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Management of iatrogenic root perforation using mineral trioxide aggregate: A case report

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Abstract

Iatrogenic root perforation accidentally occurs during root canal instrumentation and post space preparation. Successful outcome of root perforations depends on early diagnosis using Cone Beam Computerized Tomography (CBCT) and repair with Mineral Trioxide Aggregate (MTA) managing under Surgical Operating Microscope (SOM).

These case reports present successful nonsurgical iatrogenic root perforation repair. Recall showed the functional tooth stability with absence of symptoms and radiographic healing.

Keywords: Mineral trioxide aggregate, root perforation

Introduction

Root perforations are the mechanical or pathologic communication between the root canal system and the external tooth surface^[1]. Often occurs unknowingly during root canal instrumentation and post space preparation, and also due to pathological conditions like caries and resorption^[2]. Accidental root perforations, which may have serious implications on outcome, have an incidence rate of approximately 2-12% of endodontically treated teeth^[3].

The prognosis of root perforation mainly depends on time between occurrence and repair, size of the perforation, location and the material with which it is repaired^[4]. Most importantly, ideal materials like Mineral trioxide aggregate (MTA)^[5], Biodentine and endosequence root repair material are used for predictable outcome. These are bioactive materials which promote osteogenesis and cementogenesis.

Case reports present diagnosis using Cone Beam Computerized Tomography (CBCT) and repair with Mineral Trioxide Aggregate (MTA) under Surgical Operating Microscope (SOM).

Case report

A 34-year-old male patient reported to the department of conservative dentistry and endodontics with a chief complaint of pain and intermittent pus discharge in the upper left tooth since 1 month. On eliciting past history, the patient had undergone root canal treatment with 25/15 months ago post and core build-up done 6 months ago. On intra-oral examination, an abscess was present labially with purulent exudate through the sulcus of tooth no. 25. On radiographic examination, a screwed metal post perforating tooth no. 25 mesially, and presence of radiolucency extending from coronal 3rd to mid third 3rd with a partially obturated root canal. Diagnosis of endo-periodontal lesion with root damage due to perforation with 25 was made. The patient was informed about the treatment options and agreed for repair of the perforation non-surgically. Treatment initiated after application of rubber dam, composite restoration surrounding the metal post was exposed without damaging the post. A hollow key from the post and core kit was firmly attached to the exposed post and slow anticlockwise rotation was given to remove the post from the tooth. Perforation was visualized under the surgical operating microscope (SOM) (Serwell Medi Equip (P), S India.) for any contamination and disinfected using 2.5% sodium hypochlorite. Old gutta-percha was removed by Protaper retreatment file (Dentsply Tulsa Dental, Tulsa, OK, USA), working length confirmed by apex locator (Guilin Woodpecker Medical Instrument Co., Ltd) and shaping and cleaning done by enlarging the canal up to 25/06 twisted file (Sybron Endo Orange, CA, USA).

Calcium hydroxide (Prime Dental Product P Ltd, India.) dressing was given and patient recalled after one week width and length of perforation measure by placing guttaperch. To confirm the extend of bone loss and perforation CBCT (NewTom GiANO, Cefla Dental Group, Italy) was taken. Nonsurgical perforation repair done by placing MTA Angelus (Angelus, Londrina, PR, Brazil) incrementally under SOM and confirmed radiographically (Sirona, Germany). During repair cotton plug was placed in root canal to prevent blockage, moist cotton placed over MTA Angelus to felicitate the setting, and tooth was temporized. Patient recalled next day setting of MTA Angelus confirmed. Coronal tooth structure was minimal so apical 5mm sectional obturion done. After post space preparation fiber post (Coltène/Whaledent Inc, OH, USA) cemented using para post (Coltène/Whaledent Inc, OH, USA) and composite restoration done (Coltène/Whaledent Inc, OH, USA) patient was asymptomatic after follow up.

Discussion

This article presents successful nonsurgical management under magnification. Iatrogenic root perforation occurs during access preparation, identification and locating the canal, during instrumentation and post space preparation [6]. The perforations was old, large at crestal level with loss of epithelial attachment. The prognosis is questionable due to presence of infection [4]. The present case is endo periodontal lesion with root damage due to root perforation [7], associated

with abscess and mild discomfort with deep pocket. Cone beam computerized tomography imaging was performed to access the location of perforation and bone loss. Surgical operating microscope used to examine any contamination of perforation and predictably place the root repair material.

