CASE REPORT

Radiographic Evaluation of Furcal Perforation Repair Using e-MTA® in Primary Molars-90 Days Follow-up: A Case Report

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Abstract

Introduction: Iatrogenic furcation perforation is an unintended communication between the pulp chamber and the periodontal tissues that can occur during root canal therapy or while locating the root canal orifices. Management of these iatrogenic mishaps especially in primary teeth can be challenging. Recent advancements in the techniques and materials used to repair furcal perforations have improved the outlook for this procedure. Recently, mineral trioxide aggregate (MTA) has been used for several dental purposes. This biocompatible material promotes bone healing and the elimination of clinical symptoms.

Case description: The purpose of this case report is to describe the treatment of an iatrogenic furcal perforation using MTA in a primary first molar tooth of an 8-year-old boy patient who had reported a chief complaint of pain in the lower left back tooth region for the past 3 weeks. Clinical examination revealed carious lesions involving enamel, dentin, and pulp in relation to 84. Intra-oral periapical radiograph revealed well-defined radiolucency involving enamel dentin and pulp. The treatment plan was non-vital pulp therapy: Pulpectomy. Following the access cavity preparation, even after debridement and cleaning of pulp from the root canals, there was profuse bleeding in the access cavity. Furcal perforation was confirmed with a radiograph. The perforation site was sealed with MTA, followed by Metapex obturation. Follow-up visits at 90 days showed clinical and radiographic success of treatment.

Conclusion: Therefore, MTA may be considered an alternative option for the repair of furcal perforation in primary teeth, prolonging the longevity of these dental elements.

Keywords: Case report, Mineral trioxide aggregate, Perforation, Primary teeth, Pulpectomy.

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Introduction

Pulp therapy in primary teeth is an important procedure that can help to prevent pain and infection. It is a skill that is best performed by a pediatric dentist who has the experience and expertise to manage the behavioral and technical challenges of the procedure. Technically, pulp therapy in primary teeth can be challenging due to the small size of the teeth and the limited access to the pulp chamber. It is important to be careful not to damage the surrounding tissues.[1] Perforation is defined as "the mechanical or pathologic communication between root canal system and external tooth surface" in the American Association of Endodontists' glossary of endodontic words, while furcation perforation is defined as "A perforation in the furcal area of the tooth".[2]

Furcation perforation of the tooth can be caused by either iatrogenic or non-iatrogenic factors. Non-iatrogenic perforation is most commonly caused by an enormous carious lesion on the pulp chamber floor. This type of lesion can weaken the tooth structure and make it more likely to perforate. Other causes of non-iatrogenic perforation include internal or external pathologic resorption.[3] An iatrogenic perforation can occur when too much dentin is removed during access opening.[1] The sooner a furcation perforation is sealed, the better is the chances of success. Perforations that are not sealed immediately are more likely to lead to persistent periodontal infection and furcal bone loss.[4]

The ideal material for furcation perforation repair should be biocompatible, seal the perforation site, induce osteogenesis and cementogenesis, be easy to apply, be radiopaque, have bactericidal or bacteriostatic properties, and be affordable.[5] Many materials, including amalgam, calcium hydroxide, Cavit, zinc oxide and eugenol, tricalcium phosphate, hydroxyapatite, glass ionomer, super-EBA cement, and decalcified freeze-dried bone, and more, have been utilized to repair perforations. Other materials have been used in the past, but MTA has become the most popular choice due to its superior performance.[6]

This case study describes the effective treatment of an iatrogenic furcation hole related to primary 84, which was sealed and treated with mineral trioxide aggregate, along with the follow-up after 90 days.

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Case Description

An 8-year-old boy child reported to the department complaining of nighttime pain and lower left back tooth pain that had been bothering him for the last three weeks. A carious lesion involving pulp, dentin, and enamel was discovered during the clinical examination in relation to 84. A clearly defined radiolucency involving pulp, dentin, and enamel was seen on the intraoral periapical radiograph. The treatment plan was non-vital pulp therapy: Pulpectomy. The armamentarium required for this procedure is depicted in the Figure 1. Following the access cavity preparation done using BR-45 (Mani, JAPAN).

