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PERFORATION REPAIR USING MINERAL TRIOXIDE AGGREGATE – CASE REPORT

Dental Science

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ABSTRACT

Root perforations affect the prognosis of teeth. Inadequacy of the repair materials has been a contributing factor to the poor outcome of repair procedures. Mineral trioxide aggregate (MTA) is a new material that is being successfully used to repair perforations. The purpose of this study was to evaluate the success rate of root perforation repair using MTA. Pre-treatment and post treatment and at least 1 year follow-up radiographs were evaluated to determine the presence or absence of any pathologic changes adjacent to the perforation site. The result showed normal tissue architecture adjacent to the repair site at the recall visit. Teeth with existing lesions showed resolution of the lesion. Based on the result of this study, MTA provides an effective seal of root perforations and improve the prognosis of perforated teeth that would otherwise be compromised.

KEYWORDS

Root perforations, MTA, Repair, Root canal treatment

INTRODUCTION:

The principle compounds present in MTA are several mineral oxides that are responsible for the chemical and physical properties of this material.[1] MTA is a mineral powder that consists of hydrophilic particles, whose principal components are tricalcium silicate, tricalcium aluminate, tricalcium oxide, and other mineral oxides. It has a pH of 12.5 and sets in the presence of moisture in approximately 4 hours.[2] Several studies have demonstrated that its excellent sealing ability and biocompatibility.

Perforation of the pulpal floor in a multirooted tooth results in inflammatory reaction of the peridontium that can lead to irreversible attachment loss and possible demise of tooth. Furcal perforation may be the consequence of procedural error or a pathologic process such as caries and root resorption. According to Washington study, root perforations result in endodontic failures accounting for approximately 10% of all failed cases. The etiology and location of the perforation as well as the size and the time delay before perforation repair are significant factors for the prognosis and treatment planning. A good prognosis can be expected in case of fresh, small, coronal, and apical perforation. When left untreated, perforations in the cervical third of the root or the floor of pulp chamber have the worst prognosis. The prognosis for a tooth with a perforation depends on the location of the perforation, how long the perforation is exposed to contamination and feasibility of sealing the perforation.[3] Seltzer concluded that damage to periodontium always occurred, but was minimized when the perforation was sealed immediately. Unsealed perforations are exposed to microorganisms and other contaminants, resulting in downward epithelial migration and destruction of the underlying bone. Numerous materials have been recommended for the repair of the perforation defect including gutta-percha, amalgam, Indium foil, calcium hydroxide, tricalcium phosphate, Cavit and zinc oxide. However, none of these materials were able to successfully repair these perforation defects. Recently Mineral Trioxide Aggregate has been advocated as perforation repair material. Using different leakage approaches, fluid filtration technique, dye-leakage model, bacterial leakage model, and dye-extraction leakage method, mineral trioxide aggregate (MTA) experimentally showed better sealing ability than other materials. The use of biocompatible materials to repair perforations might be advocated to reduce the incidence of inflammatory reactions in the surrounding tissues. When MTA was used to seal intentional furcal perforations in dog teeth, cementum was formed over the MTA; furthermore, there was no inflammatory cells infiltrate. Ideally, the repair material should be nontoxic, biocompatible and bacteriostatic, promote healing, and provide an optimal hermetic seal.[4]

CASE REPORT

A 45 year old male patient reported to the Department of Dentistry Pt. J.L.N.G.M.C.H Chamba with the chief complaint of spontaneous pain in his permanent mandibular left second molar. He also reported that another dentist had treated the tooth due to a carious lesion 2 weeks before this visit. Clinical and radiographic examination showed that there was perforation defect in furcation area with respect to mandibular second molar. (Fig.1)

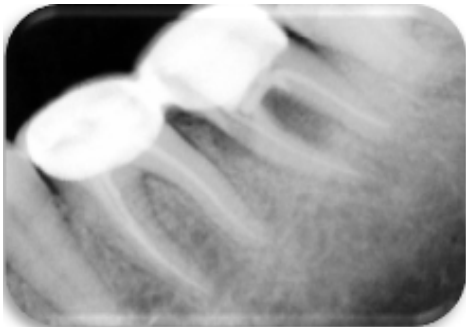

Fig.1. Preoperative radiograph showed presence of radiolucency associated with furcation area.

The situation was addressed with patient. Risks, benefits, and alternatives were discussed with the patient. It was agreed that although the prognosis was less than ideal, an attempt would be made to repair the iatrogenic defect. The crown of the patient was removed and thorough irrigation of perforation sight was done using saline. At this point, bleeding from a perforation was noted, which was also carefully controlled using pressure packs. For the sealing of this perforation site MTA was chosen as the filling material. MTA was mixed with sterile water into a paste consistency and applied into the perforation and pulp chamber with dentsply activator. The tooth then was restored with GIC.

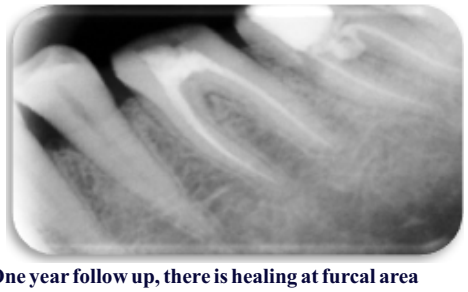

Fig.2.One year follow up, there is healing at furcal area

At the second appointment, after one week, no pain or discomfort was reported. The patient was recalled after every three months. After one year follow up tooth was asymptomatic. Radiographically, the radiolucent image had disappeared and bone formation at the furcation area had been observed (Fig.2) suggesting the healing of the underlying periodontal tissues.

DISCUSSION:

Furcal perforations adversely affect the prognosis of teeth. Management of these iatrogenic accidents can pose a significant clinical challenge. The sequence of events of furcal perforation are as

follows- perforation lead to damage of periradicular tissue leading to inflammation and formation of granulation tissues, It may further lead to bone destruction, destruction of periodontal fibres, proliferation of epithelium and ultimately the development of periodontal pocket.[5] Surgical treatment of these root perforation may lead to periodontal attachment loss and bone defects. Repair of perforation should be attempted non-surgically through intra coronal approach as these have shown good results. The main technical difficulty encountered with perforation repair material using non- surgical approach is chance of extension into periodontal tissues. Chivian found minimal inflammation when MTA came in contact with surrounding periradicular tissues.[6] In this case the time between perforation and repair was 2 weeks. After application of MTA patient was recalled after one week. On clinical examination, no evidence of periodontal breakdown was observed, and tooth was not sensitive to percussion. Bleeding was also not observed from the perforation site. After 3 month recall formation of hard tissue was seen at the furcation area and radiographically periodontal ligament showed healing. Patient was again recalled after 1 year for follow-up. Radiographic follow-up at one year showed that the furcation area was sealed completely by the formation of hard tissue and periodontal area showed regeneration with absence of radiolucency. Mineral trioxide aggregate may be considered an alternative option for the repair of furcal perforation allowing adjacent periodontal tissue healing and prolonging the longevity of these dental elements.

Summary:
Root perforation may occur during preparation of endodontic access cavities or during post-space preparation. The perforation creates the potential for an inflammatory reaction in the periodontal ligament. MTA has the potential as a material for repair of furcal perforation.

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