



## Management of External Root Resorption in Mandibular Molar with Biodentine: A Case Report

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### Abstract

In most cases of periapical abscess and bone resorption endodontic therapy alone is enough to return the infected teeth to a healthy state and function without surgical intervention. Biodentine a new calcium silicate based material is a material widely used in endodontic treatment because of its osteoblastic activity and biocompatibility. Biodentine was used in this case report for the conservative treatment of teeth with root resorption around the mesial root of mandibular first molar. Both the MB and ML canals were entirely filled with Biodentine to treat the root resorption process and strengthen the remaining root structure. The favorable response indicates the feasibility of using biodentine as part of orthograde endodontic treatment of teeth with resorption.

**Keywords:** Biodentine, mandibular molar, obturation, orthograde filling, root resorption.

## INTRODUCTION

Root resorption is a pathological condition that occurs externally and internally in permanent teeth. Resorption occurs when the pre-dentin layer and odontoblasts present in the root canal, or when the pre-cementum and cement oblasts in the periodontal ligament (PDL) are damaged or removed.<sup>1</sup>Resorption can mainly be classified on the basis of location of condition as external resorption, internal resorption or both. Internal root resorption (IRR) is a rare process resulting in dystrophy of the pulp that leads to destruction of the hard tissues, leading to morphological changes.<sup>2</sup>External root resorption (ERR) is a pathologic process caused by several etiological factors, this inflammatory response can aggravate in the presence of bacteria and their by-products inside the root canal system and dentinal tubules after pulp necrosis and in the absence of protection of cementum layer. It may further lead to rapid tooth loss. In cases of inflammatory root resorption associated with root canal infection, endodontic treatment generally has a favorable prognosis.<sup>3</sup>

Biodentine is a new tricalcium silicate (Ca<sub>3</sub>SiO<sub>5</sub>) based inorganic restorative cement and popularized as 'bioactive dentine substitute'.<sup>4</sup>It has vast clinical application due to its regenerative property. The material is claimed to retain better physical and biological properties. These favorable properties render Biodentine a suitable material for the management of tissues damage caused by ERR. The orthograde filling of the entire root canal system with Biodentine is the rational development in the recent application of this material.

## CASE REPORT

A 32-year-old male patient reported to the department of Endodontics, with the chief complaint of pain with the lower left back region of tooth. He gave history of discontinued root canal treatment with same tooth. There was no relevant medical history.

On clinical examination of tooth #36 was previously initiated for endodontic treatment, tender to percussion and there was no mobility seen. Intraoral periapical radiographic examination of tooth #36 revealed extensive apical root resorption on the mesial root, associated with diffused periapical radiolucency some bone loss.

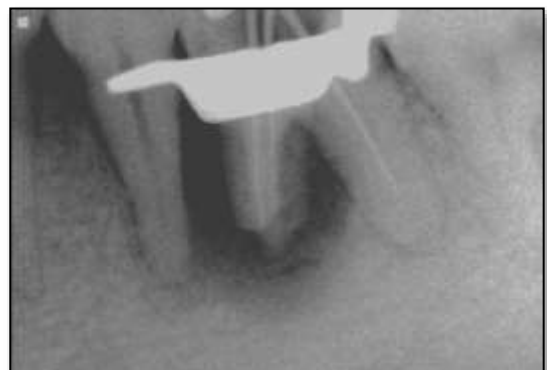
Taking into account the extent and the severity of the resorption, it was planned for orthograde Biodentine obturation of the canal space to arrest the resorption. The existing access cavity was modified and working length of the tooth was determined with help of apex locator Root ZX mini (J. Morita, USA) and was confirmed radiographically (Fig. 2). Chemo-mechanical preparation was done with rotary Protaper (Dentsply Maillefer, Ballaigues, Switzerland) using EDTA (Glyde, Dentsply Maillefer, Ballaigues, Switzerland) up to F2 with crown down technique and copious irrigation with 5.25% sodium hypochlorite with intermittent rinse with saline. The canals were dried using sterilized paper points (Dentsply Maillefer, Ballaigues, Switzerland) and calcium hydroxide (RC Cal, Prime Dental products, Kalher, Thane) as an intracanal medicament was placed in canals followed by a temporary restoration for 1 week.

