

A 16-year-old boy with chronic discharging sinus on upper left lateral incisor tooth

Ridwana Kawsar, Mozammal Hossain, Md. Mujibur Rahman Howlader, Mir Md. Mofazzal Hossain, Md. Joynal Abdin and Md. Shamsul Alam

Article Info

Department of Conservative Dentistry and Endodontics, Faculty of Dentistry, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

For Correspondence:

Mozammal Hossain
mozammalresearch@gmail.com

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Presentation of Case

Dr. Ridwana Kawsar (MS Resident): A 16-year-old boy referred to our department with chronic discharging sinus during the course of root canal treatment on the upper left lateral incisor tooth from a private dental clinic. The patient had a history of trauma to the tooth 1 year back. On clinical examination, the coronal portion of the upper left lateral incisor tooth was found to have filled with temporary restorative material. The tooth was sensitive to palpation and percussion with the presence of a sinus tract. On vitality test, there was no response to heat and cold test. The periodontal pocket depth was within the normal limit. The medical history of the patient was non-contributory.

Radiographic Findings

Dr. Mozammal Hossain (Associate Professor): A well circumscribed, fairly oval, radiolucent lesion was seen in the apical 3rd of the root along with perforation and a radiolucent lesion on the bone adjacent to the perforation. The margins were smooth and clearly defined with distortion of the original root canal outline (Figure 1A). Based on the clinical and radiological findings, the tooth was diagnosed as have previously been initiated therapy and now having an apical abscess with draining sinus with perforating internal resorption.

Treatment Procedure

Dr. Kawsar: During the first appointment, following isolation of the tooth and removal of the temporary filling material, no bleeding from the root canal was observed. Existing intracanal medicaments were removed from the canal by copious irrigation with normal saline solution. The working length was determined at 19 mm and it was confirmed by the radiograph (Figure 1B). A conservative filling in the form of scrapping was applied to the canal walls with larger H-file (ISO 90 H-file, USA). After copious irrigation of the canal with normal

saline, low concentration 1% sodium hypochlorite was used for 5 min followed by 2% chlorhexidine for 30 sec. Calcium hydroxide as an intracanal medicament was placed followed by temporarily sealing of the access cavity using zinc oxide eugenol cement. The patient was recalled after a week. On next appointment, calcium hydroxide was removed using normal saline. The canal was dried and it was found that exudates still remain into the canal and calcium hydroxide dressing was given. Calcium hydroxide dressing was repeated at 2 weeks interval till the canal was found dry.

On the 4th visit, the canal was found dry after removal of calcium hydroxide dressing using copious irrigation with normal saline. Low concentration sodium hypochlorite (1%) was used for 5 min followed by 2% chlorhexidine for 30 sec. The canal was then dried using sterile paper points. White mineral trioxide aggregate (ProRoot MTA, USA) was prepared according to the manufacturer's recommendations and carried to the tooth with an amalgam gum and filled with vertical condensation using indigenous method to compact mineral trioxide aggregate into the perforation site. It was done using a K-file draped in moist sterile cotton. Intraoperative radiograph revealed that mineral trioxide aggregate filled the canal and the resorptive defect (Figure 1C). Excess mineral trioxide aggregate was removed from the canal by scrapping action. A wet cotton pellet was placed on the canal and the cavity was sealed with the temporary restorative material. After 24 hours the hard set of mineral trioxide aggregate was confirmed and the remainder of the root canal was obturated with gutta-percha by cold lateral condensation technique (Figure 1D) and the access cavity was restored with glass ionomer cement. The patient was advised for follow-up at 1, 3, 6 and 12 months interval (Figure 1EF).