MTA Angelus bioactive material used for perforation repair. MTA Angelus is composed of 80% Portland cement and 20% bismuth oxide, without calcium sulfate to reduce setting time. The setting time is approximately 14 minutes [8], thus improves handling property. It tightly seals the perforation, guards the periodontium against microorganism for optimal healing [9, 10]. Provides better seal compared to resin modified glass ionomer cement and Super EBA. It is biocompatible, hydrophilic, stable acts as a matrix against which restorative material can be condensed and also prevents bleeding from perforation.

Other bioactive materials like Biodentine, Endosequence root repair putty, iRoot FS can be used for perforation repair, with their better handling property.

Before access opening preventive measures like palpation of root angulation with crown and thorough examination of radiograph for extent calcification, level of pulp chamber and any additional canal can be taken. During instrumentation overzealous use of grater taper instruments should be avoided especially in mesial root of mandibular molar and mesiobuccal root of maxillary molars.

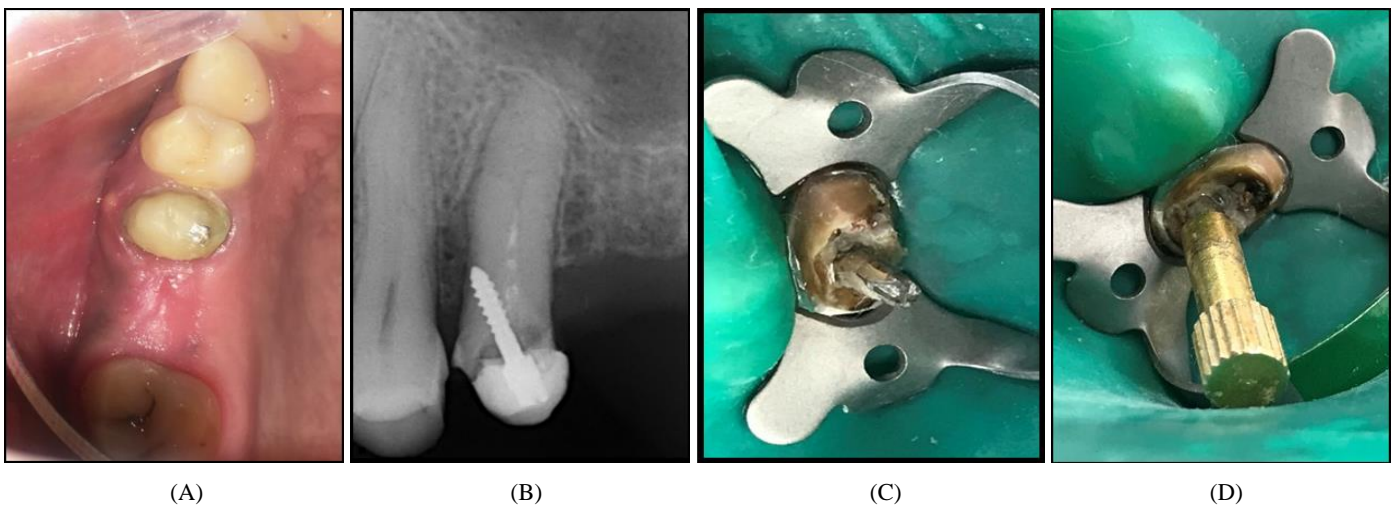


Fig 1: A- Pre-operative photograph showing presence of abscess labially with 24
 B- RVG showing metal post perforating mesially
 C- Metal post exposed
 D- Hallow key attached



