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CASE REPORT

Multidisciplinary management of an external cervical resorption and cemental tear

ABSTRACT

Aim: *The case report presents the management of two different pathologies, external cervical resorption (ECR) and cemental tear, in two different central incisors, owing to the same predisposing factor i.e. trauma from occlusion.*

Summary: *A 53-year-old man was referred to the University Dental Clinic complaining of a pink spot that he noticed on his right maxillary central incisor. After thorough clinical and radiographic examination, including (FOV) cone-beam computed tomography (CBCT), revealed ECR classified as class 3Bp in tooth 11 and a probable cemental tear on tooth 21. A root canal treatment was performed on tooth 21 using a bioceramic sealer (Bioroot™ RCS). Subsequently, a modified papilla preservation flap was raised over the ECR lesion of tooth 11, followed by a complete rubber dam isolation, and blocking the root canal with a single gutta-percha cone. The defect was then restored with a resin modified glass ionomer cement (Geristore®). A simplified papilla preservation technique was then extended to treat the cemental tear on tooth 21, after which the root canal treatment for tooth 11 was completed. A 10-months follow-up examination showed a successful outcome with clinically stable gingival margins and no further evidence of ECR recurrence.*

Key learning points

- *ECR and cemental tear can occur together owing to the same predisposing factor.*
- *CBCT proves to be an indispensable tool in the detection and extent of ECR and cemental tears.*
- *The case report also confirms the easy handling, favorable physical and biological properties of Geristore® cement to restore ECR cavities.*

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Introduction

External cervical resorption (ECR) is a pathology that is often misdiagnosed as internal resorption or subgingival caries leading to tooth loss or incorrect treatment (1, 2). Heithersay classified ECR lesions from class 1 to class 4 based on two-dimensional (2D) radiography, according to the extent of the lesion (3). He also demonstrated that after a 3-year follow-up, the success rate of a class 1 lesion was 100% and a mere 12.5% for the class 4 category (3, 4). Patel et al. (2018) recently categorized this type of lesion using three-dimensional (3D) cone beam computed tomography (CBCT), according to the height, circumferential spread and proximity of the lesion to the root canal (5). This classification allows clinicians to perceive the extent of the lesion and plan an appropriate treatment (6).
The main predisposing factors for ECR are orthodontics, previous traumatic injury, poor oral health, and malocclusion (7). Some predisposing factors of ECR are also shared by cemental tears, such as previous traumatic injury, malocclusion, and even occlusal overloading. Cemental tear mostly affects the maxillary and mandibular incisors, is common in men aged over 60 years, and is only detected radiographically in 56.3% of the cases, although its detectability using CBCT is still questionable (8). In most cases its apicocoronal location makes accessibility difficult non-surgically and is a factor that usually inclines clinicians to choose a surgical approach to remove cemental tears.

Figure 1
A pre-operative clinical picture showing patients general oral health and a pink spot over the cervical third of tooth 11.

The occurrence of external cervical resorption and cemental tear together is a rare entity and according to the authors limited knowledge has not been reported yet in the literature. This case report describes the successful multidisciplinary management of two maxillary central incisors, one that presented with an external cervical resorption and the other with cemental tear, both most probable due to occlusal trauma.

