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## Management of external root resorption by using mineral trioxide aggregate (MTA): A case report

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### Abstract

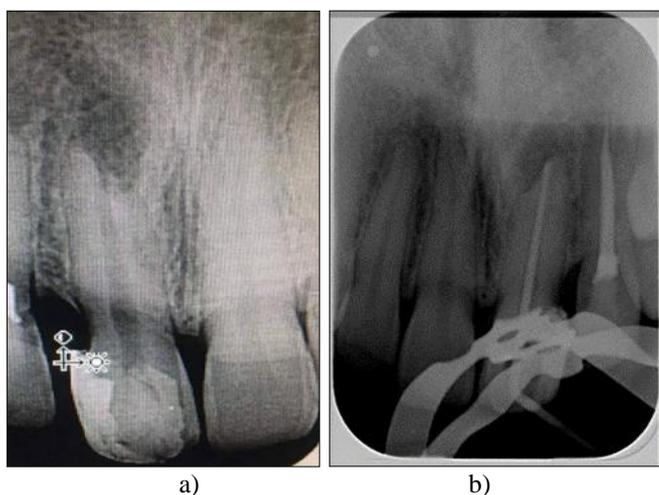
In this case report, the treatment of external root resorption in a 21 years-old female by using non-surgical root canal therapy and the results were evaluated. The maxillary right central incisor was clinically and radiographically examined. On clinical examination, the maxillary right central incisor was found slightly discoloured. Radiographic examination revealed an irregular radiolucent lesion related to the apical third of the root. The resorption process was stopped, re-calcification was extended to the area beyond the root apex. A space was left for immediate placement of fiber post core then crown. Clinical and radiographical evaluation for next 3 months.

**Keywords:** External, resorption, MTA, Re-calcification

### Introduction

At an early age, root resorption is one of the reasons for loss of the tooth [1]. The normal tooth structure which is formed of enamel, dentine, pulp and cementum do not undergo resorption in the normal permanent tooth 2. As a result of trauma, chronic inflammation of the periodontal tissues or the pulp or both or induced pressure in the periodontal ligaments due to excessive orthodontic movement, tumors, or related to tooth eruption [3].

Resorption process is initiated by the pulpal and/or periodontal inflammation. Invasion of macrophage-like resorbing cells occurs after the disappearance of the dentinal structures [4, 5]. This pathologic condition may be discovered by routine radiographic examination, it has no sign and symptoms and remains asymptomatic. This condition may be occurred at any level along the root of the tooth. External apical resorption do not show any coronal pink spots when it is compared to internal resorption [6]. The imbalance between osteoclastic and osteoblastic activity in the periodontal ligaments occurs in external root resorption removing dentine from root surface. It includes a huge interactions between resorbing cells, inflammatory cells and hard tissue structures [7]. In the cases of tooth trauma, the internal pulpal hemorrhage can develop. Formed blood clots are then organized and replaced by granulation tissue which compresses dentin wall of the pulpal chamber or root canal. With activation of undifferentiated mesenchymal cells of the pulpal tissue they differentiate into dentinoclasts, which is said to be responsible for resorption of the hard tooth structure 8. Furthermore, the chronic trauma or inflammation can be the cause of transformation of undifferentiated cells of connective pulpal tissue into giant multinuclear cells which are responsible for the resorption process [9-11]. perforation the fracture of the tooth will be occurred if the tooth remains untreated. Treatment of the tooth resorption by using mineral trioxide aggregate or Calcium hydroxide, calcium phosphate cement or hydroxyapatite have been well reported [12]. In this case study, external root resorption in a 21 years female was treated by non-surgical root canal therapy and the clinical and radiological outcome was collected and evaluated.



