

Management of External Cervical Resorption in Maxillary Central Incisor with Biodentine and Collagen Membrane: A Case Report

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ABSTRACT

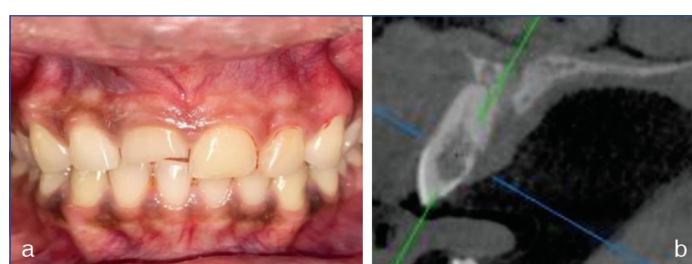
Invasive cervical resorption is a relatively uncommon form of a chronic inflammatory process that results in loss of dentine and is usually initiated in the pulp space. It begins as a localised resorptive process that initiates in the area of the root beneath the epithelial attachment and the coronal part of the alveolar process. The lesion is mainly detected on radiographs and exhibits no external signs. The limitations of conventional radiography make Cone Beam Computed Tomography (CBCT) an effective and accurate method of diagnosing root resorptions. The tooth is normally asymptomatic, and the diagnosis is usually made based on a routine examination. Most authors refer to dental trauma, whitening agents, and orthodontic treatment as aetiologic factors. This disorder necessitates a thorough study of the pathologic process in order to determine the source and stop the resorptive phenomenon. The treatment should seek to completely remove the resorptive defect and rebuild it with an appropriate filling substance. Biodentine, a calcium silicate-based material, can be used to fill resorptive defects in the teeth. Furthermore, biodentine has some desirable additional properties over Mineral Trioxide Aggregate (MTA), such as improved antibacterial properties, bioactivity-inducing hard tissue formation, good handling, self-adhesion to dentine, and shorter setting time. Hence, this article presents a case report of external cervical resorption of the maxillary central incisor. Biodentine along with collagen membrane was used to fill the resorptive defect. One year radiographic follow-up showed stability of the resorption site.

Keywords: Calcium silicate cement, Root resorption, Trauma

CASE REPORT

A 22-year-old male patient presented to the Department of Conservative Dentistry and Endodontics, complaining of discoloured teeth in the upper right central incisor for five years. An examination of the patient's prior dental history revealed that his tooth had been injured in a fall seven years ago and was untreated.

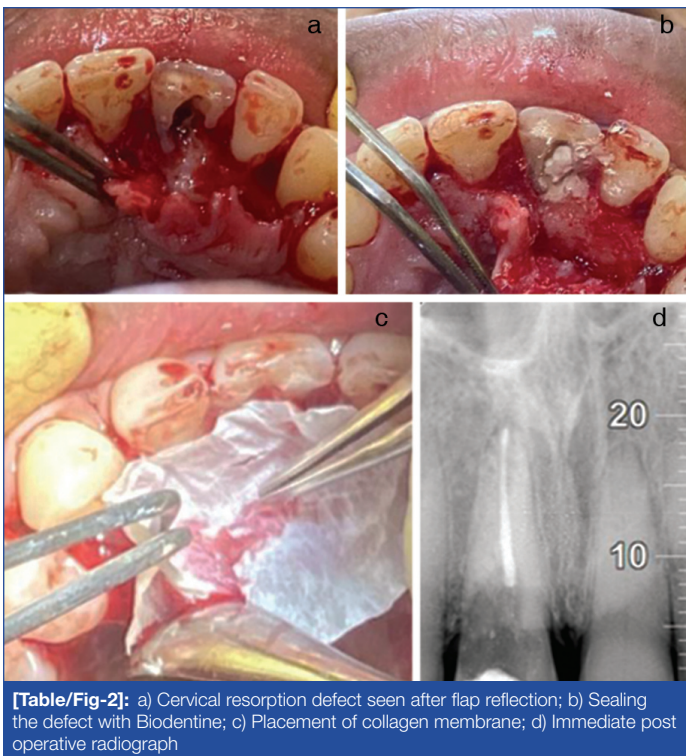
Clinical examination revealed Ellis class II fracture with respect to 11, which was darker than the adjacent teeth. The tooth was asymptomatic without any associated soft tissue injuries, swelling, and tenderness on percussion [Table/Fig-1a]. The sensitivity tests such as electric pulp vitality and cold test were negative, however, the adjacent tooth responded normally. No mobility was observed and the periodontal probing depth was within the physiological range. An asymmetrical radiolucent area was found on the radiograph in the cervical area and coronal third of the root, extending up to the middle third of the root. Cone Beam Computed Tomography (CBCT) confirmed the presence of external cervical root resorption on the palatal surface of the root measuring about 7.4×3.9 mm [Table/Fig-1b]. In this case, the diagnosis was external cervical root resorption with pulp necrosis (Heithersay's class III) [1]. As a result, root canal therapy followed by surgery to repair the resorptive defect was planned.