Case Report

A 53-year-old male was referred to the Department of Endodontics (University dental clinic at the International University of Catalunya) complaining of a pink spot in his maxillary front tooth. Intraoral examination revealed probing depths of 7 mm with profuse bleeding on probing (BOP) on the buccal aspect of tooth 11 (Figure 1). Tooth 21 had probing depths of 7 mm on the buccal aspect with a gingival recession of 4 mm, resulting in a clinical attachment loss of 11 mm. Both teeth did not respond to neither cold nor electric vitality tests and had a Miller grade 1 mobility (9). Tooth 11 was negative to percussion/palpation while tooth 21 was positive to vertical percussion and palpation. Radiographic evaluation revealed a significant radiolucent area in the cervical portion of tooth 11 while tooth 21 had periapical radiolucency (Figure 2). A CBCT scan, taken with a limited field of view (FOV) of 5 x 8 cm (Planmeca Oy, Helsinki, Finland) at 0.8 mA and 85 kV, revealed an external cervical resorption with tooth 11. As the lesion was extending into the middle third of the root, with a circumferential spread between >90 to <180 degrees and seemed to have probable pulpal involvement, it was classified as 3Bp, according to Patel et al. (2018) (5). Tooth 21 also showed a radiopaque chip separated along the root that was presumed to be a cemental tear (Figure 2). Based on the radiographic and clinical examination, tooth 11 was diagnosed as a necrotic tooth with asymptomatic apical periodontitis with an external cervical resorption (classification 3Bp), and tooth 21 as necrotic pulp with symp-

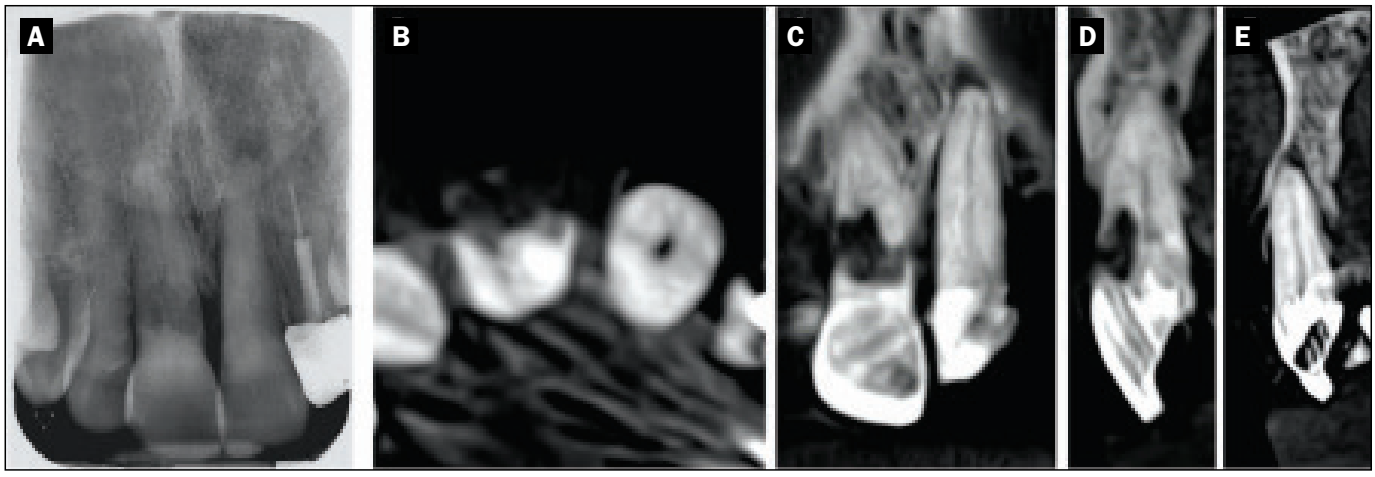

Figure 2
(A) Pre-operative periapical radiograph showing a radiolucent cervical lesion with tooth 11 and apical lesion with tooth 21.
(B) Axial CBCT cross-section showing the circumferential extent of the resorption with tooth 11.
(C) Sagittal CBCT cross-section showing the apico-coronal extent of the resorption with tooth 11 and apical radiolucency with tooth 21.
(D, E) Coronal CBCT cross-section showing the proximity of the resorption with the pulp space with tooth 11 and a cemental tear on the middle third of the root with 21.

