Retrieval of a metallic obstruction from the root canal of a premolar using Masserann technique

A. R. VIVEKANANDA PAI, SHUGUFTA MIR, RACHIT JAIN

Abstract

A metallic obstruction in the root canal blocks canal cleaning and shaping procedures and requires either bypassing or retrieval. Many methods have been recommended to retrieve a metallic obstruction from the root canal. This article describes the retrieval of a metallic obstruction from the root canal of a premolar using Masserann technique to facilitate endodontic retreatment. Masserann technique is said to have limited application in posteriors. However, in this case, the obstruction was successfully retrieved by employing Masserann technique which consisted of using a trephän to cut the dentine and extractor tube to retrieve the obstruction. The retrieved obstruction was found to be a separated H-file. Endodontic retreatment was completed following the detection and negotiation of an extra canal in the same tooth.

Keywords: Canal obstruction, instrument removal, Masserann technique, retreatment, separated instrument

Introduction

A retained metallic obstruction in the root canal is generally a consequence of instrument fracture or separation during the endodontic therapy. Considering stainless steel and nickel-titanium (NiTi) instruments, the prevalence of retained fractured endodontic instruments has been reported to a range from 0.4% to 7.4%.[1] A separated instrument prevents thorough root canal cleaning and shaping apical to the level of separation and hinders the clinician from optimally preparing and obturating the entire root canal system.[2,3]

Although it is stated that a retained instrument had no influence on the outcome of endodontic treatment, few studies have found reduced success rate.[4,5] Since a retained instrument may be an obstacle to mechanical and chemical treatment of a root canal, it may have a negative impact on treatment outcome.[4] However, the main prognostic factor in such cases has been reported to be the existence or nonexistence of a pre-operative periradicular pathosis.[4] Further, other factors like stage of canal preparation at the time of instrument fracture, canal anatomy, fragment position, and type of fractured instrument are said to significantly influence prognosis.[1]

Removal of the fractured segment, bypassing and sealing the fragment within the root canal space or true blockage are the approaches mentioned to manage a separated instrument. It is said that these approaches should be considered following the evaluation of the pulp status, the root canal infection, the root canal anatomy, the position and type of fractured instrument and the amount of damage that would be caused to the remaining tooth structure.[3]

Instrument retrieval by an orthograde approach is often considered to be difficult, time consuming, risky and having limited success. Success rate for instrument retrieval can be quite variable and a success rate ranging from 55% to 87% has been reported in the endodontic literature.[2,3,5]

Masserann technique is based on hollow tube device and employed to remove metallic obstructions from the root canal with the reported success rate of 55%. This technique has been used for over more than 30 years for retrieving broken files, silver points and posts from the root canal.[3,6,7] Masserann technique is particularly more successful in anterior teeth with a reported success rate of 73%. When compared to anterior teeth, it has limited application in posterior teeth with a lower success rate of 44%. [3,7,8]

This case report illustrates using Masserann technique successfully to retrieve a metallic obstruction found in the form of a separated instrument from a lower premolar root canal.
Case Report

A 55-year-old male patient, who reported for endodontic retreatment, required the management of a metallic obstruction found in the root canal of tooth 34 (left mandibular first premolar) to facilitate retreatment in the same tooth. Periapical radiographic examination of tooth 34 showed the metallic obstruction, which was suspected to be separated instrument, in the middle-third of the root canal with a poor Gutta-percha obturation extending only up to the obstruction. Furthermore, the root outline of tooth 34 revealed the possibility of an anatomical variation in the form of an additional root or a canal [Figure 1]. In the treatment plan, a decision was taken to negotiate the obstruction and explore the possibility of an additional canal in tooth 34. The gutta-percha obturation was removed using Xylene (Merck specialties, Mumbai, India) and H-files (Dentsply Maillefer, Ballaigues, Switzerland). Bypassing of the obstruction was attempted using size 08 and size 10 K-files (Dentsply Maillefer). However, bypassing failed as the obstruction was found tightly wedged into the root canal dentin and it was decided to retrieve the metallic obstruction by using a Masserann Kit (Micro Mega, Besancon, France).

The coronal access in tooth 34 was refined using diamond points (Shofu Preparation Kit, Japan). Radicular access to the obstruction was straightened by the sequential use of gates-glidden drills (Mani Inc., Japan). Since the size of the obstruction was not known, end cutting trephane having an appropriate diameter was selected by superimposing it over the obstruction on the radiograph. The trephane was run at slow speed in anticlockwise direction to cut the radicular dentin around the obstruction. The apical advancement of the trephane was radiographically monitored [Figure 2].

