

Conservative Management of Separated Instrument in Root Canal by Bypassing Technique: a Case Report

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Abstract

Separated instruments in root canal treatment are an unfortunate occurrence that can happen during the procedure. These instruments can become lodged in the canal, making it challenging to complete the treatment adequately. However, it is possible to manage this situation by bypassing the separated instrument. There are two primary ways to manage a separated instrument: bypassing and retrieval. Retrieval of a separated instrument is a challenging task that requires specialized tools and skills. Therefore, bypassing the separated instrument is often the conservative and less invasive method. This case report describes the conservative approach (bypass technique) to deal with broken instruments with minimum armamentaria. Furthermore, the bypassing technique does not carry much risk since it does not mandate significant removal of dentin structure.

Keywords: Equipment failure; Root canal preparation/instrumentation; Root canal preparation / adverse effects

Declarations

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Proper cleaning, shaping, and three-dimensional fluid-tight closure of the root canal system are the fundamental objectives of root canal therapy. If the practitioner fails to accomplish the aforementioned primary aims, the success of root canal therapy significantly decreases. These objectives won't be accomplished if an instrument breaks apart in the canal. According to analysis of post-endodontic radiographs, 2 - 6% of cases have fractured instruments [1].

Failure risk is expected to increase with any incident that encourages microbial activity. Separated instruments are one of the most problematic situations in endodontic therapy, particularly if the tooth is non-vital and the fragment cannot be removed. Most of the time, unless a concurrent infection is already present, the procedure error does not immediately affect the prognosis. Separated instrument fragments seldom cause endodontic failures directly, but they can indirectly do so by obstructing cleaning and obturation by limiting access to the apical portion of the canal. The presence of a periapical lesion served as the main prognostic factor for the successful treatment of such cases, despite the fact that a number of factors, including the vitality of the tooth, accessibility of the tooth, position of the fractured instrument in the canal, taper of the instrument, and type of alloy the instrument is made with, have an impact on the prognosis [2].

Visibility has a direct impact on the likelihood of removing a separated instrument. i.e. whether or not the fragment can be visualized. Bypassing the fragment by inserting a fine file between it and the root canal wall allows for thorough instrumentation and obturation while leaving the fragment in place. This alternative technique does not require direct visibility to the fragment. The root canal obturation material's ability to incorporate the fragment significantly improves the case's prognosis [3]. In this case report separated instrument was successfully bypassed with uneventful postoperative period.

CASE

A 42 year old man was referred to the department with a dull pain in the right lower back region for the last one month. Radiographic examination revealed dental caries in the right lower first molar tooth. It was determined after a thorough history-taking process and clinical examination that the tooth had dental caries with chronic irreparable pulpitis. The following procedure was used to treat the root canal: Working length was established after access opening. A # 20 stainless steel K-file was separated in the mesiobuccal canal of the

treated tooth during cleaning and shaping. To confirm the degree of separation of the instrument, a radiograph was taken. At the third apical segment of the mesial canal, the instrument was discovered to be separated. Clinical examination revealed no swelling, mobility, or pain. A nonsurgical file bypass procedure was used for this patient since the damaged file was still inside the canal and there was no periapical disease.

During the process of preparing the canal, a block measuring 17 mm was discovered. There was no interruption in the remaining canals. To establish the location of the separated file in the canal, a radiograph was obtained. Afterwards, the bypass technique was used as follows: Glide path attempted to loosen the fragment with a # 8 file before slowly and carefully inserting the file into the canal and attempting to maneuver past the fragment between the dentinal wall and broken instrument to prevent placing the instrument exactly on top of the fractured file (**Fig. 1**). The file was not removed once there was a catch feeling. A slight inward and outward movement was made, and the root canal was heavily irrigated. Once # 10 was positioned at 18 mm, a working length measuring radiograph was performed to determine the canal's patency. The canal was chemomechanically prepared using a standardized procedure. Instead of filling, a place-pull, rotation, and withdrawal motion was used in the mesobuccal canal. For seven days, calcium hydroxide dressing was used. The canals were subsequently sealed using the lateral condensation technique and gutta-percha cone and zinc oxide eugenol sealer at the subsequent appointment. The last radiograph was obtained (**Fig. 1**). After seven days, the restoration was finalized. A follow-up visit was suggested for the patient at one, six, and 12 months.

DISCUSSION

Separated instruments in a root canal typically limit the effectiveness of endodontic therapy and lower the likelihood of a successful retreatment [4]. Preventing the separation of instruments in the first place is the best method of management. During the root canal preparation processes, following tried-and-true principles, incorporating best practices, and employing safe approaches will almost completely eliminate the procedural mishap involving a broken instrument. By considering negotiating and shaping instruments as disposable objects, prevention may also be considerably aided. After each endodontic case is finished, all instruments should simply be thrown away to save breakage, lost clinical time, and upsets. Even with the best currently available technology

and methodologies, an instrument will occasionally separate, making it impossible to bypass or retrieve the fractured file segment [5].

According to a review of the literature, the average prevalence of retained broken endodontic hand instruments (mainly stainless steel files) ranges from 0.7 to 7.4%. Conversely, the average clinical fracture frequency of rotary NiTi devices is between 0.4 and 3.7%. Therefore, based on the best clinical data currently available, it is possible that the frequency of fracture for rotational NiTi devices is lower than that for stainless steel hand files. It's crucial to keep in mind that there are many complex factors that might contribute to the failure of rotary NiTi instruments, one of which could be the skill and expertise of the operator [6].

There are a number of methods for handling separated instruments, including surgical approach, bypassing the fragment, leaving the fragment in place, and more [6]. The location of the fragmented file needs to be identified in advance in order to retrieve it. The instrument that was

broken in this case and the file retrieval had a significant propensity for root perforation and deteriorating root structure [7]. As a result, bypassing the fragment was preferred because it demonstrated a more cautious approach and was able to maintain the root's integrity [8]. Bypassing the procedure's capacity to clean the entire working length of the root canal, a satisfactory prognosis was reached [9]. Bypassing instrument success rate was 37.5%, according to Navares et al [9].

CONCLUSION

A less invasive alternative to chemical and surgical treatments is the retrieval of fractured instruments using a bypass technique. Although separated instruments during root canal therapy might be a challenging problem, bypassing the fragment can efficiently handle them. In order to successfully navigate the canal and avoid the separated fragment, the dentist's experience and expertise are essential.



Figure 1: Radiological photographs of treatment with bypass technique followed by root canal obturation A. preoperative, B. broken instrument at mesiobuccal canal, C. diagnostic X-ray, D. obturation of the canal.

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