



## Endodontic Mishaps in Mandibular 1<sup>st</sup> Molar: A Case Report

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### ABSTRACT –

Instrument separation during endodontic therapy is a frequent accident with rotary instruments being more likely to separate than hand ones. The treatment of cases with a separated instrument can be either conservative or surgical. The separated instrument, particularly a broken file, leads to metallic obstruction in the root canal and impedes efficient cleaning and shaping of canal. When an attempt to bypass such a fragment becomes difficult, it should be retrieved by mechanical devices. Attempt should be made before leaving it and obturate the canal properly. Also another common mishap in dental practice is ledge formation. A ledge is an iatrogenically created irregularity (platform) in the root canal that impedes access of instruments (and in some cases irrigants) to the apex, resulting in insufficient instrumentation and incomplete obturation. Hence proper instrumentation, cleaning and shaping has to be done for successful endodontic treatment.

**Keywords** – Retreatment, Instrument separation, Retrieval technique, Ultrasonics, Mandibular 1<sup>st</sup> molar

### I. INTRODUCTION

Instrument separation during endodontic therapy is a frequent accident with rotary instruments being more likely to separate than manual ones. The treatment of cases with a separated instrument can be either conservative or surgical.

Endodontic mishaps or procedural accidents are unfortunate occurrences that can occur during treatment. Among the complications most commonly observed during root canal instrumentation is a deviation from the original canal curvature without communication with the periodontal ligament, resulting in a procedural error termed as ledge formation or ledging. This often

results when the operator works the files short of the full canal length, and the canal becomes blocked at that “short point”. This might create a ledge, or it might begin to form a new pathway at a tangent to the true pathway of the root canal. The presence of a ledge might exclude the possibility of achieving an adequately shaped canal preparation that reaches the ideal working length, and this can result in incomplete instrumentation and disinfection of the root canal system as well as incomplete obturation of the canal. The root canal space apical to the ledge is difficult to thoroughly clean and shape; therefore, ledges frequently result in ongoing periapical pathosis after the endodontic treatment<sup>1</sup>.

Another most common accidental error is instrument separation. Its incidence ranges from 2% to 6% of the cases. A variety of techniques and systems have been developed to remove a separated instrument. Ultrasonics is the most effective and reliable tools for removing a separated endodontic instrument from a root canal. Successful removal depends on: the level of separation (coronal, middle or apical third); location in relation to the root canal curvature; the type of separated instrument; its length; the degree of canal curvature and the tooth type<sup>2</sup>. The most common causes for file separation are improper use, inadequate access, curved root canal anatomy, and possibly manufacturing defects<sup>3</sup>.

Both the errors blocks the access to thorough root canal cleaning and shaping procedure apical to the level of separation and ledge also irritates the periapical tissues when it is out of the root apex. This is significant in a tooth, as it affects the final outcome of the endodontic therapy<sup>4</sup>. Hence an attempt to bypass or retrieve the instrument and negotiate the remaining canal should be made before leaving it and obturate it.



This case report describes removal of separated instrument from distobuccal root canal using a combination of hand instrumentation and ultrasonic devices which offers the following advantages: conservation of the remaining dentin wall of the root canal and elimination of the necessity for surgical treatment along with ledge management in both the mesial canals

## II. CASE REPORT

A 13years old male patient was referred to the Department of Conservative Dentistry and Endodontics with chief complaint of pain and swelling in the right lower back region of jaw since 3 months. Radiographic examination revealed under obturated canals with 46 , instrument separation in distobuccal canal at the junction of middle and apical third of canal and ledge formation in mesiobuccal and mesiolingual canals ( figure 1 ). It was diagnosed that 46 had symptomatic apical periodontitis so Re Root canal treatment was planned for 46.