[Table/Fig-1]: a) Preoperative intraoral photograph; b) Preoperative Cone Beam Computed Tomography (CBCT).

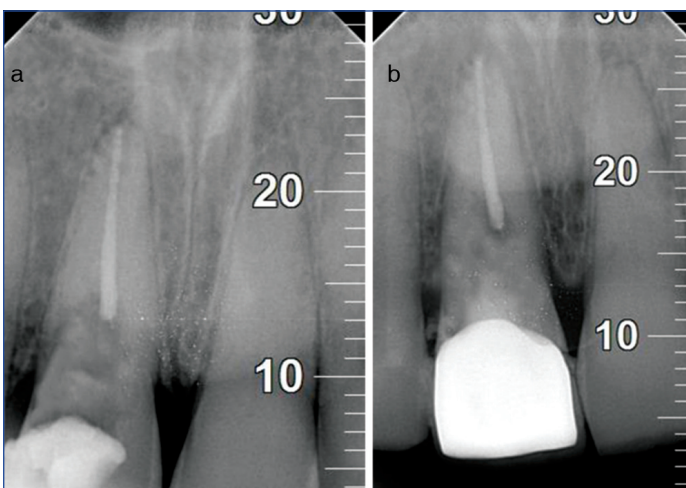
Access cavity preparation was done under a local anaesthetic agent (2% lignocaine with 1: 80000 adrenaline), with respect to 11. 3% sodium hypochlorite and saline were used for irrigation of the canal. The working length was determined using J Morita Root Zx II Apex Locator (dentaport zx) which was then confirmed radiographically. The root canal was biomechanically prepared by using ProTaper (Dentsply Maillefer) nickel-titanium rotary instruments till F3. Copious irrigation with 3% sodium hypochlorite was done to achieve thorough debridement chemomechanically. Calcium hydroxide (RC CAL) dressing was given for 30 days, with medicine changed every 15 days. The cavity was restored provisionally with Cavit (3M ESPE). The root canal was re-entered after 30 days, and irrigation was done with normal saline. A 15k file (Mani), was used to eliminate the calcium hydroxide dressing. Final irrigation was done with 3% NaOCl, 17% Ethylenediaminetetraacetic Acid (EDTA) and normal saline. Sectional obturation was done till the middle third of the canal. Since, the defect occurred in the cervical area, surgical intervention was premeditated for debridement, curettage, and restoration of the external resorption defect.

Under local anaesthesia, a mucoperiosteal flap was raised. A huge resorptive area with granulation tissue was seen clearly at the surgical site [Table/Fig-2a]. The resorptive area was excavated of the granulomatous tissue. After debridement, Biodentine (Septodont) was used to fill the resorptive area and it was contoured as per external root anatomy [Table/Fig-2b]. After the material set (setting time- 12 mins), collagen membrane (Bio-Gide®, Geistlich Biomaterials) was placed on the set biodentine [Table/Fig-2c]. and the coronal part was restored with Resin-Modified Glass Ionomer Cement filling material (RMGIC). An immediate post operative radiograph was taken to confirm the adequate filling of the resorptive area [Table/Fig-2d]. The flap was sutured back to its original position using resorbable suture material. After adequate healing of the tissues, all ceramic crown was made to give the best aesthetics to the patient.



[Table/Fig-2]: a) Cervical resorption defect seen after flap reflection; b) Sealing the defect with Biodentine; c) Placement of collagen membrane; d) Immediate post operative radiograph

The patient was recalled and reviewed on the 12th and 24th month [Table/Fig-3]. The patient was asymptomatic indicating that the resorptive site has been repaired successfully with dentine and collagen membrane.



