

MANAGEMENT OF ROTARY FILE SEPARATION IN MANDIBULAR MOLAR - CASE REPORT

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ABSTRACT

Intracanal separation of endodontic instruments may hinder cleaning and shaping procedures within the root canal system, with a potential impact on the outcome of treatment. A separated instrument in the root canal interferes with root canal cleaning, shaping, filling, and negatively affects the patient's experience. The ideal solution of the problem is to remove the separated instrument without any complication. However, the retrieval of separated instruments is one of the most difficult operations in endodontic treatment, which is time consuming and requires skillful operation, advanced techniques, and professional equipment. In addition, there are considerable risks during the retrieval process, such as ledge formation, re-fracture of instruments, and perforation or vertical cracks due to over-preparation of root canals. The retrieval rate of separated instruments is affected by multiple factors such as the tooth position, the root canal curvature, the depth, length, type, and material of separated instruments. This is a clinical case report of instrument separation at orifice level in mandibular molar. Treatment consisted of retrieval of separated instrument with the aid of a dental operating microscope and completion of endodontic therapy.

Key words: Intracanal separation, root canal curvature

INTRODUCTION

Separation of endodontic instruments within the root canal is an unfortunate occurrence that may hinder root canal procedures and affect the outcome. Although many factors contribute to instrument separation, the exact mode of separation is not fully understood. It has been reported that the prevalence of separated instrument ranges from 2 to 6% by Tronstad et al and 0.5 to 5% by Iqbal et al. This reflects the complexity of the separation process, the interaction of causal forces (torsional and bending), and contributing factors. The composition and design of root canal instruments have been modified, with the aim of achieving better performance and fewer undesirable complications including instrument separation.

The advent of nickel-titanium (NiTi) alloys has not resulted in a lower incidence of instrument separation. Whereas separation rates of stainless steel (SS) instruments have been reported to range between 0.25% and 6%, the separation rate of NiTi rotary instruments has been reported to range between 1.3% and 10.0%. Even in experienced hands, this problem can still occur and frustrate both practitioners and patients.

CASEREPORT

A 34-years old male patient reported to the department of conservative dentistry and endodontics with a chief complaint of pain in the left lower molar tooth since three weeks. Clinically the tooth presented with deep dentinal caries w.r.t 37. Tooth was severely tender to percussion and vitality tests showed painful response to hot, cold and electrical pulp tests. Iopar revealed radiolucency approximating pulp chamber [Fig.1]. From clinical and radiographic findings, a diagnosis of symptomatic apical periodontitis secondary to irreversible pulpitis was made. Treatment options were discussed with the patient and endodontic therapy was the treatment of choice. The tooth was anesthetised with 1.8 ml 2% lignocaine containing 1:200,000 adrenaline followed by rubber dam isolation. Access was prepared to locate all canal orifices and four

canal orifices were found-mesiobuccal, mesiolingual, distobuccal and distolingual. All the canals were negotiated using a 10-k file. While enlarging the orifice of distolingual canal, the orifice shaper with tip diameter of 0.19 separated leaving a length of 6mm at the orifice level [Fig.2].

Since the fractured segment could be visualised and was above the root curvature, retrieval was preferred over bypassing. Exact location of separated instrument within the canal was confirmed under the Dental operating microscope. Ultrasonic tip ET25 (Acteon, Satelec) [Fig.3] in ultrasonic hand piece at a power setting of 3, was placed into the distolingual canal between the exposed end of the file and the canal wall and activated around the obstruction in a counter clockwise direction to remove dentin around the fractured instrument and loosen it. Following the ultrasonic activation, the instrument fragment floated out from the distolingual canal [Fig.4]. Working length was established with the help of an apex locator (J Morita Inc, USA). During the shaping of canals, copious irrigation with 3% sodium hypochlorite and saline was performed. Patency was kept with a 10 size K file between every instrument. Shaping of all four canals were done upto #0.06/25. Canals were irrigated with 3% sodium hypochlorite, 17% EDTA and 2% chlorhexidine. Canals were dried using paper points and a master cone radiograph [Fig.5] was taken to check the apical fit in all the four canals. Finally canals were obturated with gutta-percha and AH plus sealer (Dentsply) by warm vertical compaction [Fig.6]. The access preparation was sealed and the post endodontic composite restoration was done.