When coronal portion of the obstruction was freed from the dentin, extractor tube of 1.2 mm diameter was guided into the canal to encircle and grip the obstruction. The encirclement of the obstruction by the extractor tube was radiographically confirmed [Figure 3] and the plunger rod of the tube was rotated in a clockwise direction to snugly grip the obstruction against the wall of the extractor tube. Following the confirmation of gripping the obstruction using tactile sense, the extractor tube was gently turned in back and forth motions to loosen and retrieve the obstruction from the canal. Retrieval of the obstruction from the canal of tooth 34 was radiographically confirmed [Figure 4]. Closer observation of the obstruction revealed that it was the fragment of a separated H-file [Figure 5].

A ledge was detected apical to the site of obstruction in tooth 34 following the retrieval of the obstruction. The ledge was negotiated using size 10 K-file. Further exploration of the pulp space revealed the presence of an additional canal. Following canal negotiation, working length was determined using the apex locator (Propex, Dentsply Maillefer) and radiographs [Figure 6]. Canals were
shaped and cleaned in a crown down manner using NiTi files (ProTaper, Dentsply Maillefer). Irrigation was carried out using 2.5% sodium hypochlorite and 2% of chlorohexidine. Calcium hydroxide (Calcicur, VOCO, Germany) was used as an intracanal medicament.

In the subsequent visit, canals of tooth 34 were obturated using Gutta-percha points (ProTaper, Dentsply Maillefer), sealer (AH-plus, Dentsply Maillefer) and lateral compaction method. The access opening was restored with silver amalgam [Figure 7] and the patient was suggested to undergo post endodontic treatment.

**DISCUSSION**

Separated instruments in the canal usually prevents access to the apex, impedes thorough cleaning and shaping of the root canal, thus may compromise the outcome of endodontic treatment and reduce the chances of successful retreatment. In such a case, it is said that the prognosis depends on the condition of the root canal, canal anatomy, type of pulpal pathology, periapical status, amount of cleaning and shaping at the time of separation, the level of separation in the canal, type of fractured instrument and is generally lower than the one with normal endodontic treatment.

Recommended management of a fractured instrument involves an orthograde or a surgical approach. Orthograde approach consists of bypassing the instrument, removing the instrument or preparing and obturating to the fractured instrument. It is said that due to the difficulty in determining the actual extent of canal disinfection when the instrument separates, bypassing or retrieving the separated instrument would be deemed necessary.

Retrieval of separated instrument is suggested when bypassing fails. Retrieval may lead to successful non-surgical treatment or retreatment, which is the more conservative approach. Instrument retrieval depends on cross-sectional diameter, length, curvature, dentin thickness and morphology.
of the root, composition, cutting action (clockwise or counter clockwise) of the instrument, length, location and amount of binding or impaction of the fragment in the canal.[6,11,13,14]

Masserann technique is one of the instrument retrieval methods. This technique is carried out using a kit which contains an assortment of color coded trephans and extractors tubes along with other accessories. The trephans burs have end cutting potential and are available in increasing sizes. These burs are rotated in an anti-clockwise direction to cut surrounding root canal dentin and create a space around the coronal end of the fragment. Extractor tube with a plunger rod (stylet) inside is inserted into the created space to encircle the fragment. Extractor tubes are available with an outer diameter of 1.2 mm and 1.5 mm. The plunger rod, when turned inside the extractor tube, would slide into the available space between the fragment and inner wall of the extractor tube. This would enable the plunger rod to lock and grip the coronal end of the fragment against internal embossment just short of the end of the extractor tube. This locking mechanism of Masserann technique provides considerable retention in gripping and dislodging an obstruction, especially one which is tightly wedged in the canal.[3,8,15]

It is stated that Masserann technique can be employed for retrieval of both stainless steel and NiTi fragments.[16] It is shown to have lesser success rate than ultrasonics and conventional methods of instrument retrieval. Although this technique is considered to be inferior to ultrasonics and time consuming, requiring 20 min to several hours, it is said to be still effective in selected cases and often the method of choice for retrieval over ultrasonic vibration.[3,7,12,16,17]