After 1 week, temporary restorations were removed, canals were cleaned and dried. Biodentine, (Septodont, France) was manipulated according to manufacture instructions. Both the mesial canals were obturated with Biodentine; material was placed in the canals with amalgam carrier and was condensed vertically with hand pluggers. And a distal canal was obturated using F2 Gutta Percha (Dentsply Maillefer, Ballaigues, Switzerland) and sealer AH plus (Dentsply, De Trey, Germany). After completion of obturation orifices were sealed, followed by postendodontic restoration.

The patient was recalled after 2 and 4 months and 6 months for clinical and radiographs follow up. Post-endodontic rehabilitation was done with PFM crown after 2 months. Clinical examination of tooth #36 was functional without sensitivity to percussion or palpation. Tooth showed normal physiologic mobility and no periodontal pockets on probing. Intraoral periapical radiograph showed regression in the size of periapical radiolucency with sign of osseous repair and no further progression of ERR.



(Figure-1) Pre-Operative Radiograph 36



(Figure-2) Working Length X-Ray 36



(Figure-3) Obturation with Biodentine in MB, ML and with GP In Distal Canal 36



(Figure-4) 2 Months Follow Up 36



(Figure-5) 4 Months Follow Up

## DISCUSSION

Inflammatory response within the root canal system and in periodontal area aggravates due to bacteria and their by-products and results into inflammatory resorption of root.<sup>5</sup> Various kinds of treatment modalities can be planned for the management of external root resorption. First and foremost, treatment plan for inflammatory root resorption is eradication or devaluation of the source of infection in the root canal.<sup>6</sup>

Open passage between the root canal and the periodontium must be sealed with materials that preserve bacterial leakage, this material should be biocompatible and should favor regeneration of supporting structure.<sup>7</sup> Most of the bioactive endodontic cements available in market are either calcium silicate or calcium aluminate-based.<sup>8</sup> Biodentine is a tricalcium silicate containing cement with the unique characteristics of rapid setting, development of early high strength, and a higher reactivity than other calcium silicates.<sup>8</sup>

Biodentine is presented as powder/liquid system comprising a powder of tri-calcium silicate, di-calcium silicate, calcium carbonate, CaO and zirconium oxide as radio pacifier. Liquid consists of calcium chloride and a hydro soluble polymer.<sup>9, 10</sup> Tricalcium silicates mix with the water component and leads to the formation of a hydrated calcium silicate gel (C-S-H) structure and calcium hydroxide.<sup>11</sup> Crystallization results in the formation of CaCO<sub>3</sub> crystals. The crystals of CaCO<sub>3</sub> slowly fill in the porosities between the unreacted grains of cement over a period of approximately 2 weeks until finally reaching a maximum. The complete hydration reaction is as follows:  $2(3\text{CaO}\cdot\text{SiO}_2) + 6\text{H}_2\text{O} \rightarrow 3\text{CaO}\cdot 2\text{SiO}_2\cdot 3\text{H}_2\text{O} + 3\text{Ca}(\text{OH})_2$

It is considered that the micromechanical bond between dentin and Biodentine is created by the growth of the crystal within the dentin tubules. Micromechanical tags like structure anchored in dentine exchange the ions through tissue and cement. Biodentine forms a tight seal. A Ca and Si rich layer causes chemical and structural alteration of the surrounding dentin. It increases the strength of dentin and makes it acid resistant.<sup>12</sup> It has antibacterial properties more than other calcium releasing materials. The material has higher stability, less setting time. It is a hydrophilic material with lower solubility. Biodentine is found to have bioactive and biocompatible characteristics. Superior mixing property and simple manipulation of biodentine allowing easy placement in resorption areas or obturation of entire root canal system.

**Conflicts of Interest:** Nil

**Source of support:** None

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