Fig.1



Fig.2



Fig.3



Fig.4



Fig.5



Fig.6

DISCUSSION

Separated root canal instruments are one of the most troublesome incidents in endodontic therapy, especially if the tooth is non-vital and fragment cannot be removed. In the majority of cases, the procedural mishap does not directly compromise the prognosis, unless a concomitant infection is already present. Separated fragment of instrument in root canal may be indirectly responsible for an endodontic failure by limiting the access to the apical part of the canal, compromising disinfection and obturation, but is rarely directly responsible.

The four treatment protocols have been suggested by the literature for management of fractured instruments in root canals:

1. Allowing the separated instrument to be retained in the canal and treating the remaining portion of canal.
2. Bypassing the separated fragment and treating the canal.
3. Retrieving the separated fragment and treating the canal.
4. Surgical approach for retrieval of separated fragment followed by treatment accordingly.

Favourable factors for the removal of a fractured instrument are straight canals, incisors and canines; localisation before the curvature; length of fragment of more than 5 mm; localisation in the coronal or middle third of the root canal; reamer or lentulo spirals; and hand NiTi K-files. Thermoplasticized obturation techniques were suggested in these cases since they seal the gap between the fractured fragment and canal walls better than other techniques like cold lateral compaction, single greater tapered cone obturation, because of their excellent flow.

CONCLUSION

The decision on management should consider the following.

- Constraints of the root canal accommodating the fragment.
- The stage of root canal instrumentation at which the instrument separated.
- The expertise of the clinician, armamentaria available.
- The strategic importance of the tooth involved.
- The presence/or absence of periapical pathosis.

REFERENCES

1. Torabinejad M, McDonald NJ. Endodontic surgery. In: Torabinejad M, Walton RE, eds. *Endodontics Principles and Practice*, 4th ed. St Louis: Elsevier Health Sciences; 2009:357–75.
2. Qian Yang, YaShen, Dingming Huang, Xuedong Zhou, Yuan Gao, Markus Haapasalo. Evaluation of Two Trephine Techniques for Removal of Fractured Rotary Nickel-titanium Instruments from Root Canals. *J Endod* 2017;43:116–120.
3. Iqbal MK, Kohli MR, Kim JS. A retrospective clinical study of incidence of root canal instrument separation in an endodontics graduate program: a PennEndo database study. *J Endod* 2006;32:1048–52.
4. Tuomas K. Niemi, Melissa A. Marchesan, Adam Lloyd, Robert J. Seltzer. Effect of Instrument Design and Access Outlines on the Removal of Root Canal Obturation Materials in Oval-shaped Canals. *J Endod* 2016;42:1550–1554.
5. Bahcall JK, Carp S, Miner M, Skidmore L. The causes, prevention, and clinical management of broken endodontic rotary files. *Dent Today* 2005;24: 74, 76, 78–80.
6. Di Fiore PM. A dozen ways to prevent nickel-titanium rotary instrument fracture. *J Am Dent Assoc* 2007;138:196–201. quiz 249.
7. Madarati AA, Watts DC, Qualtrough AJ.

- Factors contributing to the separation of endodontic files. *Br Dent J* 2008;204:241-5.
8. Tzanetakakis GN, Kontakiotis EG, Maurikou DV, Marzelou MP. Prevalence and management of instrument fracture in the postgraduate endodontic program at the Dental School of Athens: a five-year retrospective clinical study. *J Endod* 2008;34:675-87.
 9. Madarati AA, Watts DC, Qualtrough AJ. Opinions and attitudes of endodontists and general dental practitioners in the UK towards the intracanal fracture of endodontic instruments: part1. *IntEndod J* 2008;41:693-701.
 10. Madarati A.A., Hunter M.J., Dummer P.M.: Management of intracanal separated instruments. *J Endod* 2013; 39: pp. 569-581