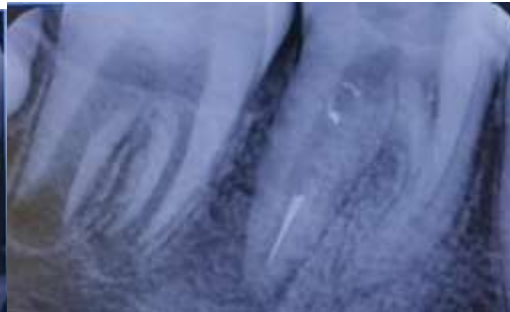
## III. PROCEDURE

The tooth was isolated with a rubber dam. Endodontic access was re entered with a round diamond bur in a high speed airtor handpiece. Previous cement restoration was removed from pulp chamber. Gutta percha was removed with 35 no. H file . Radiographic examination showed

instrument separation in distobuccal canal at the junction of middle and apical third of canal and ledge formation in mesiobuccal and mesiolingual canal ( figure 2 ).. Initially ledge was bypassed slowly with no. 8 k file in both mesial canals under copious irrigation with 5.25% sodium hypochlorite solution. Remaining canals were blocked with cotton pellet to prevent entry of fractured instrument in other canals. Ultrasonic was activated at lower point setting with reduced water supply to enhance visibility into canal and vibrated in counter clockwise direction in order to loosen the instrument. With this trephining action vibrations being transmitted to the fractured instrument and it loosened and floated out of the root canal. ( figure 3,4 ). Woking length was determined with radiograph and confirmed with apex locator ( figure 5 ).. Cleaning and shaping was done. Thorough irrigation was done. The canals were dried with paper points and intra canal dressing of calcium hydroxide was given for 7 days and the tooth was temporized. After seven days, access cavity was re-entered and the canals were irrigated thoroughly with normal saline. Master cone selection for both the canals were done ( figure 6 ) and canals were obturated with cold, lateral compaction of gutta percha cones with epoxy resin sealer ( figure 7 ). A post obturation radiograph with composite resin restoration was taken to evaluate the quality of obturation ( figure 8 ).



(Figure 1)



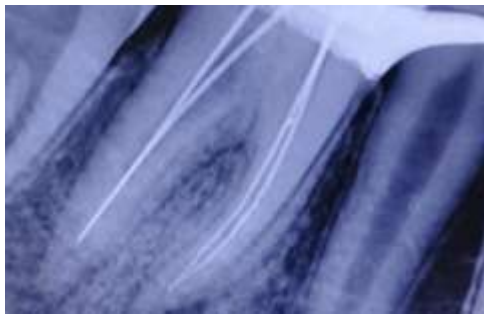
(Figure 2)



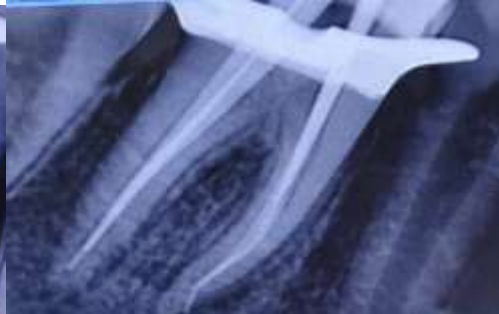
(Figure 3)



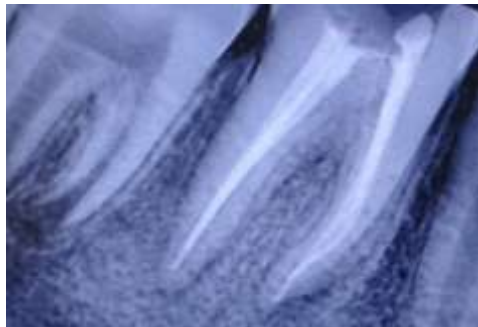
(Figure 4)



(Figure 5)



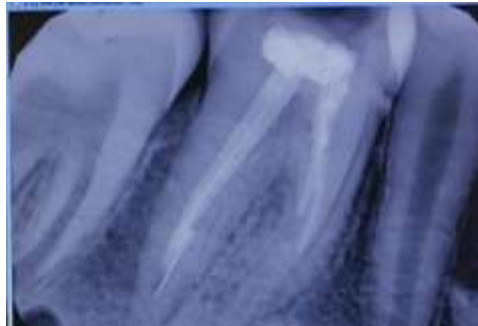
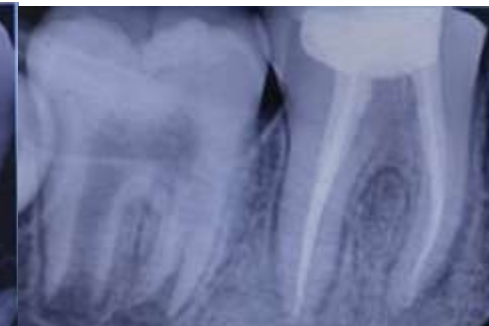
(Figure 6)



