Case Report:

Surgical repair of root perforation: a case report

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Abstract

Root perforation is a significant complication during root canal treatment. Root perforation can result in loss of integrity of the root structure and severe periodontal and bone defect. Perforations are regarded as serious complications in dental practice and pose a number of diagnostic and management problems. However, when teeth are of strategic importance perforation repair is clearly indicated if possible. It may occur at any level in the pulp chamber or along the length of the root canal. The main complication that arises from perforation is the potential for secondary inflammatory periodontal involvement and loss of attachment, eventually causing tooth loss .This case report presents surgical repair of maxillary central incisor using mineral trioxide aggregate(MTA).

Keywords : Root perforation, Maxillary central incisor, Mineral trioxide aggregate(MTA)

Introduction

Traditionally, the presence of radicular perforations has been both difficult to determine and manage. Perforations occur primarily because of three possible reasons: 1) Procedural errors during root canal treatment 2) Post-space preparation 3) Resorptive processes and Caries. Most perforations result from procedural errors. Errors leading to these defects include bur perforation during access opening or during the search for canal orifices, excessive removal of dentine in the danger zone, either with hand or rotary instruments, misdirected files during canal negotiation, unsuccessful attempts at bypassing separated instruments and misaligned instruments during post-space preparation(1). Different materials have been used for perforation repair, including amalgam, IRM, Super EBA, Cavit, gutta-percha, glass ionomer, resin-ionomer, new generation dentin-enamel bonding systems, and composites; but none of them fulfill the criteria of an ideal repair material that include sealing ability, biocompatibility, and ability to induce osteogenesis and cementogenesis (2)

Mineral trioxide aggregate [MTA] is a widely known material that was originally proposed to repair perforations; however, it gradually gained a variety of clinical applications such as root end filling , pulp capping in primary and permanent teeth, apical barrier for immature permanent teeth, and repair of tooth resorption . MTA has also shown strengthening effect on dentinal wall of immature roots and was also proposed as a suitable coronal barrier material. (2,3,4)

Case report

A 21 year old female patient reported in the Department of conservative dentistry and endodontics, Govt Dental College and Hospital,

Ahmedabad with chief complaint of spontaneous pain in right upper central incisor. Patient had undergone root canal treatment before 6 months.The patient's medical history was non-contributory. On clinical examination, the upper right central incisor was sensitive to percussion; however,on probing with williiam's probe,probing depth was within normal range.On clinical examination of tooth there was gutta percha cones seen perforating labial surface of root. Obturating material was clearly seen underneath labial mucosa.(figure-1).Radiographic evaluation revealed over obturation of the tooth.(figure-2)

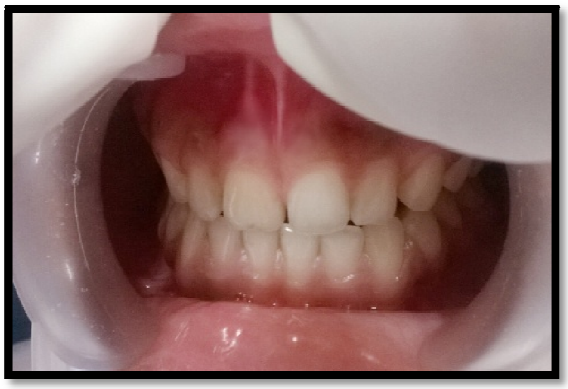

Figure-1

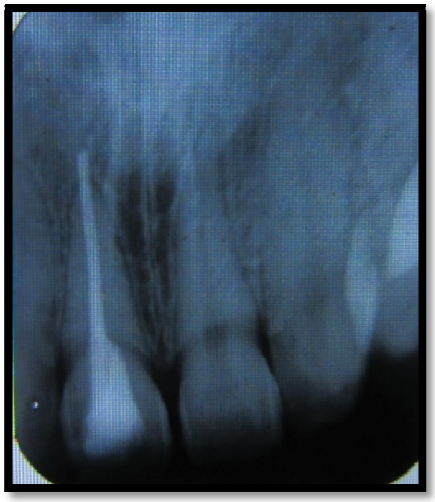

Figure-2

Endodontic re treatment was planned. Re treatment initiated under rubber dam isolation. Gutta percha solvent RC solve(prime dental) and H-files used to retrieve gutta percha from the canal following which the canal was modified using F3 protaper system (DentsplyMaillefer, Ballaigues, Switzerland).The canal was copiously irrigated with normal saline and 2% chlorhexidine. Sodium hypochlorite was avoided as it could percolate through perforation in to the periodontium.Tooth was temporarily restored using IRM (DentsplyMaillefer, Ballaigues, Switzerland).