**Fig 1:** Pre-operative intraoral photograph

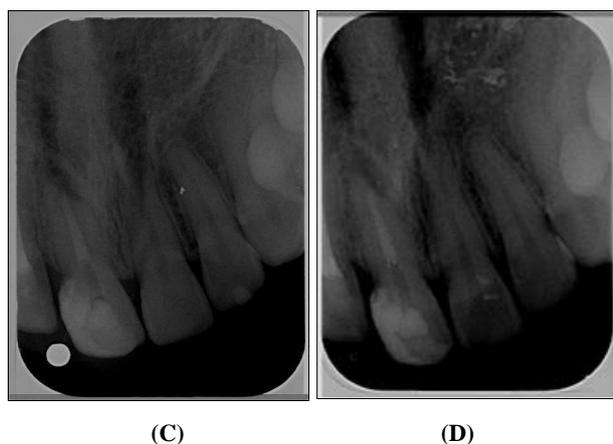
- a) Shows irregular radiolucency and root outline related to apical third of the root  
 b) Master cone was inserted into the canal in order to ensure that the canal was cleaned and shaped to the proper length

### Case Report

A 21 years old patient came to the endodontics clinic. The patient gave a history of trauma 11 years back. The patient felt no significant pain and slight discoloration of the affected tooth was noticed during the clinical examination. There was a mild pain on percussion. Pulp vitality test was negative. Radiographic findings revealed that a radiolucency and irregular root outline in the apical area of the upper right central incisor. The initial treatment plan included:

First visit: finishing cleaning and shaping under copious irrigation with sodium hypochlorite using side vented needles, then dryness then intracanal calcium hydroxide for 2 weeks and temporary filling. Second visit after 2weeks: doing MTA apical plug. [Figure-1(c)]

The canals were fully prepared with 60 number of H-file and the canal made dry. Then it was filled with radio- opaque Ca(OH)<sup>2</sup> up to apical region. During follow-up after 1 month the patient had no complain and the re-calcification process was begun successfully. [Figure-2]



### Discussion

Numerous past researches have thought that external resorption cases can be treated by non-surgical and surgical strategies. There were a cases made for the wider use of Ca(OH)<sup>2</sup> as an invigorating and recuperating agent. Nowadays these contemplations ended up and became real i.e. Ca(OH)<sup>2</sup> is used as an apical plug before obturation of the

remaining root canal. But it was found that the periapical tissues have a better and fast response to Mineral Trioxide Total (MTA). MTA is composed of calcium oxide (tricalcium silicate, dicalcium silicate and tricalcium aluminate). Bismuth oxide is included for radio-opacity, MTA is considered a silicate cement, its biocompatibility is due to its response products, the results of MTA reaction with water is Calcium Hydroxide, and so it is really the formation of calcium hydroxide that provides MTA's biocompatibility.

MTA and Calcium hydroxide have a common points when they are compared to each other such as mechanisms of action, both of them are antibacterial and have a biocompatible properties, high pH, radio- opacity and its ability to help in the formation of bioactive dentin proteins. The antibacterial property of MTA is questionable, MTA has a few of the facultative bacteria but no impact on any of the anaerobic micro-organisms. The antimicrobial activity of MTA may not be the same as the conventional Calcium Hydroxide- based cements and sealers. MTA can provide a protection against leakage due to its sealing property. MTA is proposed to be better than Calcium Hydroxide due to formation of uniform and thicker dentin bridge and less damage to pulpal tissues.

There are some contrasts between MTA and Calcium Hydroxide. To begin with, MTA has two colours, white and grey. The greyish colour is due to addition of iron. On the other hand, MTA has many disadvantages such as long setting time (2 hours and 45 minutes). Setting time of the greyish MTA is shorter than the white one. A long setting time is considered a disadvantage to dentist and patient, since it requires direct pulp-capping with MTA in two visits, one for application of MTA and the other one for the restoration. Also the risk of bacterial contamination may be increased. Another disadvantage of MTA which is the poor handling of mixture and it is produced by the coarse particles of Powder and the distilled water, it is difficult to be delivered to the required site and difficult to be condensed properly which can be affected by the particle size and distribution as well as by the shape of the powder. Tooth discoloration has been reported with the use of greyish MTA in direct pulp capping. Also the use of white MTA has generally been preferred in the esthetical zones. Despite of that a tooth discoloration with whitish MTA has been found in some cases and it is thought that this discoloration is formed due to presence of blood, oxygen and Ca(OH)<sup>2</sup> [13-20].

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