

## Accidents in endodontics: A case report

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### Abstract

Endodontic practice is not risk-free; a variety of technical accidents can complicate root canal treatment, influencing the prognosis and prejudicing the chances of the success. Fracture of endodontic instruments within root canals is not an uncommon incident in endodontic therapy. The prognosis of such teeth depends upon preoperative condition of periradicular tissues and instrument retrieval. An attempt to remove broken instruments should be undertaken in every case. There have been many different devices and techniques developed to retrieve instruments fractured during endodontic procedures. This report describes a case of broken instrument and its retrieval. During cleaning and shaping procedure while performing root canal treatment with a rotary instrument, the instrument fractured at the junction of middle and apical third of the canal. Two Hedstrom-files were used with 5% NaOCl irrigation and the instrument was retrieved followed by conventional obturation using gutta percha points with lateral compaction method.

**Key Words:** Broken instruments, Endodontic failures, Ni Ti instruments

### Introduction

For the success of endodontic treatment in general dental practice, a clinician should have good knowledge regarding the management of procedural mishaps. Fracture of endodontic instruments within root canals is one of the most problematical incidents<sup>1</sup>. Evaluation of endodontic recall radiographs have indicated that the frequency of remaining fragments ranges between 2% and 6% of the cases investigated<sup>2</sup>. However, it has been shown that less than 1% of endodontic failures are due to instrument fractures<sup>3</sup>.

Since the introduction of nickel-titanium (NiTi) instruments both NiTi hand files and rotary instruments have been gaining popularity<sup>4</sup>. A major reason for their selection is the much greater flexibility of NiTi files compared to their stainless steel counterparts. This offers distinct clinical advantages in curved root canals<sup>5,6</sup>. Despite their undeniably favorable qualities, there is a potential risk of "unexpected" fracture with NiTi instruments<sup>7,8</sup>. Broken instruments usually prevent access to the apex, and the prognosis of teeth with broken instruments in the curved canals may be lower than for the normal ones. The

removal of fractured instruments from root canals can be difficult and time-consuming, with a reported success rate ranging from 55% to 79%<sup>9</sup>. There have been many methods proposed for the removal of broken instruments in root canals. Methods using chemical agents such as iodine trichloride, mechanical methods such as hand instrumentation, ultrasonic devices, canal finder system, Masseran Kit, Endo Extractor System, and several kinds of pliers<sup>10</sup>. Various surgical methods along with microscopes have also been used. This paper describes a case of broken rotary instrument and its removal followed by completion of root canal treatment.

### Case report

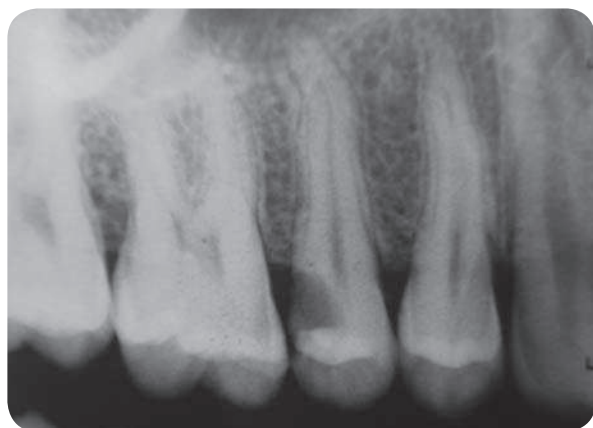
A 28 year old man reported to the university-based dental clinic with a complaint of localized bleeding from the gingiva in relation to his right maxillary second premolar. Clinical examination revealed a class II carious lesion and a gingival polyp in relation to the tooth. Radiograph revealed deep carious lesion involving the enamel, dentin and pulp. Well-circumscribed periapical radiolucency was also visible (Fig. 1).

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The tooth was anesthetized and the polyp was excised using a no. 15 bard parker's blade. This was followed by pulp extirpation and working length determination. Working length radiograph revealed buccal and palatal canals. Initial biomechanical preparation with hand instruments up to no. 20 was done under copious irrigation with sodium hypochlorite, and 15% EDTA (RC-Prep) was used for chelation. Patient was later recalled for the completion of biomechanical preparation. Initial cleaning and shaping was done with hand files and finally no. 20 stainless steel file was used to make a glide path for the rotary instruments. After confirming the access with no. 20 stainless steel files, protaper rotary files were used. Initially Sx file was used for preparing both the canals later followed by S1 file. Completing the access in buccal canal with S1 file, instrument was introduced into palatal canal. While cleaning and