tomatic apical periodontitis with recurrent periodontal abscess due to a probable cemental tear. From a periodontal point of view the diagnosis was periodontitis stage III grade B, given the attachment loss of ≥5 mm and no teeth lost; and since the percentage of bone loss to age was between 0.25 and 1.0. The patient also presented gingival recessions classified as RT2 and RT3 according to Cairo et al. 2011 (10); as well as generalized secondary occlusal trauma due to the loss of periodontal support.
The treatment plan was explained and an informed consent was obtained from the patient.
The treatment plan consisted of an initial phase I periodontal therapy (hygienic phase) with simultaneous occlusal adjustment. This was followed by an endodontic treatment of tooth 21 which was performed using absolute rubber dam isolation (Hu Friedy, Chicago, IL). After the access opening, a 10-k file (Mani, Inc, Shioya, Japan) with an electronic apex locator (Root ZX mini, J Morita Corp, Tokyo, Japan) was used to achieve patency and determine the working length. A radiograph was performed using a 15 k-file to confirm the working length and the canal was instrumented with Reciproc 25 (VDW GmbH, Munich Germany) using intermittent irrigation with 4.25% sodium hypochlorite (NaOCl) and 17% EDTA solution. Apical enlargement was performed using a 35.04 Profile instrument (Dentsply Maillefer, Ballaigues, Switzerland).
Final irrigation was performed with 96% alcohol and the root canal was dried and filled using a single master gutta-percha cone calibrated at 35.04 (Autofit, Sybron Endo, Kerr, USA) and a bioceramic sealer (Bioroot™ RCS, Septodont, France) according to manufacturer instructions. The tooth was immediately restored using a nano hybrid composite (Filtek™ Z250 XT, 3M, ESPE).
Due to the extent of the ECR lesion (Figure 2) on tooth 11 and the position of the cemental tear on tooth 21, an external and internal treatment approach was planned such that within a single intervention both lesions could be treated simultaneously. This plan also included orthodontic treatment to align and correct the malocclusion. A modified papilla preservation technique (Cortellini et al. 1995) (11) was performed over tooth 12 and 11 to expose the resorptive lesion. The granulation

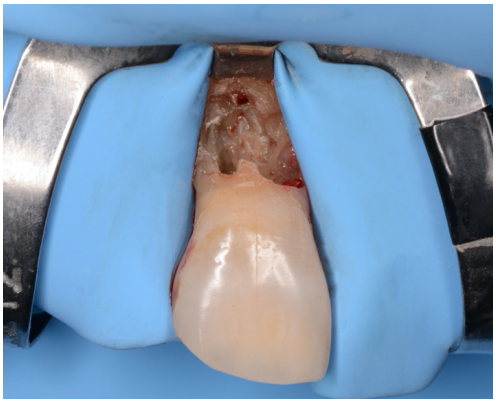

Figure 3
An absolute isolation of the resorptive cavity after excavation of the resorptive tissues.

Figure 4
A gutta-percha cone used to block the root canal and the application of the bonding agent to receive the restorative material.

tissue was removed using small excavators and absolute rubber dam isolation was performed (Figure 3, see supplementary video). An access cavity was made and reciprocating instrumentation using Reciproc 25 up to the middle third was performed to temporarily block the canal using a gutta-percha cone as an aid in endodontic treatment following surgery (Figure 4). A cotton pellet impregnated in 90% trichloroacetic acid was applied to the cavity intermittently for 5 minutes. Thereafter, the cavity was irrigated with saline and etched with 35% phosphoric acid for 15s. A dual cure adhesive (ExciTE® F DSC, Ivoclar Vivadent, Ellwangen, Germany) was rubbed over the cavity for 10 seconds and then air-dried for 2 s. The cavity was then sealed with a dual-cure cement (Geristore, DEN-MAT Corporation, Santa Maria, CA), applied directly with its mixing tip. It was then light-cured for 40 s and polished using Perio-set (Intensiv SA) and Soflex discs (3M ESPE, St Paul, MN, USA). As already planned, the flap was then extended to the tooth 21 using also the simplified papilla preservation technique between tooth 21 and 22. Deep scaling and root planning were performed with ultrasonic and manual scalers, and cemental tears were carefully removed (Figure 5 and 6, see supplementary video).
After a thorough cleaning, the flap was repositioned and sutured. After 7 days the sutures were removed and root canal treatment was completed for tooth 11, which was then filled using warm vertical condensation (Elements Free, SybronEndo; Orange, CA). At the 11-day post-surgery control visit, the patient was completely asymptomatic. The patient refused orthodontic treatment, opting instead for a more aggressive prosthetic treatment. A 10-month follow-up radiograph showed that both the teeth were healing (Figure 7) and were clinically asymptomatic (Figure 8). A flow chart demonstrated the summary of the treatmnets performed (Figure 9).

