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Clinical Evaluation Of Furcal Perforation Repair In Human Teeth: A Case Report

Ruchi Gupta[1], Anil K Tomer[2], Jaswanth.J.S.[3]
Professor, Dept of Conservative Dentistry and Endodontics, Divya Jyoti College of Dental Sciences and Research, Modinagar, Ghaziabad
Professor and Head, Dept of Conservative Dentistry and Endodontics, Divya Jyoti College of Dental Sciences and Research, Modinagar, Ghaziabad
PG Student, Dept of Conservative Dentistry and Endodontics, Divya Jyoti College of Dental Sciences and Research, Modinagar, Ghaziabad

Abstract
A perforation is a mechanical or pathologic communication between the external tooth surface and the root canal system which may be a result of pathologic factors such as caries or resorption as well as iatrogenic factors. Accidental perforations of the pulpal floor are a common endodontic mishap that might have a negative impact on the treatment outcome. Factors determining the prognosis include size and location of the defect, time, duration of exposure to contamination, the material used to repair it, the possibility of sealing the perforation and the accessibility to the main canal. This case report is an attempt to repair a furcal perforation in human teeth.
Key words: *Perforation, Furcal, Repair, Pain, Asthetic, Endodontic treatment.*

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I. Introduction

A perforation is a mechanical or pathologic communication between the external tooth surface and the root canal system which may be a result of pathologic factors such as caries or resorption as well as iatrogenic factors. In multi-rooted teeth, periodontitis and irreversible attachment loss can result from furcal perforations of the pulpal floor.

Accidental perforations of the pulpal floor are a common endodontic mishap that might have a negative impact on the treatment outcome. In these cases, the prognosis is affected by a number of factors, including the location, size and time of perforation.[1] In multi-rooted teeth where the furcation is perforated, the prognosis differs according to the factors described for single-rooted teeth. Accidental root perforations do occur in approximately 2–12% of endodontically treated teeth that might have serious implications. This perforation acts as an open channel encouraging bacterial entry either from root canal or periodontal tissues or both eliciting inflammatory response that results in fistulae including bone resorptive processes may follow. When perforation occurs laterally or in furcation area there might be over growth of gingival epithelium towards the perforation site worsening prognosis of the tooth. Sufficient data is available regarding the prognosis of a tooth with perforation defects. Factors determining the prognosis include size and location of the defect, time, duration of exposure to contamination, the material used to repair it, the possibility of sealing the perforation and the accessibility to the main canal.[2] Always small perforation apical to the crestal bone which is closed immediately will have a good prognosis. The ability of the material employed to seal the perforation is also an important factor that impacts the treatment prognosis.

II. Case Report

A patient came with the complaint of pain in lower right tooth region. On examination , there was caries. Before the start of the treatment, mouth rinse with 0.2% chlorhexidine rinse was carried out in order to control the oral microbial flora. After administering local anesthesia(lidocaine with 1:80000 adrenalin) and proper tooth isolation, the access cavity was made and then all canal orifices were located. The cavity and perforation site was copiously irrigated with normal saline. Then the canals were blocked with appropriate sized gutta percha points to avoid obstruction with perforation repair material. Furcation repair material MTA angelus was prepared according to manufactures instruction and placed into the cavity. In order to obtain a good marginal adaptation, the bulk of biomaterial was gently packed with a dry cotton pellet. After a few minutes required for initial setting of repair material, the gutta percha percha points were removed and the furcation area was covered with a moistened cotton pellet. After application of temporary restoration the patient was recalled. The second visit was a week later during which the patient was clinically evaluated. After all the signs/symptoms has subsided and the tooth underwent conventional non surgical root canal treatment. The working length was established and all four canals were mechanically shaped using and chemically cleaned by means of copious irrigation with 5.25% sodium hypochlorite and then normal saline. The root canals were filled with gutta percha points and root canal sealer using lateral condensation technique. The tooth was then restored with composite resin. On postoperative recall, the patient was asymptomatic.

III. Discussion

Various materials have been employed to seal furcal perforations in the past such as amalgam, reinforced zinc oxide eugenol, super EBA and calcium hydroxide. Glass ionomer cement, composite resins, MTA, biodentine, bioaggregate, platelet-rich fibrin (PRF), platelet-rich plasma (PRP) are used commonly currently. However, none of these materials possess all of the characteristics of an ideal repair material. An ideal perforation repair material should be biocompatible, dimensionally stable, nontoxic, noncarcinogenic and insoluble in bodily fluids. The material should also have the property to stimulate osteogenesis and cementogenesis and most importantly have excellent sealing ability.[3] Because of their excellent biocompatibility and ability to produce calcium-phosphate precipitation at the interface with periodontal tissue, calcium silicates have been the material of choice for sealing furcation perforations. MTA has been the most extensively used perforation repair material, since being first discovered by Torabinejad in 1993. It is biocompatible, has good marginal adaptation and has low cytotoxicity. MTA is a bioactive cement that can generate the ideal microenvironment for repair because of its tissue compatibility and antibacterial properties. It can stimulate the growth of periodontal ligament cells, osteoblast adhesion and bone regeneration due to its cementogenic and osteogenic capabilities. When in contact with tissues, MTA activates bone markers necessary for biomineralization and the healing of periapical bone defects while also stimulating immune system cells to generate lymphokines that promote cementum repair and regeneration. It, however, have a few disadvantages, which include the potential for discoloration, a long setting time (3 h), difficult handling and a higher cost. MTA-Angelus is a newer MTA formulation with a faster setting time (10 min). For the purpose of overcoming the limitations of MTA, new calcium silicate-based bioactive cement Biodentine was introduced in 2011. Biodentine (Septodont, Saint-Maurdes-Fosses, France) has been used as an alternate for MTA since it has similar qualities to MTA but with the additional advantage of a faster setting time and better handling. It has a modified powder constituent, setting accelerators and softeners, and is available as a new predosed capsule formulation that contributes to the improvement of the physical properties of biodentine. Biodentine has been found to induce the healing of furcation perforations when in contact with periradicular tissues because it created a biomineralizing microenvironment with a minimal inflammatory reaction.[4] Cell viability and tissue healing are both known to be promoted by MTA and Biodentine. These calcium silicate-based bioceramics can also promote regenerative responses in natural tissues, such as osteoinduction, which is similar to that of hydroxyapatite.[5] Therefore, the effectiveness and outcome of endodontic applications, such as pulp capping, root-end filling, perforation repair and pulp regeneration were intrinsically linked to the biocompatibility and bioactivity of these calcium silicate-based bioceramics. Incorporating light-curable resins has been proposed for many materials, such as the resin-modified glass-ionomer cement, to reduce their setting time as well as enhance their mechanical properties.[6] MTA incorporated with light-curable resin will have a shorter setting time, extending its therapeutic use and allowing it to be used in wet and blood-contaminated surgical sites. Light-cured MTA cement had lower solubility values as a result of its quick setting. Factor that is under the control of operator is the choice of material to be used that enhances treatment outcome.

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