(Figure 7)



(Figure 8)

**PREOPERATIVE RVG****POSTOPERATIVE RVG**

#### IV. DISCUSSION –

Instrument separation is a procedural mishap which can lead to undue obstacle in success of endodontic treatment. One of the major reasons leading to separation of rotary instruments are the technique of instrumentation, instrument design, and difficult root anatomy<sup>5</sup>. Instrument separation during endodontic treatment interferes with the process of complete disinfection of the canal, resulting in increase in possibility of failure of treatment. In cases where fracture occurs after cleaning and shaping process, the chances of failure decrease to an extent. Contrary to this, fracture before complete instrumentation, and also in cases with periapical pathologies, causes questionable prognosis of the tooth. Hence, in such cases, either retrieval or bypass of instrument has to be done for success of endodontic therapy<sup>6,7</sup>. Diameter, length and position of the fragment

within the root canal influence the nonsurgical removal of a broken instrument. Also, the thickness of root dentin, the depth of external concavities and the root canal anatomy influence the removal of the broken fragment. Instruments that lie in the straight portions of the canal can be typically removed<sup>8,9</sup>. In this case report, instrument was fractured in the distobuccal canal, which was a straight canal with the least curvature. Several methods and instrument retrieval systems have been proposed for retrieval of broken instruments from the root canals. However, none of them can guarantee 100% success or can be considered the gold standard for instrument retrieval<sup>10</sup>. In our case, instrument was retrieved with ultrasonic without surgical intervention, minimizing trauma to the patient. Due to its various advantages such as minimal dentin damage and compatible tip designs, which can reach the apical third of the canal. Proper training



of new techniques and adherence to the established principles and guidelines of clinical usage can reduce the incidence of instrument fracture. Ledge formation is a common instrumentation error that usually occurs on the outer side of the curvature due to exaggerated cutting and careless manipulation during root canal instrumentation. Ledge formation and canal blockage caused by packing dentin chips and/or tissue debris impedes access of instruments to the apex, resulting in insufficient instrumentation and incomplete obturation.

The most common causes of ledge formation are:

Incorrect or insufficient access cavity preparation

- 1) Obstructed access to the apical constriction.
- 2) Use of files without pre curve
- 3) Failure to use the instruments in a sequential order
- 4) Incorrect length determination of the root canal

Incorrect assessment of root canal direction (Fig. 4).

Incorrect length determination of the root canal

Ledge formation is easily recognized because the endodontic instrument can no longer be inserted into the canal to the full working length. At the same time, the characteristic tactile sensation of the instrument reaching the narrowest end of the root canal is lost. This feeling is supplanted by that of an instrument hitting against a solid wall. When a ledge is suspected, root canal instrumentation should immediately cease and efforts should be concentrated on regaining access to the apex using small sized hand stainless-steel instruments. Early detection of ledge formation will allow its management<sup>11</sup>.

## V. CONCLUSION –

The skill and experience of the operator plays an important role in the success and safety of this instrument-removal technique. Clinician should be aware of techniques and various instruments. With the proper knowledge about root canal anatomy, root canal treatment, various accidents like instrument fracture can be reduced. This report has described “Ultrasonics” a conservative and safe technique for removal of fractured instruments. Ledges and blockages can be prevented if accurate, high-quality diagnostic pre-operative radiographs are obtained and carefully interpreted before initiation of the treatment. Among the several factors associated with the occurrence of ledges the canal curvature,

instrumentation technique, and instruments used seem to be the most important. Overall procedures can aid in successful endodontic treatment and increases prognosis of tooth.

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