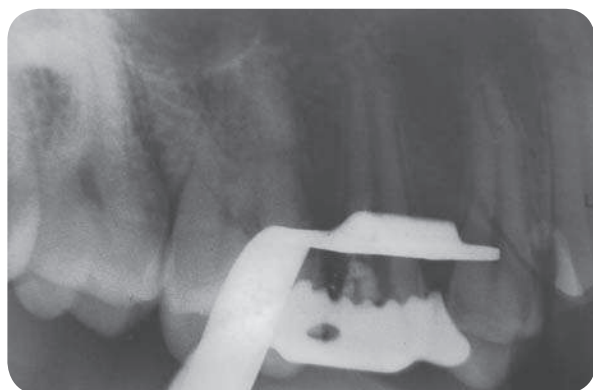
shaping of palatal canal with S1 file some obstruction was encountered. Retrieval of the instrument revealed that the instrument had fractured at the tip. This was confirmed with a radiograph which showed a broken instrument tip wedged near the curvature at the junction of middle and apical third of the palatal canal (Fig. 2). To retrieve the fragment, canal was irrigated with 5% sodium hypochlorite, and 15% EDTA was used. Initially one H-file was used to bypass the broken tip, followed by another H-file which was inserted gradually. Then under copious irrigation these files were rotated in order to grasp and pull out the fragment. Repeating this procedure engaged the fragment and it was withdrawn. A radiograph was taken to confirm its complete removal (Fig. 3). This was followed by conventional cleaning and shaping of the canals and obturation was done using gutta percha with lateral condensation method (Fig. 4).



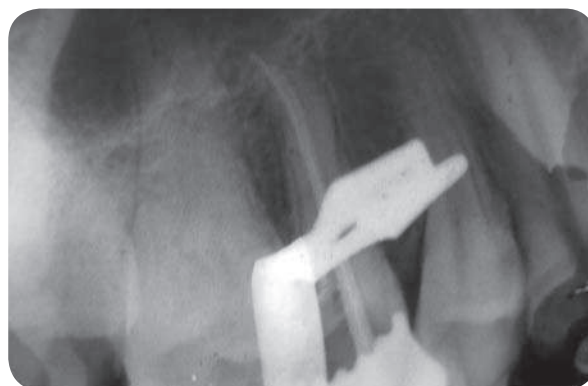
**Fig. 1:** Diagnostic radiograph showing caries involving enamel, dentin and pulp along with well circumscribed periapical radiolucency



**Fig. 2:** Fractured segment at the junction of middle and apical third of the palatal root



**Fig. 3:** Radiograph showing clear canal after removal of the fractured segment



**Fig. 4:** Radiograph showing obturated canals

## Discussion

Although various techniques and devices for retrieving the fragment have been described, no standardized procedure for the successful removal of broken instrument in the root canal exists<sup>9,10</sup>. Each individual case may require a different approach depending on various factors like tooth anatomy, size of fragment, location of fragment etc. Instrument fragment retrieval can be tried starting with the simplest and least invasive method like using endodontic files along with copious irrigation as was used in this case.

There are various factors that may contribute to the successful management of fractured instruments within root canals. The success rate in maxillary teeth is found to be higher than that in mandibular teeth<sup>11</sup>. Degree of curvature is another factor that influences the successful management of broken instruments. Studies have shown that NiTi instruments fractured mostly in canals with severe curvature. The success rate of removal was lower in severe curvatures<sup>11,12</sup>. Location of the fragment in the canal is another factor. Fragments located before the root canal curvature were removed completely<sup>1</sup>. The length of fragment also tends to affect the success rate. Fragments shorter than 5 mm present the lowest success rate<sup>9</sup>.

Among the various methods used for broken instrument retrieval, one is chemical method using chemical agents like iodine trichloride, nitric acid, hydrochloric acid and sulfuric acid etc. These methods may help in achieving intentional corrosion of the metal objects, but could be irritant to the periapical tissues when extruded through the apical foramen<sup>10</sup>. Although use of Masserann kit has shown successful results for fragment removal<sup>13,14</sup> it requires a large loss of root canal dentin, thus could result in perforation or fracture of narrow roots. In addition, it has high risk of perforation in apical part of root canal<sup>10</sup>.

In our case, two Hedstroem files under copious irrigation with 15% EDTA and sodium hypochlorite were used. The two files were braided and the instrument fragment was grasped and pulled out which is similar to previously tried procedures<sup>15,16</sup>. EDTA a chelating agent, is helpful as a lubricant<sup>17</sup>. Studies have shown that if it is possible to bypass the instrument then there are greater chances of removal<sup>7</sup>. In our case, the fragment could be bypassed. The removal of the broken instrument from a root canal must be performed with a minimum damage to the tooth and supporting tissues<sup>16</sup>. Thus, this method was employed which lead to successful removal of the fragment with least amount of damage to the tooth and surrounding tissues.

## Conclusion

By being little meticulous with our techniques and better application of our knowledge regarding various instruments, root canal anatomy and methods of performing root canal treatment, endodontic accidents can be reduced but still they are not inevitable. Despite these accidents, there are chances of treatment success with several approaches to the broken instrument removal being available. To begin with, the simplest and easily available technique must be the goal.

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