

## Root Perforation Repair of Upper Central Incisor Using Biodentine as Repair Material

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**Abstract:** Root canal perforation are the artificial communication between the root canal system and the supporting structures of the oral cavity [1]. Root perforation are iatrogenic complication of root canal treatment. It can also be due to resorption or advanced carious lesion. A root perforation severely compromise the prognosis of endodontic treatment. In such cases Prognosis of endodontic treatment will depend on extent of root perforation, its location, duration and various other factors.

Root perforation can be repaired using different material and different techniques. Surgical intervention is required depending upon site and the size of perforation. This case report presents bilateral iatrogenic perforation repair of maxillary central incisors using bio-dentine as repair material.

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### I. Introduction

An artificial communication between the oral cavity or, supporting structures to the external root surface is termed as root perforation [1]. Most commonly occurs iatrogenically during access cavity preparation in search of canal orifice or during post space preparation. Occurs in approximately 2-12% and affects the prognosis of endodontically treated teeth [2, 3]. Perforation act as a channel for bacterial entry either from root canal or from periodontal tissue or both leading to inflammatory response. Epithelial overgrowth into the perforation area may further worsen the prognosis. Such cases have to be diagnosed and treated as early as possible to limit the inflammatory response and improve the prognosis of involved tooth[4].

Gilles and Olivier in 2010 introduced a new material and called it to be an bioactive dentin as a substitute to natural dentin. Powder content are tricalcium silicate, dicalcium silicate, calcium carbonate, zirconium oxide, iron oxide and liquid contents are calcium chloride and water. [5] The initial setting time for biodentine is 9-12 min. Properties such as short setting time, good compressive strength, resistance to erosion and microleakage, high alkaline ph, excellent biocompatibility makes this material favourable option for root perforation repair. [6,7].

Fuss and trope has classified root perforation into three categories that is coronal, crestal and apical. Coronal perforation- where the perforation are coronal to the epithelial attachment and the crestal bone with minimal involvement to the supporting tissues. Crestal perforations - are at the level of epithelial attachment and the crestal bone. And apical perforations are apical to the level of the crestal bone and the epithelial attachment. Apical perforation have favourable prognosis among all three.

### II. Case Report

A 20-year-old boy was referred to the department of conservative dentistry and endodontics with pain in the maxillary anterior region, which was determined as originating from the upper central incisors. The patient gave a history of root canal treatment performed 18 month back and since then he has pain in upper anterior region and has taken medication for same. Clinical examination revealed that the maxillary permanent right and left central incisors were sensitive to percussion and also showed mild mobility with normal probing depth. Radiographic examination showed incomplete obturation and perforation on the root surface. Surgical management was planned considering the location of the perforation in the apical region of root surface and biodentin was selected as repair material.

Access opening of teeth 11 and 21 was done and gutta percha cone was removed using H-files. Working length IOPA was taken to confirm the perforation site.

After adequate local anesthesia, flap was raised until 2mm apical to the working length of teeth 11 and 21 and the perforation site was exposed. Granulation tissue present at the perforation site was removed with gracey curette. Obturation of the root canal system was done on the same day and perforation site was repaired

with bio-dentin. Mixing of biodentin capsule was done in amalgamator for 30sec and carried to the perforation site with the use of amalgam carrier. The site was sealed with biodentin and the material was left to set. Once the material was hardened, excess material was removed and was contoured to reproduce the root surface anatomy. Flap was then sutured and patient was recalled after one week.

At one week follow up for suture removal patient showed minimal discomfort in relation to upper anterior region. At 3,6 and 9 month follow up patient was completely asymptomatic clinically as well as radiographically.



### III. Discussion

Tricalcium silicate based cement, bio-dentin is a new dentin substitute with excellent biocompatibility. Its biocompatibility is studied and reported in various in vitro and in vivo studies. The indication are similar to other bioceramic material such as MTA etc. However biodentin has some superior properties over MTA such as short setting time, better handling characteristics, ease of manipulation etc.

The major disadvantage of bio-dentin is its radiopacity. The standard set by ISO requires 3mm of aluminium (AL) as minimal radiopacity for any root repair material. Wide range of radiopacities values of Biodentine are reported so far in the literature (1.5 to 4.1 mm Al). [8,9,10] Biodentine is difficult to distinguish from dentine radiographically supporting various studies with values reported below the set ISO standards for the material. The difference in radiopacity as compared to other materials is mainly explained on the basis of radiopacifiers used. Biodentin manufacturer uses zirconium oxide instead of bismuth oxide as radiopacifier. Considering the biocompatibility, zirconium oxide seems to be superior compared to bismuth oxide. [11] In a study by Gunesser et al, Biodentine showed significantly better performance as a perforation repair material even after being exposed to various endodontic irrigants as compared to MTA. [12]

### IV. Conclusion

With the advancement of new material , knowledge and technology in dentistry, the quality of care rendered to the patient is vastly improved, and thus we are able to save such teeth within past would require extraction and restoration with the prosthesis. The teeth affected with the root perforation can be saved with

proper knowledge of the site, size, time of the perforation, and the choice of the material used. Biodentine seems to be a promising choice as repair material with less cost and ease of manipulation.

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