In the next appointment periodontal surgery was performed under local anesthesia.Infra orbital nerve block and labial infiltration was given using 2% lignocaine hydrochloride with adrenaline(1:80000). Full thickness mucoperiosteal flap reflected involving four anterior teeth. Anterior releasing incision was given. During flap reflection root perforation could be visualized 2 mm apical to the crestal margin. (figure-3)

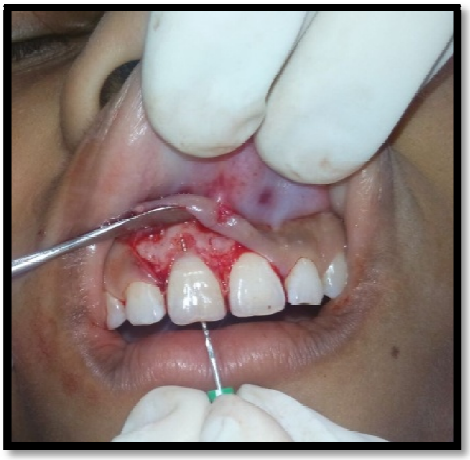

Figure-3

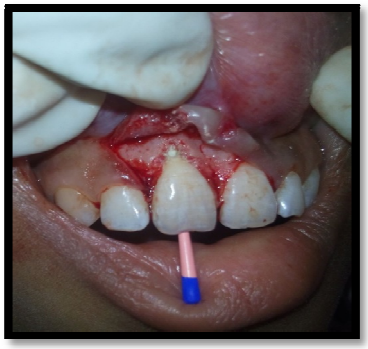

Figure-4

A gauze soaked with epinephrine was used to control hemorrhage which allowed visualization of the perforation.Canal was packed with F3 Protaper gutta percha cone (Dentsply Maillefer, Ballaigues, Switzerland) , so that perforation could be easily sealed with MTA. Perforation was sealed using MTA Plus (Prevest Denpro limited)(figure-4).A wet cotton pellet was placed in canal space for setting of MTA.After sealing of perforation flap was adapted well and sutured with two interrupted silk suture.patient was recalled after 5 days for suture removal then canal was obturated with corresponding gutta percha cones using AH-Plus sealer.Tooth was coronally restored with GIC.(figure-5)

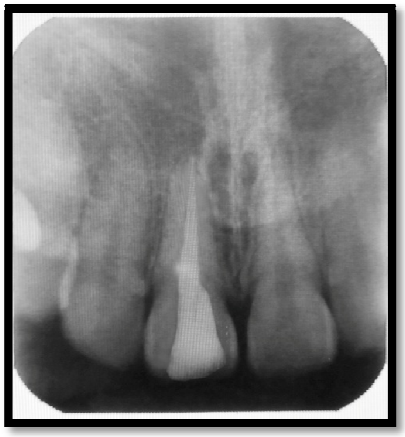

Figure-5

Patient was recalled after 3 months. Patient found to be asymptomatic. Non vital bleaching was done on the same tooth using walking bleach method. (figure-6)

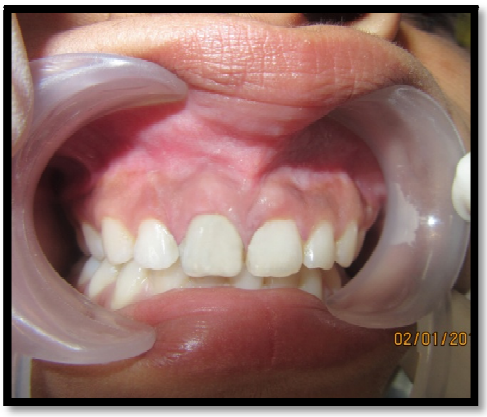

Figure-6

Discussion

The aim of surgical perforation repair is to produce an environment conducive to the regeneration of the periodontium. Periodontal tissue reactions to experimentally induced perforations in animals. and accidental perforations in humans. have been studied. Successful regeneration of the periodontal tissue will return the tooth to an asymptomatic functioning unit of the dentition.(8,9)

Different materials have been used for perforation repair, including amalgam, IRM, Super EBA, Cavit, gutta-percha, glass ionomer, resin-ionomer, new generation dentin-enamel bonding systems, and composites; but none of them fulfill the criteria of an ideal repair material that include sealing ability, biocompatibility, and ability to induce osteogenesis and cementogenesis.(10) Among the various materials used for perforation repair, MTA has been applied with good treatment outcomes owing to its properties of bio compatibility, low provocation of inflammation, good seal even in presence of moisture/blood and a high pH(12.5) which promotes

growth of cementum and regeneration of peridontal ligament.