However, Masserann technique can be modified by using or combining with ultrasonics and is said to be more effective in selected cases when employed with surgical operating microscope.[7,8] On the other hand, the use of relatively large and rigid trephans leads to removal of a considerable amount of root dentin and weakening of the teeth or risk of perforation. To overcome the risks associated with it; this technique needs frequent radiographic monitoring and a well-controlled use with ample convenience form.[7,8]

Therefore, Masserann technique is useful in removing metal obstructions from anterior teeth having thick, straight roots. However, this technique is contraindicated in teeth with thin roots, curved roots or more apically due to the risks associated with it.[7,8,17]

In this case, the separated instrument in the form of an obstruction could not be bypassed as it was tightly wedged in the straighter middle-third of the root canal with normal bulk of surrounding dentin. Considering its location and straight line accessibility, Masserann technique was employed to successfully retrieve the obstruction.

Conclusion

Masserann technique is useful to retrieve tightly wedged metallic obstructions found in the form of a separated instrument from posterior teeth such as premolars. However, it should be employed with proper case selection as it would be effective only in the straight portion of the canal having adequate bulk of surrounding dentin and requires straight line accessibility with good clinical skill.

References

1. Panivisai P, Parunnit P, Sathom C, Messer HH. Impact of a retained instrument on treatment outcome: A systematic review and meta-analysis. J Endod 2010;36:775-80.
2. D’Arcangelo C, Varvara G, De Fazio P. Broken instrument removal – Two cases. J Endod 2000;26:368-70.
3. Gencoglu N, Helvaciglu D. Comparison of the different techniques to remove fractured endodontic instruments from root canal systems. Eur J Dent 2009;3:90-5.
4. Cujé J, Bargholz C, Hülsmann M. The outcome of retained instrument removal in a specialist practice. Int Endod J 2010;43:545-54.
5. Alomairy KH. Evaluating two techniques on removal of fractured rotary nickel-titanium endodontic instruments from root canals: An in vitro study. J Endod 2009;35:559-62.
6. Hülsmann M. Methods for removing metal obstructions from the root canal. Endod Dent Traumatol 1993;9:223-37.
7. Friedman S, Stabholz A, Tamse A. Endodontic retrieval – Case selection and technique. 3. Retreatment techniques. J Endod 1990;16:543-9.
8. Okiji T. Modified usage of the Masserann kit for removing intracanal broken instruments. J Endod 2003;29:466-7.
9. Parashos P, Messer HH. Rotary NiTi instrument fracture and its consequences. J Endod 2006;32:1031-43.
10. Torabinejad M, Lemon RR. Procedural accidents. In: Walton R, Torabinejad M, editors. Principles and Practice of Endodontics. 3rd ed. Philadelphia: Saunders; 2002. p. 310-30.
11. Ward JR. The use of an ultrasonic technique to remove a fractured rotary nickel-titanium instrument from the apical third of a curved root canal. Aust Endod J 2003;29:25-30.
12. Terauchi Y, O’Leary L, Suda H. Removal of separated files from root canals with a new file-removal system: Case reports. J Endod 2006;32:789-97.
13. Ruddle CJ. Non surgical retrieval. In: Cohen S, Burms RC, editors. Pathways of the Pulp. 8th ed. St. Louis, MO: CV Mosby; 2002. p. 875-929.
14. Hülsmann 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.
15. Stabholz A, Freidman S, Tamse A. Endodontic failures and retreatment. In: Cohen S, Burms RC, editors. Pathways of the Pulp. 6th ed. St. Louis, Missouri: Mosby; 1994. p. 690-728.
16. Gutmann JL, Dumsha TC, Lovdahl PE. Problem-solving challenges in the revision of previous root canal procedures. In: Gutmann JL, Dumsha TC, Lovdahl PE, editors. Problem Solving in Endodontics: Prevention, Identification and Management. 4th ed. St. Louis: Elsevier Mosby; 2006. p. 239-79.
17. Yoldas O, Oztunc H, Tinaz C, Alparslan N. Perforation risks associated with the use of Masserann endodontic kit drills in mandibular molars. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2004;97:513-7.

How to cite this article: Vivekananda Pai AR, Mit S, Jain R. Retrieval of a metallic obstruction from the root canal of a premolar using Masserann technique. Contemp Clin Dent 2013;4:543-6.

Source of Support: Nil. Conflict of Interest: None declared.