[Table/Fig-3]: Follow up radiograph at a) 12; b) 24 months.

DISCUSSION

Root resorption is induced by a pathologic or a physiologic process that leads to loss of dentine, cementum, and/or bone [2]. due to odontoclastic action [3]. Depending on its location relative to the root surface, it can be classified as internal or external resorption. An uncommon form of rapid external root resorption is referred to as progressive external root resorption. Heithersay described it as "invasive cervical resorption" which is aggressive and invasive [1]. It usually occurs at the cervical third of the root [4]. At the zone of the connective tissue attachment [5]. Clinically, pink discoloration of the affected tooth is seen which can be attributed to the resorption of the enamel and dentine as highly vascular resorptive tissue becomes more evident through the tooth structure [6].

Invasive cervical resorptions are usually asymptomatic and can be misdiagnosed as caries or internal root resorption. Radiographic findings may vary from irregularly bordered mottled to well-defined radiolucency [1]. Until the late stage of the process, the pulp is covered by a faint layer of predentin, which is characterized by a radiopaque line separating the image of the lesion from the root canal [1].

Since, the aetiology of invasive cervical resorption is unclear, various predisposing factors have been identified. These include dentoalveolar surgery, traumatic injuries, periodontal treatment, orthodontic tooth movement, extraction of adjacent tooth, bruxism, orthognathic and, and internal bleaching [7].

Early detection along with removal of the defect and restoration with a compatible material can lead to successful outcomes in such cases. The treatment includes removal of the resorptive tissues along with conditioning of the dentinal walls with aqueous solution of trichloroacetic acid [4]. Restorative materials like Glass Ionomer Cement (GIC), composite or calcium-based silicate cement like Mineral Trioxide Aggregate (MTA) or biodentine can be used to restore the cavity. Bioactive materials like MTA and biodentine are suitable for such defects [8,9]. Biodentine can be a viable option since it may act as a dentine substitute and it can be accepted aesthetically [10]. It is ideal to use a regenerative approach because it can recreate the lost periodontium by forming new attachments and against the damaging effects of the disease [11]. Bioabsorbable collagen membranes are gaining popularity because of their ability to enhance platelet attachment, stimulate fibrin bonding, and act as a chemotactic for fibroblasts [12]. Moreover, it prevents the apical movement of the epithelium, balancing out the wound [13].

Biodentine, a hydraulic bioactive calcium silicate-based cement interacts with the dentine and pulp tissue. It promotes dentinogenesis by up-regulating the transforming growth factors. It releases calcium ions which augments the alkaline environment and makes osteoblastic activity more likely [14,15]. Endodontic applications of biodentine include root perforations, apexification, resorptive lesions, retrograde fillings, and pulp capping in restorative dentistry [9]. When compared to MTA and bioaggregate, biodentine possesses better biological and physical properties [14].

Collagen promotes wound healing through hemostasis and clot stabilization. It also attracts fibroblasts enhancing the wound coverage area. Collagen membranes are highly compatible and integrate into the connective tissue wall, thereby enhancing the potential for periodontal regeneration [16].

The diagnosis of the present case was Heithersay's class III Invasive cervical resorption. The treatment plan included non-surgical root canal therapy followed by surgery to expose the defect and seal it with Biodentine. In comparison to MTA, Biodentine had better handling properties, quicker setting time, and less tooth discoloration. It has sufficient push-out bond strength making it an exceptional material for repair of perforations [17]. Similar case were reported by Eftekhar L et al., and Baranwal AK, where surgical intervention was done followed by placement of Biodentine to fill the resorptive area. Adequate healing of the defect was observed during follow-up of 2 years and 11 months respectively [10,18]. However in this case report, collagen membrane was used because it promotes cellular growth and attachment and the ability to reconstitute into the microfibrillar structure found in natural tissues [19,20]. It also has the potential to promote periodontal regeneration [21]. Following the treatment, satisfactory healing was seen after 2 years. The patient was symptomless and the radiographic examination revealed no periapical pathology.

CONCLUSION(S)

In order to retain a tooth with invasive cervical root resorption for a long time, early diagnosis, appropriate restorative and regenerative material along with a suitable treatment plan are critical for the long-term and good prognosis of the tooth. Although this case report presents a favorable clinical outcome, further studies are necessary to provide more information about the use of biodentine and collagen membrane to fill the resorptive defect.

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