and an instrumentation without risk of secondary fracture, we should not have fun removing the instrument and damaging the root walls.

If bypass was unsuccessful and direct access to fragment is possible, retrieval procedure should berecommended.³

There are cases where you can neither bypass nor remove the instrument. in this situation it is recommended The use of Ca(OH)2 dressing for 2-4 weeks. After this procedure, root canal obturation and follow-up after 6 and 12 months are recommended. If the periapical lesion increases periapical surgery or extraction should beconsidered.^{7,8} Generally, bypass is indicated whenever removal of the instrument is impossible or contraindicated. It offers several advantages, it does not compromise the integrity of the tooth, does not require sophisticated technical means and may be the cause of spontaneous removal of the instrument during instrumentation maneuvers.¹

But the disadvantage of bypass is that the risk of abutment or transport of the canal trajectory can occur at anytime. in addition, the instrument left in place can compromise a good disinfection of the canal system.

However, this can be remedied by activating irrigation and the use of sealers based on Bioceramics or hot filling techniques which will make it possible to coat the fragment inside the filling.

In order to facilitate the therapeutic decision with respect to a fractured instrument, a decision-making charterhas been drawn up (Figure 11).





Figure 11 Decision-making charter.

Conclusion

The instrumental fracture is a dramatic accident during endodontic practice and the best solution to remedy this problem remains prevention.

If the incident occurs, we can act according to several methods without affecting the long-term prognosis of thetooth, except that the choice of technique must be well chosen and that the practitioner must be well experienced.

Other techniques are being developed which try to be softer towards the root walls compared to the ultrasonic technique which seems very aggressive to the tooth. These techniques enrich our therapeutic arsenal and mustbe taken into consideration.

Acknowledgments

None.

Conflicts of Interest

None.

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