

Mineral Trioxide Aggregate for Management of Three Resorptive Areas in a Single Rooted Tooth

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ABSTRACT

The maxillary anterior tooth is the key tooth for the esthetics of an individual. Unfortunate trauma to the maxillary anterior tooth results in compromised esthetics and self-esteem of a young patient. Multiple resorptive defects in a tooth may compromise its prognosis and may be indicated for extraction following replacement by the implant. However, “a naturally retained tooth is the ultimate implant”. A 25-year-old patient visited the Department of Conservative Dentistry and Endodontics with the complaint of purulent pus discharge and unacceptable colour in the front tooth region for two months. The yellowish-brown discolouration was observed in 11. Radiographic imaging revealed two internal resorption areas. Apical resorption was evident on the distal aspect of the root. The Cone-beam Computed Tomography (CBCT) imaging revealed two internal resorptive areas with external resorption. This case report describes the successful surgical therapy of communicating internal, external and apical resorption with complicated pulp space that was managed effectively with the help of CBCT, magnification and bioceramic materials. This case report highlights the importance of Mineral Trioxide Aggregate (MTA), Dental operating microscope and CBCT for the diagnosis and effective management of a structurally compromised tooth.

Keywords: Cone beam computed tomography, Internal resorption, Surgical management

CASE REPORT

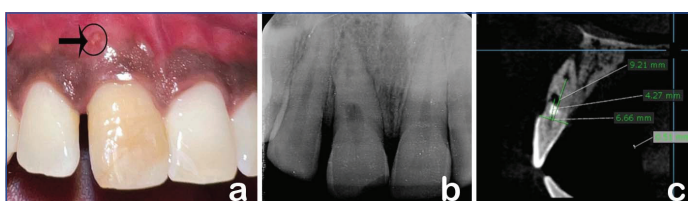
A 25-year-old patient visited the Department of Conservative Dentistry and Endodontics with the complaint of purulent pus discharge and unacceptable colour in front tooth region for two months. The patient revealed an incident of trauma eight years back and pus discharge that increased over the past one week. Soft tissue examination revealed a draining sinus tract in the mid-root region of 11. Clinical examination revealed yellowish-brown discolouration in 11 with spacing between 11 and 12 [Table/Fig-1a]. On palpation of the mid root region, a hard bony structure was felt. No tenderness was elicited on vertical percussion. Mobility was within the normal physiological range. Pulp sensibility tests showed negative responses for cold test and electric pulp tester.

Radiographic examination revealed a wide radiolucency at the intersection of the coronal and midsection of the root, radiopacity in the middle-third, patent pulp space in the apical third with distal external resorption. Obscure periapical radiolucency was present with Periapical Index (PAI) Score-5 [Table/Fig-1b] [1]. CBCT imaging revealed two radiolucencies within the tooth that were communicating with the Periodontal Ligament (PDL) [Table/Fig-1c], patent root canal and resorption in the apical-third. Sagittal section revealed tear drop shaped radiolucency from cervical to middle-third of root canal. Axial section revealed, thinning of the dentinal wall, absence of labial cortical plate and periapical radiolucency [Table/Fig-2]. A probable diagnosis of a case of communicating internal-external inflammatory resorption in 11 was made considering the clinical and radiographic imaging. According to Kim S and Kratchman S, this case was designated as Class F, which represents a tooth with

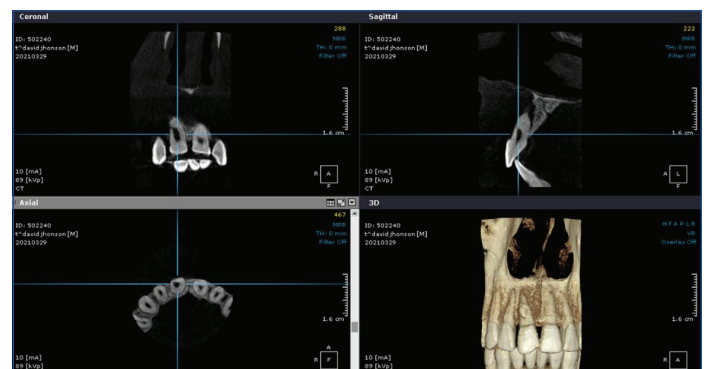
an apical lesion and complete denudement of the buccal plate but no mobility [2]. Surgical management of communicating resorptions and apical root resorption were planned under Dental Operating Microscope (DOM).