Debridement, canal irrigation, Metapex obturation, and stainless-steel crown implantation were all part of the treatment plan. An inferior alveolar nerve block was administered with 1/100,000 epinephrine and 2% lidocaine. In order to determine the working length of the canals, initial files (#15 K file for the mesial canal and #20 K file for the distal canals) were introduced. Radiographically, an accurate working length was ensured (Fig. 2).

A radiograph taken with a 10-K file confirmed the furcal perforation, revealing a perforation in the middle one-third of the furcation area. Saline solution irrigation and filing were used to prepare the canal.

A cotton pellet soaked in 5.25% sodium hypochlorite was inserted into the access cavity and used to dry the canal as much as possible using paper points (for relative disinfection of the perforation site). Following the manufacturer's instructions, e-MTA® was combined and applied by an endodontic plugger to the perforation site (Fig. 3). After the canals were cleaned and shaped, Metapex® was used to fill them (Fig. 4). The literature contains a plethora of studies that demonstrate the effectiveness of MTA application and the prompt filling of root canals in a single visit.[7–11] Consequently, Metapex was used to fill root canals during the same session.

#3 3M® stainless-steel crown was inserted after the tooth was fully prepared for SS crown in order to guarantee coronal seal. To ensure proper adaptation and marginal fit, a radiograph