Differential Diagnosis

Tooth with open apex

Dr. Mujibur Rahman Howlader (Associate Profe-



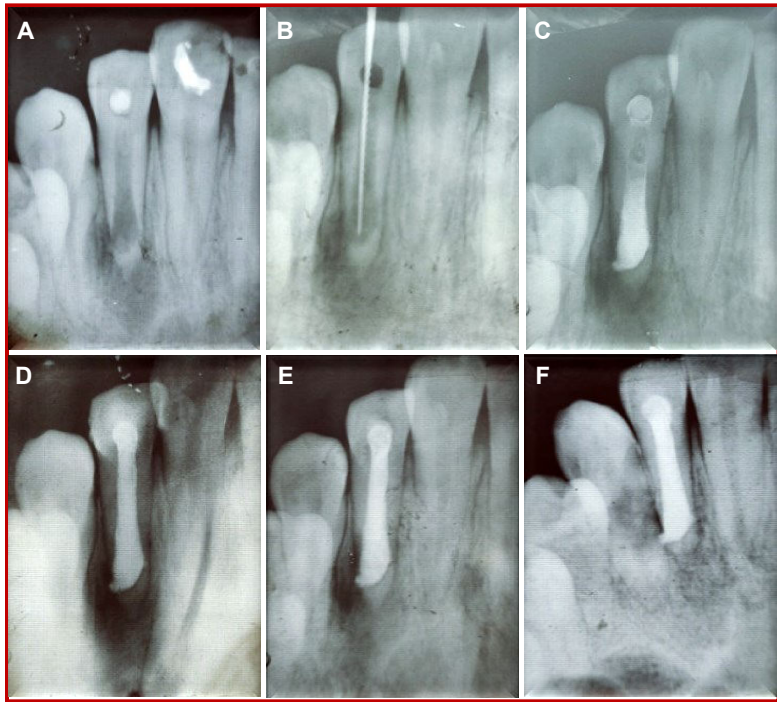


Figure 1: Pre-operative radiograph shows an internal resorption in the apical third portion of the root with perforation along with large periapical radiolucency. The canal is wide due to incomplete root development (A); A gutta percha is placed which reached up to the area of resorption (B); Repair of the apical part by mineral trioxide aggregate (C); The remaining canal was sealed by gutta-percha and sealer (D); One month follow-up (E); After one year (F)

ssor): Tooth apex may not close if there is periapical pathology or trauma to the tooth before the completion of root development.^{1,2} In the present case, the canal is wider at apex and narrower at cervical area which showed a blunder bass appearance.^{3,4} In most of the cases, patients may present with chronic apical abscess and discoloration of the tooth.^{5,6} However, in this case, the time of trauma occurs after completion of root development and radiograph shows fully developed apical portion of the root and hereafter, it is not a case of tooth with open apex.

Chronic periapical periodontitis

Dr. Mir Md. Mofazzal Hossain (MS Resident): This asymptomatic condition usually diagnosed by routine radiographic examination.^{7,8} In this case, the tooth is symptomatic with history of swelling and presence of an apical discharging sinus, it disfavors the diagnosis as chronic apical periodontitis.

External root resorption

Dr. Md. Joynal Abdin (Assistant Professor): External root resorption may occur following injury to the periodontium by dental trauma, chemical irritation such as bleaching agent or by periodontal procedure.⁹⁻¹⁰ There is worn or scooped out area on the side of the root and lesion moves away from the canal as angulations changes.¹¹⁻¹² Root canal can be

seen running through the defect with outline of the root canal remains normal. But this is not seen in this case so it is not consistent with the diagnosis of external root resorption.

Provisional Diagnosis

Previously initiated therapy with chronic apical abscess

Dr. Kawsar's Diagnosis

Previously initiated therapy with chronic apical abscess with perforating internal root resorption

Discussion

Pathogenesis

Dr. Howlader: Internal root resorption is characterized by the loss of dentine due to dentinoclast cell activity.¹³⁻¹⁴ In the pulpal inflammation, the blood supply carry the dentinoclastic cells into the pulp chamber and the root resorption starts by two phases (e.g. injury and stimulation).¹⁵⁻¹⁶ In the injury phase, although the non-mineralized tissues covering the internal surface of the root canal, the predentin and the odontoblasts layer are affected but the pulpal side of the dentin is still covered by odontoblasts and predentin. Previous studies have indicated that internal resorption proceeded mainly due to chronic inflammation in the pulp, loss of/or damage to the odontoblasts and the predentin.¹⁷⁻¹⁸ Furthermore, the invasion of macrophage into the pulp also responsible for internal root resorption. In the advance cases, the pulp tissue apical to the resorptive lesion undergoes necrosis and the bacteria infect the entire root canal system resulting in acute or chronic apical periodontitis followed by formation of sinus tract with suppuration in the periapical tissue or possibly at the site of perforation of the root canal wall caused by the hard tissue destruction.¹⁹⁻²⁰

Discussion on treatment method

Dr. Kawsar: Root canal treatment still remains the treatment of choice of internal root resorption because it removes the granulation tissue and blood supply of the odontoclastic cells.²¹⁻²² In case of internal root resorption, the treatment is complex because it is associated with profuse bleeding from the granulation tissues and impaired visibility of operator. This can be treated by using an intracanal antibacterial medicament to reduce the microbial load from the root canal system or by improving the disinfection of the system. In the present case, copious irrigation of the canal with normal saline, low concentration 1% sodium hypochlorite was

used for 5 min followed by 2% chlorhexidine for 30 sec as suggested by some of the previous studies.²³⁻²⁴ Calcium hydroxide also used as an intracanal medicament and a favorable result was achieved in the present and previous studies.²⁵⁻²⁶

