

Management of Iatrogenic Lateral Root Perforation At The Alveolar Crestal Level Using Biodentine: A Case Report With 2 Year Follow Up

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Abstract : Iatrogenic root perforations are undesired endodontic mishaps. Root perforation results in the loss of integrity of the root and surrounding periodontal tissues which may lead to extraction of involved tooth. This case report illustrates the management of an iatrogenic lateral root perforation at crestal level of root of mandibular right central incisor using Biodentine with 2 year follow up. Correct diagnosis, immediate sealing and use of biocompatible material are the key to successful outcome of the treatment.

Keywords : biodentin, crestal perforation, iatrogenic, repair

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I. Introduction

Incidence of iatrogenic root perforation is reported to range from 2-12% [1]. Misaligned use of rotary burs during access opening, location of canal orifices and inappropriate post space preparation often leads to iatrogenic root perforation [1]. Perforations reduced the success of endodontic treatment to 54%- 56% and contribute to the extraction of 4.2% endodontically treated teeth [2,3]. Fuss and Trope classified the perforations into furcal and lateral type and further classified lateral perforation into coronal, crestal and apical perforation [4]. Fresh perforations, smaller in size, present at apical and coronal site are considered to have a better prognosis as compare to old perforations which are large in size and present at crestal site [4]. However recent material Biodentine (Septodont, Saint Maur des Fosses, France) is a tricalcium silicate based cement have recently gained much importance for repair of root perforation based on their superior biocompatible, sealing and handling properties. The present case report discusses the successful management of an iatrogenic perforation at crestal level of left mandibular central incisor using biodentine as a perforation repair material.

II. Case Report

A 40- year- old female with noncontributory medical history was referred by a general dental practitioner to the Department of Conservative Dentistry and Endodontics for opinion and management of the right mandibular central incisor. Previous dentist suspected an iatrogenic perforation in the tooth. Clinical examination under dental microscope revealed the communication of access cavity with periodontium i.r.t tooth #31 (Fig. 1A, 1B). Tooth was nonvital, tender on percussion and grade 2 mobile. Radiographical examination revealed coronal extension of the radiolucency from the crestal area along with periapical radiolucency (Fig. 1C). The radiograph taken with file communicating with the periodontium through the perforation confirmed the diagnosis of iatrogenic crestal root perforation. Patient was explained about the guarded prognosis of retaining the tooth by perforation repair with root canal treatment. Alternative treatment plans of extraction and implant or bridge was presented to the patient however the patient was decided for treatment directed at retaining and preserving her natural dentition. Written consent was obtained from the patient and treatment was started. Under the local anesthesia and rubber dam isolation root canal orifice was located and gutta-percha was placed within the canal to prevent canal blockage during perforation repair. While ensuring hemostasis, perforation was sealed with biodentine. It was mixed in a triturator and placed at the perforation site using micro apical placement system (Dentsply, Maillefer, Ballaigues, Switzerland) and radiograph was taken to confirm the repair (Fig. 1D). In the same appointment, following the setting of Biodentine, working length was determined and cleaning and shaping of the root canal was done with ProTaper Universal rotary files (Dentsply Maillefer, Ballaigues, Switzerland) up to F2 in a crown down manner. Copious irrigation was done with 3% Sodium Hypochlorite (Septodont, India) and 17% EDTA solution (Smear Clear, Sybronendo, Kerr, Italy). Root canal was dried and calcium hydroxide (Endocal, Septodont) was placed inside the root canal as intracanal medicament. Access cavity was temporized with Cavit (3 M ESPE Dental Products, St. Paul, MN, USA). After 1 week recall patient had no pain. The patient was put on periodic follow- up examinations. After 2 month

follow-up periodontal mobility was decreased to grade 1. At 6 month follow-up visit, the patient was symptom free with favorable healing of periradicular tissues; obturation was done with ProTaper F2 gutta-percha cone and AH plus sealer (Dentsply, DeTrey Konstanz, Germany) (Fig. 2C). Access cavity coronal restoration was done with light cure composite resin. Radiographic follow-up at 2 year revealed that the periapical radiolucency had disappeared and tooth had normal physiological mobility (Fig. 2D).