Mineral trioxide aggregate is well known biocompatible material that induces cementogenesis around the perforation sites(11). It has been used successfully to repair the perforations in different clinical situations. Because of hydrophilic nature of MTA, moisture is required for complete setting of the material. However, some studies have proposed that the moisture from the tissue side is often enough for proper setting of MTA without the need for additional moisture from within the canal. We used a wet cotton pellet for 48 h to assure proper setting of MTA. MTA is primarily composed of tricalcium silicate, tricalcium aluminate, tricalcium oxide, and silicate oxide that upon hydration, forms a colloidal gel that solidifies in approximately 3h. MTA has shown many favorable properties including a good sealing, biocompatibility, antibacterial effect, radiopacity, and ability to set in the presence of blood. In vitro perforations repaired with MTA show significantly less leakage when compared with amalgam, IRM, ZOE, and Super EBA. Its ability to induce osteogenesis and cementogenesis make MTA a suitable material for the treatment of root perforations (12)

Conclusion

This case report presents a favorable clinical outcome in perforation repair with MTA. From the endodontic perspective, complications were successfully resolved due to the effective sealing of the perforation. From the periodontal perspective, the attachment apparatus has regenerated to establish periodontal health. So the prognosis for this tooth treated with MTA using the described procedure is considered to be good, but further follow ups are required.

References

1.Fuss Z, Trope M. Root perforations: classification and treatment choices based on prognostic factors. Endod Dent Traumatol. 1996;12(6):255–64.

2. Bryan EB, Woollard G, Mitchell WC. Nonsurgical repair of furcal perforations: a literature review. Gen Dent. 1999;47(3):274–8. quiz 9-80.

3.Torabinejad M, Chivian N. Clinical applications of mineral trioxide aggregate. J Endod. 1999;25(3):197–205.

4. Parirokh M, Torabinejad M. Mineral trioxide aggregate: a comprehensive literature review--Part III: Clinical applications, drawbacks, and mechanism of action. J Endod. 2010;36(3):400–13. doi: 10.1016/j.joen.2009.09.009.

5. Torabinejad M, Parirokh M. Mineral trioxide aggregate: a comprehensive literature review--part II: leakage and biocompatibility investigations. J Endod. 2010;36(2):190–202. doi: 10.1016/j.joen.2009.09.010.

6. Parirokh M, Torabinejad M. Mineral trioxide aggregate: a comprehensive literature review--Part I: chemical, physical, and antibacterial properties. J Endod. 2010;36(1):16–27. doi: 10.1016/j.joen.2009.09.006.

7. Main C, Mirzayan N, Shabahang S, Torabinejad M. Repair of root perforations using mineral trioxide aggregate: a long-term study. J Endod. 2004;30(2):80–3. doi: 10.1097/00004770-200402000-00004.

8. Asgary S, Eghbal M, Parirokh M, Torabzadeh H. Sealing Ability of Three Commercial Mineral Trioxide Aggregates and an Experimental Root-End Filling Material. Iran Endod J. 2006;1(3):101–5.

9. Menezes R, da Silva Neto UX, Carneiro E, Letra A, Bramante CM, Bernadinelli N. MTA repair of a supracrestal perforation: a case report. J Endod. 2005;31(3):212–4.

10. Yildirim G, Dalci K. Treatment of lateral root perforation with mineral trioxide aggregate: a case report. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2006;102(5):e55–8. doi: 10.1016/j.tripleo.2006.04.001.

11. Koh ET, McDonald F, Pitt Ford TR, Torabinejad M. Cellular response to Mineral Trioxide Aggregate. J Endod. 1998;24(8):543–7.

12. Torabinejad M, Hong CU, McDonald F, Pitt Ford TR. Physical and chemical properties of a new root-end filling material. J Endod. 1995;21(7):349–53.