Discussion

The effectiveness of CBCT for planning and treating ECR has been shown previously (12). One study demonstrated the use of CBCT-generated digital models of ECR to help evaluate the tooth structure

Figure 5
An intra-operative picture demonstrating complete removal of cemental tears from the root surface of tooth 21.

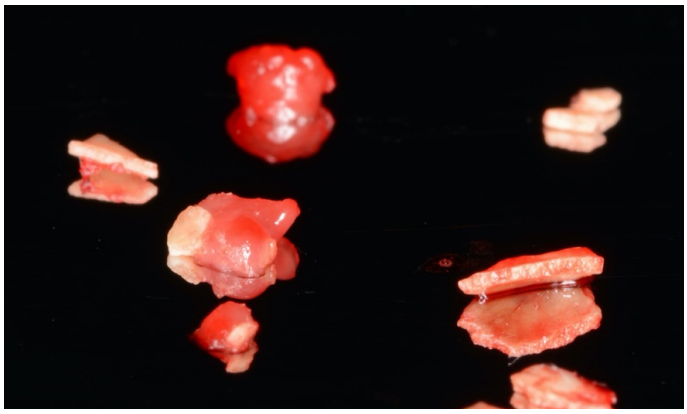

Figure 6
An image of the cemental tears removed from the root surface of tooth 21.

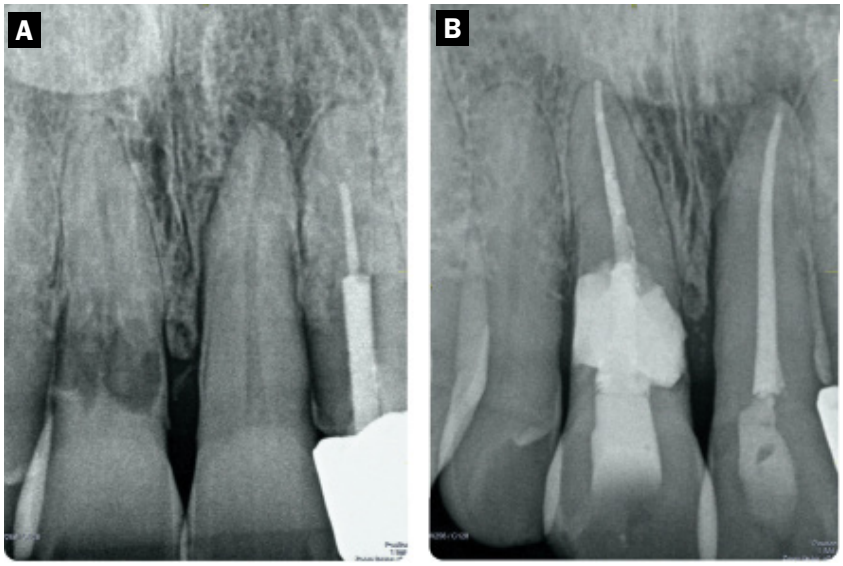

Figure 7
A comparison of **(A)** pre-operative and **(B)** 10-months post-operative periapical radiograph images demonstrating stability with no evidence of resorption recurrence.