In the first appointment, after rubber dam isolation, pulp chamber was accessed in 11. The canal could not be negotiated till the full working length. The negotiated canal was cleaned and shaped till 25 K-file (Mani, Tochigi, Japan) and calcium hydroxide dressing was placed. The tooth was temporised. The tooth was asymptomatic after a week but the sinus tract did not heal. Another attempt was made to renegotiate the canal, which was unsuccessful. Surgical intervention was planned for the next visit and repeat calcium hydroxide dressing was placed.

The entire surgical procedure was performed under DOM (Labomed Dental Microscope Prima DNT, CA, USA) at 3X magnification. Infraorbital nerve block was administered with 2 mL of 1:1,00,000 epinephrine. A full-thickness mucoperiosteal rectangular flap was elevated and surprisingly only a small piece of bone was visible in the middle-third of the root. Two external resorptive sites were identified. Orthograde root canal negotiation was tried with 10 K-files, but in vain. The instrument was exiting at the external resorption sites [Table/Fig-3a,b]. Cleaning and shaping was completed till 30/0.04 using Hero gold files (Micro Mega, Becacon,



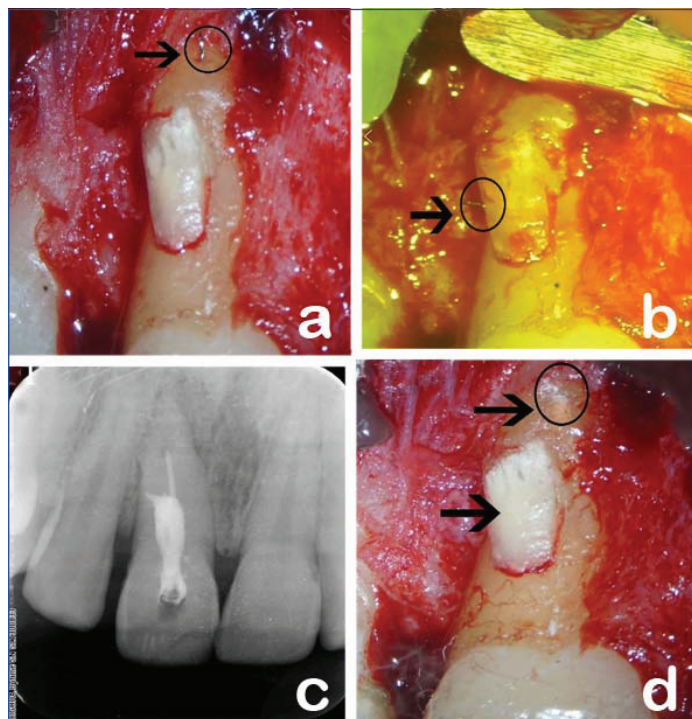
[Table/Fig-1]: a) Preoperative clinical photograph depicting the discoloration and sinus tract opening in 11. b) Preoperative radiograph. c) CBCT image depicting the location of the resorption areas.



[Table/Fig-2]: Coronal, sagittal, axial and 3D views of CBCT depicting the dimensions and extent of the two internal resorptions with external resorption.

France), and irrigation was done using 3% sodium hypochlorite (NaOCl). Ultrasonic irrigation activation was done with a stainless steel #20/.00 file (Irrisafe; Acteon, Merignac, France, Satelec P5 NewtronXS). Sectional obturation was done in the negotiated canal followed by thermoplasticised obturation of guttapercha (Guilin Woodpecker Medical Instrument Co., Ltd, China) [Table/Fig-3c].