Fig. 1: Armamentarium

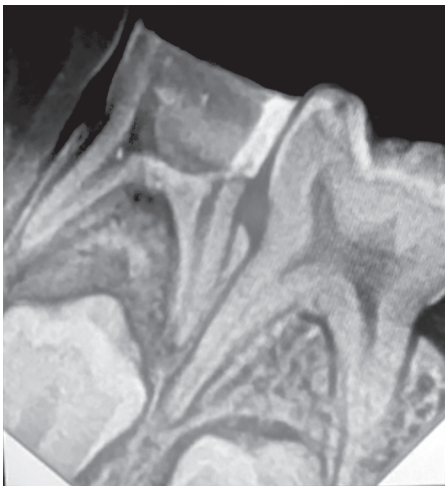

Fig. 3: MTA filling at perforation site

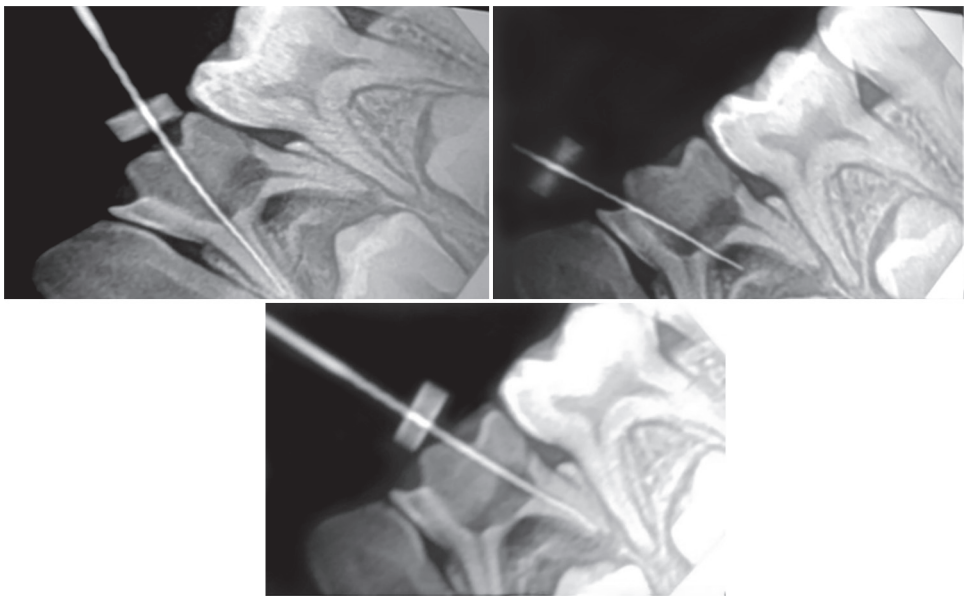

Fig. 2: IOPAR IRT 74

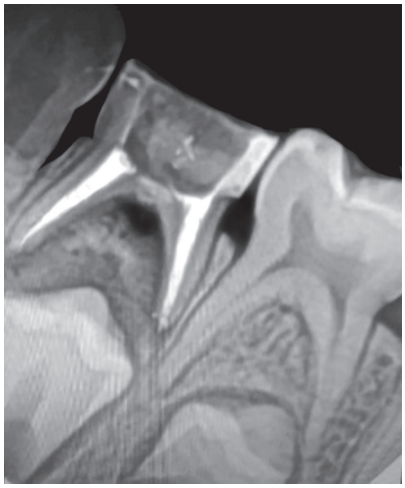

Fig. 4: Metapex obturation

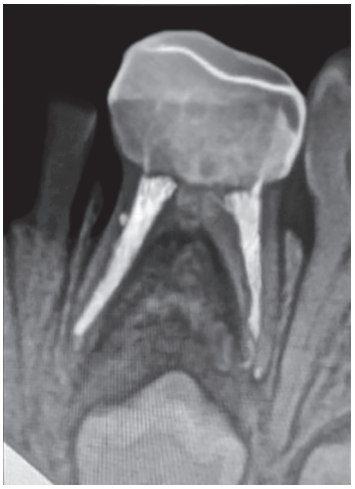

Fig. 5: SS crown cementation with 3 months follow-up

was taken before glass ionomer cement was used to cement the crown. When the patient returned a month later for a check-up, the corresponding tooth was assessed radiographically and clinically (Fig. 5).

No lesion was found in the tooth-supporting tissues (alveolar bone and PDL) after the perforation was repaired. Following-up was done every three months. All radiographs taken during follow-up appointments verified that the perforation site had been successfully repaired.

Discussion

The literature has regularly reported on the successful use of MTA to seal furcal perforations in primary and permanent teeth.[1,2,4,6,12,13] On the other hand, no research on primary tooth repair following lateral root perforation was discovered. The biocompatibility and efficacy of various materials for the repair of root perforations in permanent teeth have been investigated. In their investigation into the periodontium of dogs, Holland et al. documented a range of pulpal reactions that transpired 30 days subsequent to the periodontium's exposure to MTA. Nevertheless, 180 days later, the periodontium showed no symptoms of inflammation.[14] Mineral trioxide aggregate can perfectly seal root perforations because of its high biocompatibility.[1] The location, extent, and length of contamination (exposure to the oral cavity) determine the perforation's prognosis. The prognosis for our patient's lateral root perforation is better than that of furcal perforations because there is less chance of bacterial contamination of the area through the gingiva sulcus and PDL. In a case study, Oliviera et al. showed that furcal radiolucency vanished 20 months following MTA repair, demonstrating the formation of new bone and periodontal tissue healing. As a result, they suggested that MTA be used as the preferred material to fix furcal perforations in primary teeth and raise the teeth's survival rate.[12] In our case, it was impossible to determine the precise size of the perforation because there was no direct access to or view of the perforation site. However, we calculated the size of the perforation using radiography, and it came out to be about the same as the diameter of the tip of an endodontic file #35. Inflammation or bone loss around the MTA was not seen on the follow-up radiographs (Fig. 2).[15] While some researchers advise using a resorbable collagen matrix to stop MTA extrusion, others have used calcium hydroxide before applying MTA.[16] Al-Dafaas and Al-Nazhan observed mild to moderate chronic inflammation around the perforation site along with stratified squamous epithelial tissue after using calcium hydroxide to stop the extrusion of MTA.[15] Since we didn't use a matrix on our patient, some material inevitably extruded from the distal wall. A follow-up radiograph verified that there was no issue with this extrusion and that there was no evidence of bone loss or periodontal lesion. The process of repair is improved when the perforation site is sealed immediately because it reduces the possibility of bacterial contamination. According to Holland et al., the results of lateral root perforations sealed with MTA following bacterial contamination were worse than those of perforations sealed right away.[14] As soon as a definitive diagnosis of perforation was made in our patient, MTA was used to repair the site, lowering the possibility of contamination.

Conclusion

At the 3-month follow-up, the primary mandibular first molar of our patient, who had a root perforation repaired with MTA, showed positive radiographic and clinical results.

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