and plan a more conservative treatment (13). The recent 3D classification by Patel et al. (5) overcomes the limitations of the previous 2D classification by Heithersay (4) while also allowing clinicians to plan an effective and more conservative treatment. While radiographically cemental tears are only detected half of the time (8), in this case report it was only detected through CBCT. Although, a small chip on the apical third along the root surface of tooth 21 was observable on the CBCT scan, during the surgical intervention it became clear that more incomplete separated chips were present. This might indicate the low sensitivity of CBCT towards cemental tear in this case, but is still a better alternative to periapical radiography.

Figure 8
A 10-month follow-up clinical picture demonstrating soft tissue stability with no evidence of resorption recurrence.

Heithersay recommended glass-ionomer cement as the material of choice for the restoration of ECR defects, although in this case Geristore®, a resin-modified glass ionomer cement was used. This material, compared to mineral trioxide aggregate (MTA) and glass-ionomer cement (GIC), has demonstrated to have enhanced biological behavior in human periodontal ligament cells and superior biocompatibility (14). Its fluoride-releasing properties and low shrinkage make this material a more reliable choice (15, 16).

The mechanism of cemental tear is unknown, but it has been linked with some predisposing factors such as >60 years of age, occlusal trauma, occlusal overloading, thicker or higher fragility of cementum, or also previous periodontal treatment. It largely affects the middle and apical third of the root and is related to recurrent periodontal abscesses (8). Hsueh-Jen Lin et. al. (8) had a success rate of 51.5% in 33 teeth treated for cemental tears. Almost half of the teeth (57.7%) were treated surgically, as was performed in the present case report. Lin et al. 2011 (8) considered cemental tear to be one of the reasons for the exposure of dentin that initiates ECR, however in this case it was not evident with tooth 11.

External cervical resorption and cemental tear maybe difficult to diagnose clinically, although in this case report CBCT proved to be very helpful in detecting both the pathologies (6, 17). Some predisposing factors like occlusal trauma, occlusal overloading and even previous periodontal treatment are common for both the pathologies, which might be the reason of development of ECR in one and cemental tear in the other tooth. Moreover, neither the coexistence of ECR and cemental tear due to the same predisposing factor nor any protocol to treat the same has been published in the literature. A multidisciplinary approach should be considered and the elimination of the predisposing factor is as necessary for the complete resolution of similar lesions.

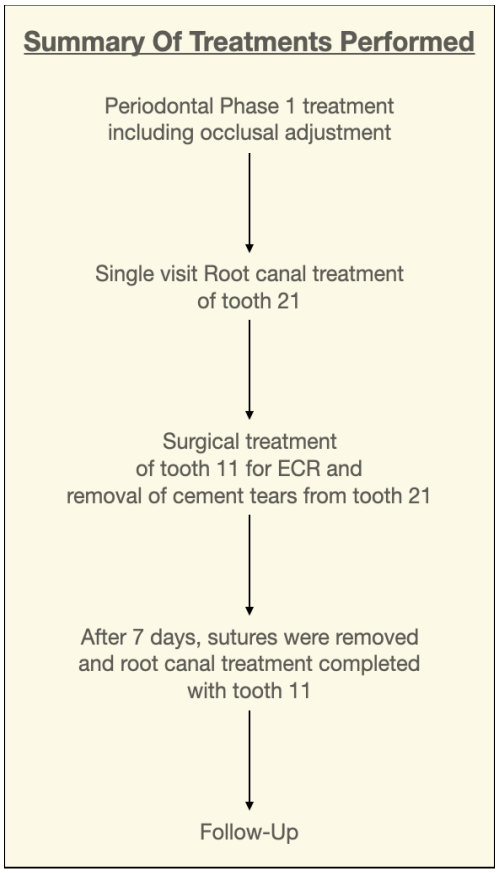

Figure 9
A flowchart demonstrating the summary of treatments performed.