III. Discussion

Among the various prognostic factor studied by Fuss and Trope location of perforation has been attributed as one of the most important determinant of prognosis. They considered the area of the crestal bone and the epithelial attachment as a “critical zone.” Perforation present coronal and apical to crestal level have better prognosis since these perforation have intact coronal attachment apparatus and doesn't have periodontal involvement continuum with the oral cavity bacterial flora [4]. Clauder and Shin reported that down growth of epithelium and pocket formation decreases the success of endodontic outcome in case of crestal perforation [5]. In the present case, tooth had guarded prognosis with crestal perforation and grade 2 mobility but the patient was inclined for preserving and retaining the tooth so a decision for perforation repair with endodontic treatment was done. Diagnosis of perforation was made by clinical observation under magnification and radiographs. Additional methods of perforation diagnosis are observation of sudden bleeding and pain, use of paper point, electronic apex locator and Cone Beam Computerised Tomography [6-8]. Time elapsed between the perforation and repair is a significant prognostic determinant. In order to minimize the bacterial infection and periodontal damage once the perforation was diagnosed and located it was immediately sealed with biocompatible tricalcium silicate based cement of biodentine. An ideal perforation repair material should provide a tight seal at the perforation site. Various studies have been published where MTA was successfully used as a perforation repair material but MTA has certain disadvantages like long setting time, poor handling properties, high cost and discoloration of dental tissue [9-10]. Since crestal perforations are present in close proximity to epithelial attachment; a fast setting, biocompatible restorative material having the good sealing ability is recommended [4]. In the present case biodentine was used to repair the perforation as it doesn't discolor like MTA and has short setting time of 12 mins and have higher push-out bond strength at 24 hours as compared to MTA [11]. Owing to small particle size biodentine penetrates into dentin, forms tag like microstructure within tubules and provide hermetic seal. Because of fast setting of biodentine it was possible to undertake cleaning and shaping of canal in the same appointment. This property reduces the no. of visit and chances of bacterial contamination. Biodentine also increases the secretion of morphogen TGFβ1 which plays an important role in tissue healing by stimulating the angiogenesis, woven bone formation, differentiation of odontoblast like cells and proliferation of osteoblast & collagen [12]. Zhou et al. have reported that human gingival fibroblasts exhibited good attachment to the surfaces of biodentine [13]. This property of aiding favorable periodontal healing was observed in the follow up observations in our present case where the patient had healthy periodontium associated with the biodentine repaired surface. This has to be judiciously interpreted in the context that the nature of histologic attachment to the biodentine is debatable until further basic and clinical assessment establishes and validates the nature of attachment.

Figures

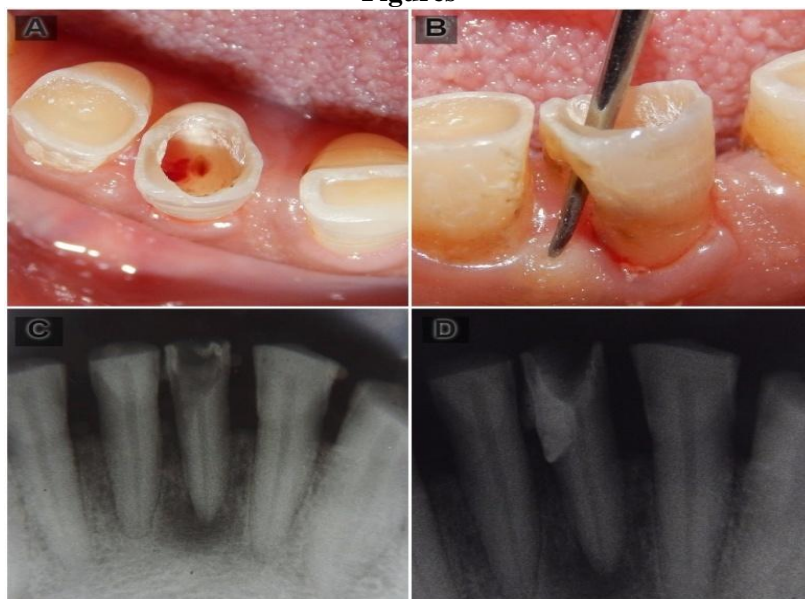


Figure 1: (A) & (B) clinical images showing the perforation (C) radiograph showing the lateral perforation at crestal level (D) radiograph showing the perforation repair using biodentine

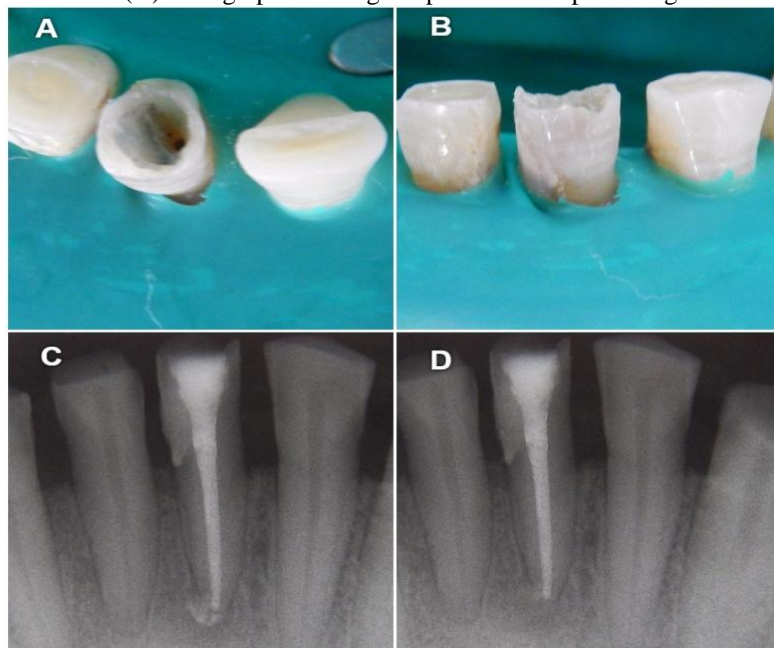


Figure 2: (A) & (B) clinical images showing the perforation repair using biodentine (C) obturation after observing the signs of healing periapical lesion (D) follow-up radiograph after 2 years

IV. Conclusion

Our case can be considered clinically and radiographically successful because at 2 year follow-up complete healing was evident at perforation site and periapically. A healthy gingival tissue with definite attachment apparatus without any evidence of periodontal pocket was seen all around the tooth. Biodentine can be considered a potential repair material enhancing the prognosis of perforated teeth.

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