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REPAIR OF IATROGENIC FURCAL PERFORATION USING BIODENTINE

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ABSTRACT

The present case report highlights the successful management of iatrogenic furcal perforation in left mandibular first molar of a 59-year-old male patient with Biodentine. The advent of recently introduced biomaterials in field of endodontics have led to predictable repair and improved prognosis of furcal perforations, which were earlier considered to be difficult to manage. Biodentine is a promising material for repair of furcation defects.

INTRODUCTION

The advent of recently introduced biomaterials in field of endodontics have led to predictable repair and improved prognosis of furcal perforations, which were earlier considered to be difficult to manage. The ideal material for repair of furcation should be antibacterial, radiopaque, non-cytotoxic, non-absorbable and biocompatible.[1,2] It should be able to induce formation of hard tissues over the site, particularly cementum.[2] Till date wide array of materials being used to repair furcal perforations include; Amalgam, GIC, Calcium hydroxide, gutta percha, Calcium Enriched Mixture, MTA, dentine chips and Biodentine.[3] All these materials have been used with or without artificial barrier or matrix.[4]

The etiology of root perforations can be pathological, i.e., secondary to resorption or caries, or iatrogenic that occurs during root canal treatment. An average 2%–12% of endodontically treated cases have reported accidental root perforations. [5] Perforations may also occur during access cavity preparation, post space preparation or as a result of pathological internal resorption extending into the peri-radicular tissues.[5] Fuss and Trope[6] suggested that fresh perforations of size smaller than #20 endodontic instrument, treated as soon as possible after first observation under aseptic conditions have good prognosis. On the other hand, old perforations and large perforations; previously not treated and is contaminated with bacteria; with a high amount of trauma to the tissue and difficulty in providing an optimum seal, have questionable prognosis. The Coronal perforation seen coronal to the level of crestal bone, and epithelial attachment with trauma to adjacent tissues are less and easy access possible have good prognosis whereas Crestal perforation – at the level of the epithelial attachment into the crestal bone, questionable prognosis.[5]

Biodentine is calcium silicate-based biomaterial that has polycarboxylate based hydro-soluble polymer system described as water-reducing agent to reduce the overall water content of the mix, along with $CaCl_2$ as setting accelerator. [7] Biodentine binds chemomechanically with tooth and composite. This has high compressive and flexural strength.

[7]

The present case report presents an account of successful repair of large iatrogenic furcal perforations of mandibular left first molar using Biodentine (Septodent, France).

CASE REPORT

A 59-year-old male patient was referred to the Department of Conservative Dentistry and Endodontics, from an unskilled trainee for the management of perforation in lower left mandibular molar (#36) that occurred during the root canal treatment procedure. At the time of reporting, the patient had dull pain in tooth #36. On intraoral examination, tooth showed large perforations on the lingual aspect of the floor of pulp chamber. The tooth had cervical abrasion, attrition and a calcified pulp chamber. The perforation occurred during an attempt of locating the mesio-lingual canal. No bleeding, periodontal pockets were observed on either side of the tooth. The radiographic examination, revealed the perforation site and excessive tooth structure loss with the remaining dentine thickness of <1mm (Figure 1a & 1b). After explaining the treatment plan and status of the tooth to the patient, a decision of non-surgical repair of furcal perforation using Biodentine (Septodont) was made and a written consent was taken.

TREATMENT PLAN

After administering 2% lignocaine with adrenaline, the perforation site was located, and hemorrhage from the perforation site was completely controlled. All the canals were negotiated, and coronal enlargement of the canal orifices was done. Working length was determined with electronic apex locator (EAL) (Root ZX) and confirmed radiographically. The canals were irrigated with 3% sodium hypochlorite and normal saline. EDTA gel (RC Help, Prime dent) was used for lubrication during instrumentation. The canals were instrumented using Protaper Gold (Dentsply) rotary files till F2. Canals were dried using paper points and were blocked using F2 Protaper gutta-percha cones (Figure 1c). Biodentine was mixed as suggested by the manufacturer and was delivered to the perforation site with an amalgam carrier (Figure 1d). A hand plugger was used condense the biodentine inside the defect with minimal pressure. Following this the canals were obturated using cold lateral compaction technique with F2 Protaper master cones and Sealapex sealer. After taking the postoperative radiograph, the patient was put on a scheduled follow-up (Figure 1e).