Conclusions

The simultaneous occurrence of two different pathologies, ECR and cemental tear, in this case report had developed due to the same predisposing factor of trauma from occlusion. CBCT is an essential tool to diagnose cemental tear, although it cannot be relied on completely. An extensive evaluation of the restorability and the treatment outcome with the help of appropriate tools and knowledge should always be considered before treating such complex pathologies.

Clinical Relevance

Although occurrence of ECR and cemental tear is rare, a multidisciplinary approach with the correct use of CBCT is inevitable in such cases.

Conflict of Interest

The authors deny any conflicts of interest.

Acknowledgement

The authors deny any financial affiliations related to this study or its sponsors.

References

1. *Discacciati JAC, de Souza EL, Costa SC, et al. Invasive cervical resorption: etiology, diagnosis, classification and treatment. J Contemp Dent Pract. 2012;13:723-8.*
2. *Bergmans L, Van Cleynenbreugel J, Verbeken E, et al. Cervical external root resorption in vital teeth: X-ray microfocus-tomographical and histopathological case study. J Clin Periodontol. 2002;29:580-5.*
3. *Heithersay GS. Clinical, radiologic, and histopathologic features of invasive cervical resorption. Quintessence Int. 1999;30:27-37.*
4. *Heithersay GS. Invasive cervical resorption. Endod Top. 2004;7:73-92.*
5. *Patel S, Mavridou AM, Lambrechts P, et al. External cervical resorption-part 1: histopathology, distribution and presentation. Vol. 51, International Endodontic Journal. 2018. p. 1205-23.*
6. *Patel S, Kanagasingam S, Pitt Ford T. External Cervical Resorption: A Review. Vol. 35, Journal of Endodontics. 2009. p. 616-25.*
7. *Mavridou AM, Bergmans L, Barendregt D, et al. Descriptive Analysis of Factors Associated with External Cervical Resorption. J Endod. 2017;43:1602-10.*
8. *Lin HJ, Chan CP, Yang CY, et al. Cemental tear: Clinical characteristics and its predisposing factors. J Endod. 2011;37:611-8.*
9. *SC M. Textbook of Periodontia (Oral Medicine). J Am Med Assoc. 1950;91.*
10. *Cairo F, Nieri M, Cincinelli S, et al. The interproximal clinical attachment level to classify gingival recessions and predict root coverage outcomes: an explorative and reliability study. J Clin Periodontol. 2011;38:661-6.*
11. *Cortellini P, Prato GP, Tonetti MS. The Modified Papilla Preservation Technique. A New Surgical Approach for Interproximal Regenerative Procedures. J Periodontol. 1995;66:261-6.*
12. *Salzano S, Tirone F. Conservative nonsurgical treatment of class 4 invasive cervical resorption: A case series. J Endod. 2015;41:1907-12.*
13. *Espona J, Roig E, Durán-Sindreu F, et al. Invasive Cervical Resorption: Clinical Management in the Anterior Zone. J Endod. 2018;44:1749-54.*
14. *Gupta SK, Saxena P, Pant VA, et al. Adhesion and biologic behavior of human periodontal fibroblast cells to resin ionomer Geristore: A comparative analysis. Dent Traumatol. 2013;29:389-93.*
15. *Scherer W, Dragoo MR. New subgingival restorative procedures with Geristore resin ionomer. Pract Periodontics Aesthet Dent. 1995;7:1-4.*
16. *Mehrvarzfar P, Dahi-Taleghani A, Saghiri MA, et al. The comparison of MTA, Geristore® and Amalgam with or without Bioglass as a matrix in sealing the furcal perforations (in vitro study). Saudi Dent J. 2010;22:119-24.*
17. *Jeng P-Y, Luzi AL, Pitarch RM, et al. Cemental tear: To know what we have neglected in dental practice. J Formos Med Assoc. 2018;117:261-7.*