Management of external resorptions: The two external resorptive defects were sealed with Mineral Trioxide Aggregate (MTA Plus, Prevest Denpro Limited, Jammu, India) [Table/Fig-3d].

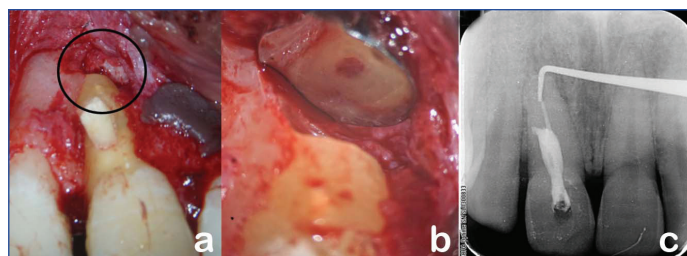


[Table/Fig-3]: a) Identification of external resorption at the junction of middle and apical third of the root. b) Identification of external resorption at the middle third of the root. c) Sectional obturation followed by thermoplasticised obturation of guttapercha. d) Restoration of the two resorptive sites with MTA.

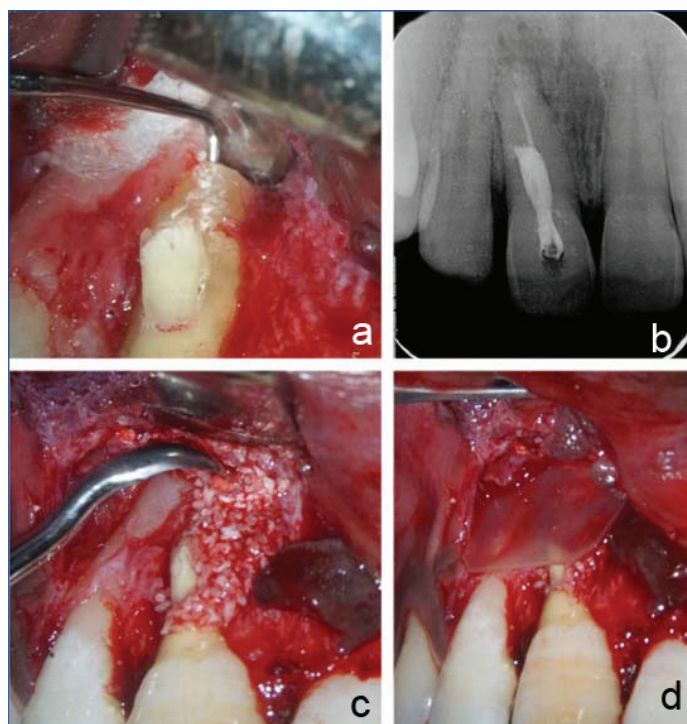
Management of apical resorption: The 3 mm of the root tip was sectioned using #703 carbide bur along with copious saline irrigation [Table/Fig-4a]. Periapical lesion was curetted using curette (SybronEndo, Orange, California, United States of America (USA)). The root end visualisation was done at 17X magnification using a micromirror (SybronEndo, Orange, California, USA) [Table/Fig-4b]. The retrograde canal was negotiated using microexplorer (Kerr, Romulus, MI, USA). A 3 mm of root-end preparation was carried out using AS3D ultrasonic tip (Satelec/Acteon, Merignac, France) [Table/Fig-4c]. The retrograde filling was done using MTA and was compacted using micropluggers (SybronEndo, Orange, California, USA) [Table/Fig-5a]. The quality of the restoration was confirmed with radiograph [Table/Fig-5b].

The apical lesion was filled with a Xenogenic bone graft (Osseograft®) [Table/Fig-5c] and was covered with a type I collagen resorbable membrane (Healiguide®) [Table/Fig-5d]. The flap was sutured back atraumatically using simple interrupted sutures. Postendodontic composite restoration was placed in 11. The surgical site was dressed with a periodontal pack (COE-PAK, Coe Laboratories Alsip, IL, USA). The patient was recalled after five days for evaluation and suture removal.

