Removal of a Broken Pathfile: Case Report

Tolga Han Edebal[1*]

1. Harran University, Faculty of Dentistry, Department of Endodontics, Şanlıurfa, TURKEY.

***Corresponding author:** Edebal TH, MSc.PhD, Asst. Prof. Department of Endodontics, Faculty of Dentistry, Harran University Sanliurfa, Turkey.
E-mail : edebal@harran.edu.tr

Abstract

Broken root canal files are challenging complications in endodontics. Especially, teeth with apical pathologies are more difficult to threat because of the must to establish an access to apex. Otherwise, root canal system can't be disinfected by irrigants or medicaments. In this case, a #16.02 pathfile was broken in a tooth with acute apical periodontitis.

After this complication, the broken instrument totally removed from the root canal system and the tooth treated by a multivisit aproach succesfully.

Case Report (HRU Int J Dent Oral Res 2022; 2(2): 142-144)

Keywords: Broken file, complication, ultrasonics

Introduction

In endodontics broken files are one of the most common and feared complications (1). In some cases they make the endodontic treatment impossible and clinicans have to apply apical surgery or extraction (2). Especially, in the cases with apical pathologies like acute apical periodontitis, the whole root canal system must be properly disinfected with irrigants and intracanal medicaments (3-4). But the presence of the broken instrument makes the disinfection impossible so the broken files in the cases with apical pathologies should be removed to avoid further treatments like apical surgery, extraction and dental implants. This treatment options are more invasive and expensive than ortograde endodontics and file removal. There are different techniques and devices for broken instrument removal. Nearly all of these techniques needs a straight way to see and locate the seperated part of the instrument in the root canal (5). After establishing a straight approach to the seperated file clinicians attempt to by-pass the instrument to the apex. If the instrument could be removed from the root canal by hand files no further application is necessary (6).

If it can't be removed by this method, ultrasonic tips can be used to remove the seperated instrument (7-8). All of the ultrasonic scaler manufacturers produce special ultrasonic tips for instrument removal.

Case Report

A 60 year-old female patient was admitted to private practice after being referred with a broken endodontic instrument in tooth #22. After clinical intraoral examination the patient diagnosed with acute apical periodontitis. An intraoral radiograph taken from the tooth #22 (Figure1). There was a long part of a pathfile in the root canal. The patient brought a note from the dentist who referred her that says the broken file is a #16.02 pathfile and the initial diagnosis was acute apical periodontitis.

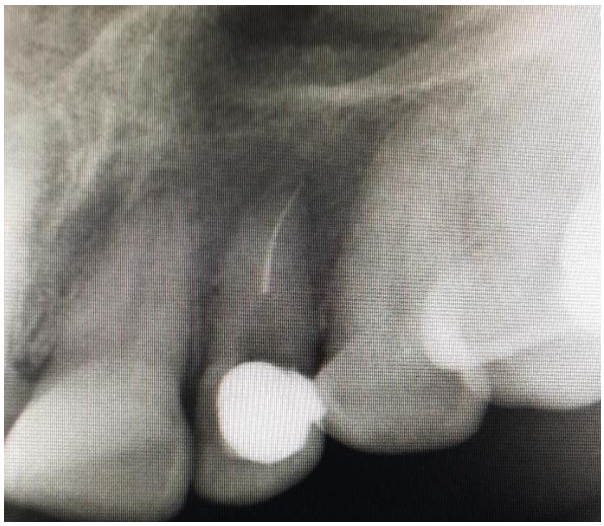

Figure 1. Initial intraoral radiograph of tooth #22.

Because of the painful situation, treatment have been started immediately. Local anesthesia applied before placing the rubberdam(Coltene, Altstätten, Switzerland). Temporary coronal filling material removed using a diamond high-speed bur. A dental loupe has been used all the time during treatment(Carl Zeiss AG, Oberkochen,Germany). The canal orifice has been spotted. Initially the broken file was not seen. Using a K-file #6, the broken instrument detected clinically.

Attempts to by-pass the broken file with #6, #8, #10 K-files have been failed. At this point establishing a direct access to the broken file has been decided. For this porpose, #4-6 Gates-Glidden burs have been modified(Figure2). Gates-Glidden burs used at 1000rpm carefully until the broken file has been reached. Copious irrigation with NaOCl have been applied to avoid debris blokage. At this point dental loupes light power have been set to maximum and the broken file has been detected visually. After visual detection, attempting to by-pass the file have been decided.

But the by-pass attempts failed again. After this using endodontic ultrasonic tip LM,EN-11(LM Dental,Parainen,Finland) to remove the broken file have been decided. Under magnification x4.3, the ultrasonic tip has been used couter clockwise around the broken file. The broken file have been removed during irrigation and unintentionally have been aspired by suction. Then an intraoral radiography taken to comfirm the absence of the broken file (Figure3). Then the working lenght determined by using an apex locator Propex Pixi (Dentsply-Maillefer, Ballaigues, Switzerland) and chemomechanical preparation have been made to an apical size of F3(F3 of the ProTaper system; Dentsply Maillefer, Ballaigues, Switzerland). Then %17 EDTA used for smear layer removal and final irrigation have been made by using NaOCl. After final irrigation root canal dressing with Ca(OH)2 applied to ensure root canal disinfection. The access cavity have been closed by a temporary filling material and an appointment amonged for two weeks later.