Repair with mineral trioxide aggregate

Dr. Hossain: In the case when resorptive defect was seen on the apical part of the root canal with perforation of the root, this can be repaired by mineral trioxide aggregate because it is biocompatible, has superior sealing ability, induces osteogenesis and cementogenesis as well as well tolerated in the periapical tissue.²⁷⁻²⁹ Furthermore, when used as a root end filling material in the absence of infection, it also helps to regeneration of the periodontium. Previous studies have reported that the perforating resorptive defects could be successfully sealed by mineral trioxide aggregate.³⁰⁻³¹

Surgical approach to treat perforating internal root resorption

Dr. Abdin: Surgical approach is needed when it is not possible to get access to the lesion through the canal. Therefore, it can be performed in a second step before taking a decision for apicectomy or extraction. In the present case, as the shape of the root canal was favorable, surgical approach was avoided. However, when there is significant tissue damage caused by the resorptive process, surgical treatment could be the treatment of choice.³²⁻³³

Follow-up

Dr. Kawsar: The prognosis was good after 12 months with no symptoms. Follow-up radiograph after one year showed periapical healing of the lateral incisor.

Dr. Sharmin Mahmud (MS Resident): How can the internal root resorption be detected?

Dr. Kawsar: Internal resorption can be detected by visual examination (e.g. changed color in the tooth crown), radiographic diagnosis, conventional and cone beam computed tomography, light microscopy and electron microscopy.^{25,34} Radiographically, it appears as a round-to-oval radiolucency with uniform density and symmetrical enlargement of the pulp space. The margins are smooth and clearly defined with distortion of the original root canal outline and the original canal shape is lost at the site of resorption.³⁵ Occasionally, it may appear as oval and asymmetrical shapes. However, as the conventional X-ray sometime fails to detect resorption at an early stage, cone beam computerized tomography has been recommended for accurate diagnosis.^{25,34} The position, extent, dimensions of an internal root resorption can be obtained with cone beam computerized tomography.

Dr. Md. Asaduszaman (MS Resident): What are the common reasons of internal resorption?

Dr. Kawsar: The exact cause of the damage is still unknown. The various etiological factors suggested for internal root resorption include traumatic injury; infection, orthodontic treatment, a cracked tooth, tooth transplantation, restorative procedures and invagination.³⁶⁻³⁷

Dr. Tanima Nusrat Jabeen (FCPS trainee): What are the common clinical features and how can it be identified clinically?

Dr. Kawsar: Most teeth with internal root resorption are symptom free and are first clinically recognized through routine radiographs, however, it may include the presence of a reddish area – pink spot, which represents the granulation tissue showing through the resorbed area.³⁸⁻³⁹ Most patients complain of only mild or no pain, perforation is often accompanied by sinus tract formation and swelling. Once necrosis of the pulpal tissue takes place, then the typical signs and symptoms of an abscess occur.⁴⁰

Dr. Chowdhury Afrina Parvin (MS Resident): How does internal resorption occur?

Dr. Kawsar: Resorption occurs in two stages: Degradation of the inorganic mineral structure followed by disintegration of the organic matrix. Internal inflammatory resorption involves progressive loss of dentin, whereas root canal replacement resorption involves subsequent deposition of hard tissue that resembles bone or cementum but not dentin. Internal inflammatory resorption can be perforating or non-perforating root resorption.¹⁷

Dr. Tahmida Hoque (MS Resident): Would you please tell about the material used for this treatment?

Dr. Kawsar: Various materials available for the treatment of internal root resorption include MTA, glass ionomer cement, Super EBA, hydrophilic plastic polymer (2-hydroxyethyl methacrylate with barium salts), zinc oxide eugenol and zinc acetate cement, amalgam alloy, composite resin and thermoplasticized gutta-percha administered either by injection or condensation techniques. However, prognosis of the tooth can be influenced by the biomaterial employed for the treatment. Mineral trioxide aggregate is most commonly used because of its biocompatibility, sealing ability and potential induction of osteogenesis and cementogenesis followed by thermoplasticized gutta-percha obturation techniques.²⁷⁻²⁹

Dr. Tanvirul Islam Wali (MS Resident): What is the prognosis of tooth with internal root resorption?

Dr. Kawsar: The prognosis of treating internal tooth resorption depends on the clinical experience, the structure of the remaining tooth, and the extent and the size of the perforation, its location, and possibi-

lity of repair. With proper treatment and use of modern endodontic techniques and materials, the treatment outcome of internal tooth resorption is expected to be good.

Dr. Khondoker Rumon (MS Resident): What is the common sequel of the case?

Dr. Kawsar: Perforating internal resorption may complicate the prognosis of endodontic treatment due to weakening of the remaining dental structure and possible periodontal involvement.

Final Diagnosis

Previously initiated therapy with chronic apical abscess with perforating internal root resorption

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