A follow-up examination was done after 12 months. The tooth was functional with no associated symptoms. Clinically, the sinus tract opening had healed and the soft tissues were of normal architecture [Table/Fig-6a]. Interestingly, there was a reduction in tooth discolouration. Radiographically, there was a reduction in apical radiolucency to PAI Score-2 [1]. External resorption sites revealed normal PDL with lamina dura [Table/Fig-6b]. Only



[Table/Fig-4]: a) Depicts the root end resection. b) Root end visualisation at 17 X magnification. c) Confirmation of root end preparation using radiographs.



[Table/Fig-5]: a) Retrofilling of MTA using micropluggers. b) Radiographic confirmation of the quality of retro filling. c) Xenogenic bone graft was placed in the surgical site. d) Type I collagen resorbable membrane was used to cover the bone graft.



[Table/Fig-6]: a) Follow-up clinical photograph taken after 12 months. b) Follow-up radiographic after 12 months.

the chief complaint was resolved because the patient refused to undergo other treatments for diastema closure.

DISCUSSION

Tooth resorption can be a physiological or pathological activity occurring internally (pulpal origin), externally (periodontal origin), or both. According to the glossary of endodontic terms, resorption is a condition associated with either a physiologic or a pathologic process resulting in the loss of dentin, cementum, or bone [3]. The treatment planning, in this case, included: eradication of intrapulpal infection and granulation tissue followed by restoration of resorptive defects. In this case scenario, the patient presented with discolouration and a draining sinus tract opening. The trauma might have resulted in pulpal haemorrhage and necrosis. The infiltration of pulpal haemorrhagic products into the dentinal tubules might have caused discolouration over time [4].

Considering the complexity of the case, CBCT imaging was indicated. The communicating external resorptions were evident on

the buccal surface of 11, which was not appreciated in conventional radiographs. In the CBCT imaging of different sections, the canal patency was appreciated. However, clinically, because of the communicating internal-external resorption, the canal could not be negotiated. Hence, both orthograde and retrograde treatment of the pulp space was decided and executed.

The magnification and illumination with a green filter assisted in identification and management of external resorptions in two different sites. Precise root resection, retro preparation and restoration were possible with endosonics and microsurgical instruments. Bacteria that persist even after chemo mechanical preparation can be eradicated with calcium hydroxide because of its antibacterial property [5]. In the present case, calcium hydroxide dressing was given for two weeks because of its high alkalinity and ability to inhibit clastic activity that causes 180 resorption.

The irregular resorption cavity cannot be cleaned by only mechanical instruments hence chemical means like ultrasonically activated NaOCl, are required. Using copious amounts of NaOCl during multiple visits could have resulted in a bleaching effect on the discoloured tooth. NaOCl is highly effective in removing chromogenic organic material located in the enamel, by oxidising it and allowing the smaller degraded molecules to be washed away [6]. Obturation could be best achieved by thermoplasticised obturation technique to enhance the filling of the resorptive defect area [7].

Two areas of internal resorption with external resorption were identified and sealed with MTA. MTA possesses beneficial properties like biocompatibility, bioactivity, fluid tight sealing ability and sets in blood or moisture contamination [8]. The apical region of the root canal was patent but could not be negotiated conventionally. Additionally, apical root resorption was evident. So, root end resection was performed and the retrograde cavity was restored with MTA. This procedure established a fluid tight seal between the radicular space and periapical tissues [9]. The patient was followed-up after 12 months. The tooth remained functional and the patient is expected for follow-up after five years.

CONCLUSION(S)

The presence of multiple resorptions with complicated pulp space is quite a rare occurrence in anterior teeth. Considering the complexity of the case, CBCT imaging was performed to precisely locate the extent of the resorptive defects. The internal, external and apical resorptions were managed effectively using microsurgery and MTA. At 12 months of recall, the tooth remained functional and interestingly, there was a reduction in tooth discolouration, probably due to the bleaching effect of sodium hypochlorite. It is worth an effort to try slow down the resorption process and maintain the tooth as long as possible in the arch for esthetics, mastication and natural space maintenance and, above all psychological uplift of the patient.

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