The second visit was a week later during which the patient was clinically evaluated. All the sign/symptoms had subsided and the tooth underwent conventional non-surgical root canal treatment.

The repair site was sealed using resin-modified glass-

ionomer cement (GC Fuji II), and the lingual wall was built up using composite resin (Z350 XT, 3M) (Figure 1e).

During the one year follow-up, the tooth remained functional and asymptomatic. Clinical examination showed that the tooth had no tenderness to percussion/palpation and the probing depth remained within normal level. Radiographic examination demonstrated adequate filling and sealing of the perforation site with normal periodontal apparatus (Figure 1f).

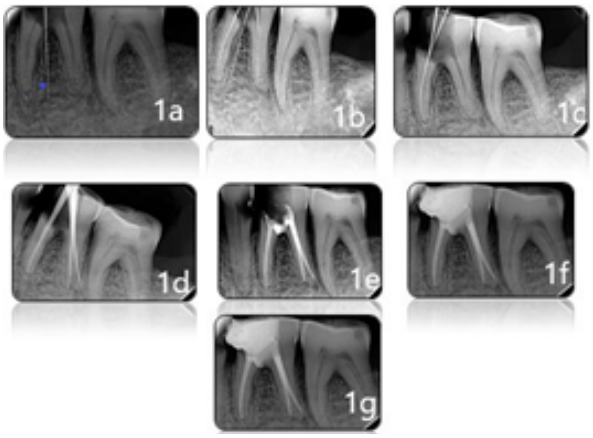

FIGURE 1a & 1b: IOPA of tooth #36 reveals furcal perforation.
FIGURE 1c: Negotiation of MB AND ML canal done.
FIGURE 1d: Blocking the canals with F2 master cones before repairing the defect.
FIGURE 1e: Repairing the perforation site with Biodentine plug.
FIGURE 1f: Coronal build-up with resin- modified GIC and resin composite done.
FIGURE 1g: Follow –up image at 1 year showing healthy periodontium in the furcation area.

DISCUSSION

Perforation is defined by the *American Association of Endodontics (AAE) Glossary of Endodontic Terms* (2003) as a mechanical or pathological communication between the root canal system and the external tooth surface, which is caused by caries, resorption, or iatrogenic factors. It has been identified as the second greatest cause of endodontic failure that accounts for 9.6% of all unsuccessful cases (Pitt Ford, et al., 1995). A furcation perforation has to be regarded as an endodontic and periodontal problem. The inflammatory response in the periodontium, leading to irreversible loss of periodontal attachment in the area, can result in loss of the tooth if the perforation is not successfully repaired.

A tightly sealed repair in the perforation site is the key to successful treatment as it disrupts path of microbial contamination and guards the periodontium apparatus for optimal healing. [2,8] It is stated that mineral trioxide aggregate is not only able to create a biocompatible barrier against which the repair material can be packed, but also it acts as a repair material itself that provides a physical seal when applied in perforation repair. [2,9]

In the present case, we used Biodentine as both the internal matrix and also the repair material, with favourable treatment outcome. Biodentine can induce the synthesis of a dentin-like matrix by human odontoblast-like cells in the form of mineralization nodules that have the molecular characteristics of dentine.[10] This material can also stimulate cell growth and induces Hydroxyapatites (HA) formation on the surface of the material when exposed to simulated body fluid. [11,12] HA have been shown to induce bone formation, growth, and maintenance at the bone material interface.

CONCLUSION

Biodentine ensures successful repair of furcal perforation defects.

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