Fig 2: A- CBCT Sagittal view showing mid root perforation mesially

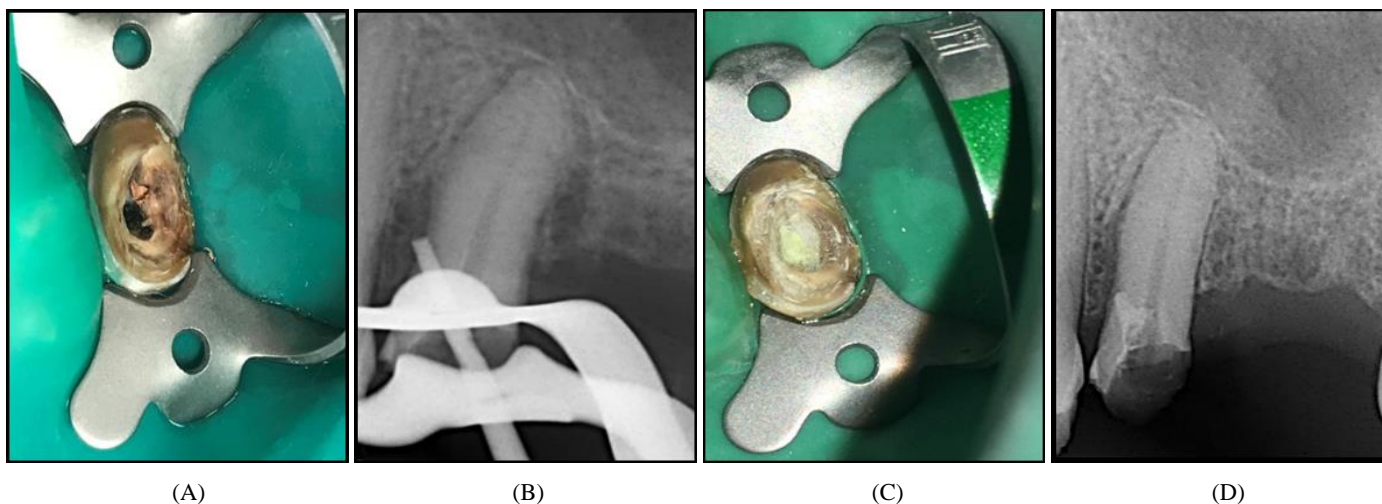


Fig 3: A- Photograph immediately after post removal
 B- Length and width of perforation determined by gutta percha
 C- Perforation repaired with MTA Angelus
 D- RVG immediately after perforation repair

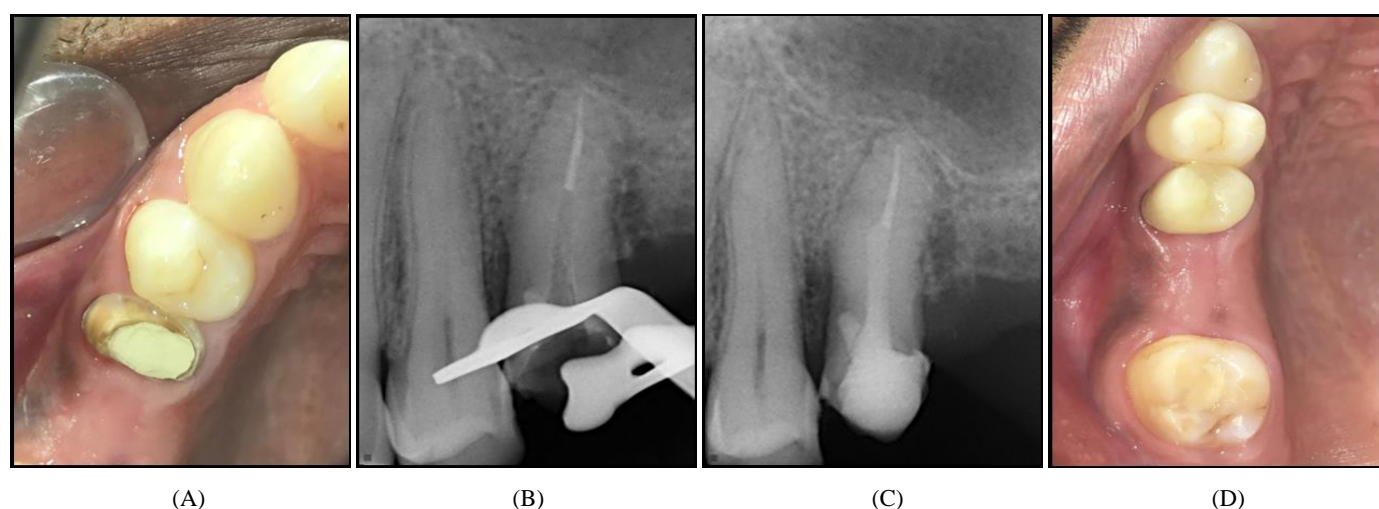


Fig 4: A- Resolution of abscess
 B- Sectional obturation
 C- Fiber post and core build up
 D - Follow up

Conflict of Interest

Not available

Financial Support

Not available

Conclusion

Successful endodontic treatment depends on adequate seal of the root canal system from coronal and radicular aspect. Perforations though avoidable, clinicians need knowledge of their management. Bioactive material like MTA has emerged as an ideal material repairing iatrogenic root perforation with use of operating microscope.

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