Figure 2. Modified Gates-Glidden burs.

Figure 3. Radiograph after file removal.

At the second appointment, the tooth was symptom free. After removal of temporary coronal filling the Ca(OH)2 dressing removed by using ultrasonic tip LM,EN-15(LM Dental, Parainen, Finland). During all ultrasonic interventions the ultrasonic device (LM Dental, Parainen, Finland) arrenged for endodontic mode. There was no drainage in the canal. A warm vertical

compaction technique have been used to achieve a tight roor canal filling. After root canal filling coronal restoration have been made immediately (Figure4).

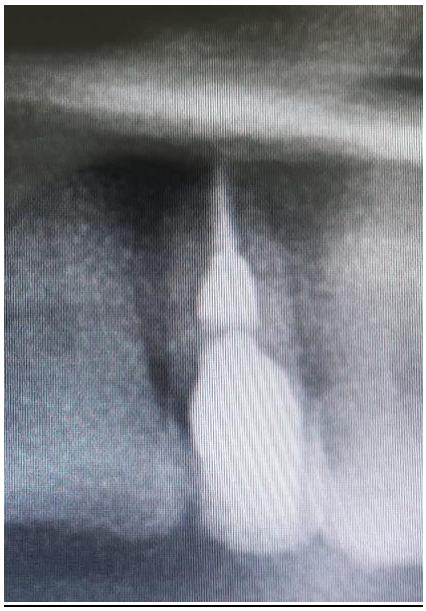

Figure 4. Radiograph after root canal and coronal fillings.

Discussion

The main aspect of root canal treatment is to disinfect all the root canal system (9). The complications like debris blockage, ledge formation or broken root canal instruments make the disinfection harder or even impossible. Because of this, removing the broken instrument plays a vital role on threating the teeth with apical pathologies remains (10). There are few approaches and devices to remove the broken instruments (5). It's well known that the remaining dentin structure both at the coronal part and root plays an important role on the survivability of the root canal threated teeth (11). Due to this fact, when attempting to remove the broken file, by-passing have been tried at the first hand to protect dentin structure. If by-pass attempt failes, removing more dentin structure becomes an option of last resort (12). In this case, using ultrasonics was ended with success. After removing the broken file, routine preparation and disinfection protocols have been applied (13). To ensure the tight sealing, warm vertical compaction technique have been used (14).

Conclusions

Although the successfull removal of the broken file, during the intervention dentin structure have been decreased dramatically. So it's important to keep that in mind, avoiding complications is more important than treating them.

The procedures used for removing files until now are based on removing high amounts of dentin structure. To prolong the life time of root canal treated teeth the need for new broken file removal techniques is obvious. Further investigations and developments are highly needed on this field.

References

1.Bahcall JK. Remedying and preventing endodontic rotary nickel-titanium (NiTi) file breakage. Compendium of Continuing Education in Dentistry (Jamesburg, N.J.:1995). 2013;34(5):324-7.
2.McGuigan MB, Louca C, Duncan HF. Endodontic instrument fracture: causes and prevention. British Dental Journal. 2013;214(7):341-8.
3.Hulsmann M, Schinkel I. Influence of several factors on the success or failure of removal of fractured instruments from the root canal. Endod Dent Traumatol.1999;15:252–8.
4. Ørstavik, D. Apical periodontitis: microbial infection and host responses. Essential endodontology: prevention and treatment of apical periodontitis. 2019;1-10.
5.Gencoglu N, Helvacioglu D. Comparison of the different techniques to remove fractured endodontic instruments from root canal systems.Eur J Dent 2009;03(02):90-5.
6.Bahcall JK, Carp S, Miner M, Skidmore L. The causes, prevention, and clinical management of broken endodontic rotary files. Dentistry Today. 2005;24(11):74-80.
7.Shahabinejad H, Ghassemi A, Pishbin L, Shahravan A.Success of ultrasonic technique in removing fractured rotary Nickel-Titanium endodontic instruments from root canals and its effect on the required force for root fracture.J Endod.2013; 39(6):824-8.
8. Nagai O, Tani N, Kayaba Y, Kodama S, Osada T. Ultrasonic removal of broken instruments in root canals. Int Endod J.1986; 19:298-304.
9.Mohammadi Z, Jafarzadeh H, Shalavi S, Kinoshita JI. Unusual Root Canal Irrigation Solutions. J Contemp Dent Pract. 2017;18(5):415-20.
10.Friedman S.Considerations and concepts of case selection in the management of post-treatment endodontic disease (treatment failure).Endodontic Topics.2002;23(11):54-78
11.Pashley DH. Clinical correlations of dentin structure and function. J Prosthet Dent. 1991;66(6):777-81.
12.Duigou C. Discuss The Prevention And Management Of Procedural Errors During Endodontic Treatment.Aust Endod J.2004;30(2):74-8.
13.Bonsor S J. Disinfection of the root canal system: what should the protocol be? Dental Update 2021;48:(10):836-44.
14.Qu W, Bai W, Liang Y-H, Gao X-J.Influence of warm vertical compaction technique on physical properties of root canal sealers.J Endod.2016;42,(12):1829-33.