NON SURGICAL AND SURGICAL APPROACH FOR MID ROOT PERFORATION REPAIR USING MINERAL TRIOXIDE AGGREGATE: A CASE REPORT OF TWO CASES

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ABSTRACT: Root perforation repair has historically been an unpredictable treatment modality with an unacceptably high rate of clinical failures. Inadequacy of the repair materials has been a contributing factor to the poor outcome of repair procedures. Mineral trioxide aggregate (MTA) is one of the materials that is being used successfully to repair perforations. Repair may be instituted in one of two ways, either non-surgically by approaching the defect internally through the tooth or surgically by using an external approach through the periradicular tissues. This article reports two cases of mid root perforation where MTA material was successfully utilized via nonsurgical or surgical approach.

KEY WORDS: Root perforation, Mineral trioxide aggregate, Periradicular tissues.

INTRODUCTION: Root perforations are undesired complications of endodontic treatment which result in loss of integrity of the root and further destruction of the adjacent periodontal tissues. Such perforations are managed surgically or nonsurgically, depending on the particular characteristics of the case. Various materials have been used in managing perforations, including zinc oxide–eugenol, amalgam, calcium hydroxide, composite resin, glass ionomer and resin-modified glass ionomer. The ideal material -for treating radicular perforations should be nontoxic, nonabsorbable, radiopaque, and bacteriostatic or bactericidal; it should also provide a seal against microleakage from the perforation.

MTA over other restorative materials has been considered as a material of choice for repairing root perforations, as it has not only shown biocompatibility[1] to the surrounding periradicular tissue but also has demonstrated the ability to allow regeneration of hard tissue like cementum, thus facilitating the regeneration of periodontal apparatus[1]. The prognosis of repair depends on the location, size and time of contamination of the lesion[2]. More apical the perforation, better the prognosis.

CASE REPORT: Case I repair via nonsurgical approach: A 26 year old female presented with the chief complain of pain in her upper right posterior tooth region. Her maxillary right second premolar had a large open cavity. Clinically the tooth was open and tender on percussion. Her dental history revealed that the tooth had been treated by a general dentist 6 months earlier. Patient was carrying a radiograph (fig.1) revealing file passing through mid root area suggesting root perforation. Radiograph also revealed incomplete obturation. On placing the file inside the canals, a sudden occurrence of haemorrhage in the canals was noted and file passed through mid root area confirming perforation.

Retreatment and management of perforation was planned. Previous gutta percha was removed from the canals by using H-file and gutta purcha solvent. Working length was confirmed by radiograph and canals were irrigated and canals were prepared to the no.30# k file. Calcium hydroxide dressing was placed in canals and pulp chamber and access cavity was sealed with cavity. Patient was recalled after 1 week. At the next appointment cavity and calcium hydroxide dressing was removed. Cut gutta purcha of larger size was placed in canal to prevent its inadvertent blockage with sealing material. Perforation site was accessed through the canal via nonsurgical approach. MTA was mixed on glass slab according to manufacturer instructions and was placed over perforation area and was condensed in place (fig.2). Damp cotton was placed over it and access was sealed with cavity. After 24 hours, setting of MTA was confirmed by gently running the probe over its surface. Later on obturation and post endodontic restoration was done (fig.3). Case was clinically and radiographically evaluated during recall visits, after one week, three months and six months (fig.4). Patient showed no sign and symptoms during the recall visits.

Case II repair via surgical approach: A 35 yr old female patient reported with a chief complaint of pain and intermittent pus discharge in upper front region of jaw for past 8 months. Patient gave a history of root canal treatment before 4 yrs. On clinical examination, intraoral sinus opening was present in relation to maxillary right central incisor. IOPA revealed gutta percha extruding through the mid root region, indicative of the mid root perforation (fig 5). Perforation site was approached surgically and sealed with MTA (Fig 6).

DISCUSSION: Successful treatment of perforations depends mainly on the immediate sealing of the perforation and prevention of infection[2]. Factors such as time elapsed since the perforation has occurred, size of the perforation as well as the repair material is important for a better prognosis following perforation [2].

In the past years, amalgam, composite resin, and glass ionomer cements have been used for sealing furcal perforation. However, studies have shown that MTA is apparently superior to these materials with respect to marginal adaptation, bacterial leakage and cytotoxicity. MTA has been regarded as an ideal material for perforation repair[3] because of its excellent sealing ability and biocompatibility[4]. MTA experimentally showed better sealing ability than other materials such as amalgam, zinc oxide-eugenol cement, resin-modified glass ionomer cements, using different leakage approaches, fluid filtration technique, dye-leakage model, bacterial leakage model and dye-extraction leakage method. Microscopic examinations of periodontal tissues after perforations in the furcal area and subsequent sealing with MTA have demonstrated repair of the periodontium and new cementum formation over the material[5]. The repair capacity of MTA can in turn be attributed to the antimicrobial properties and high pH (12.5) of MTA.

Another important factor is the locations of perforation site as more apical the perforation, better the prognosis and more coronal the perforation, lesser the prognosis[2]. This is due to the fact that perforation of the crown or root causes an inflammatory process which causes break down of the periodontium which may extend to the gingival sulcus, producing a deep and un-manageable periodontal defect, the chances of which is higher when the perforation is coronal as compared to one that is apical.

Tooth was irrigated with sodium hypochlorite to make perforation site free from hemorrhage and contamination. Pitt Ford et al[6] reported good response in which repair with MTA

can likely be attributed to the effective use of hypochlorite irrigation. To prevent overfilling or underfilling, a resorbable collagen matrix calcium phosphate can be applied before placing the MTA[7].

However, the use of matrix depends on the size of the lesion. However, Arens and Torabinejad concluded in their study that MTA does not need a barrier. As well as contact with adjacent tissues may increase the sealant capacity of MTA, since an acidic environment (such as tissue) may increase this property[8]. In the cases presented here, matrix was not used before placing MTA as perforation was small with low risk of filling material extrusion. However, slight extrusion of the MTA was observed, which was later replaced by hard tissue deposition.

CONCLUSION: Perforations are inadvertent errors that may occur during endodontic therapy and adversely affect the prognosis of the tooth. Based on the success of cases done, MTA provides an effective seal of root perforation and shows permissible results in improving the prognosis of perforated teeth that would otherwise be compromised.

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CASE 1: PERFORATION REPAIR WITH MTA (UPPER RIGHT SECOND PREMOLAR)

Fig.1: Preoperative radiograph revealing perforation

Fig. 2: Sealing of perforation with MTA

Fig.3: Post Obturation Radiograph

Fig. 4: Six months follow up radiograph

CASE 2: SURGICAL APPROACH

Fig. 5: Preoperative radiograph showing gutta percha extrusion

Fig. 6: Postoperative radiograph showing MTA in place

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