Cementodontinal Tear Associated with a Periodontal-Endodontic Combined Lesion: A Case Report with a 14-Month Follow-up

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This case report describes the diagnosis and multidisciplinary treatment of a clinically indiscoverable cementodontinal tear associated with a periodontal-endodontic combined lesion. The tear site was located at the palatal root surface of the maxillary left canine. Due to its position and concomitant periapical periodontitis, it was not noticed at the initial visit until a 3D CBCT examination was conducted. Through combined endodontic-periodontal therapy (which included root canal therapy, root debridement, and periodontal flap surgery), the tear fragment was removed, and the periapical lesion healed gradually. A histologic examination confirmed the definitive diagnosis of a cementodontinal tear. After 14 months, the periodontal and endodontic status of the maxillary left canine were stable. According to these results, CBCT examination and multidisciplinary cooperation seem to be effective and necessary for the diagnosis and treatment of such clinically indiscoverable cementodontinal/cemental tears. Int J Periodontics Restorative Dent 2022;42:e27–e32. doi: 10.11607/prd.5555

In the 1999 classification of periodontal diseases, cemental tears (CTs) were categorized as localized tooth-related factors that would modify or predispose individuals to plaque-induced gingival diseases or periodontitis.1 When CTs are in communication with the oral cavity or dental pulp, it could lead to rapid periodontal destruction, endodontic problems, or both.2

Although the etiology is uncertain, several predisposing factors have been proposed to be related to CTs, including age, gender, tooth type, and attrition.3 Among these, occlusal trauma was the factor mentioned most often. The reported clinical manifestations of CTs include gingival swelling, mucosal fistula, narrow periodontal pocket, periodontal and periapical bone destruction, tooth mobility, etc.2,4–6 Proper diagnosis usually needs assisting imaging examinations. CTs located on proximal surfaces could be discovered in periapical radiographs. However, the tear fragment may be undetected on buccal or lingual/palatal surfaces. Thus, the use of CBCT examinations could overcome the shortcomings of two-dimensional periapical films, detecting those hard-to-find tear fragments. To obtain optimal outcomes, the treatment plan should be multidisciplinary.

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Many CT cases were reported to be diagnosed through direct inspection of extracted teeth. However, definite diagnosis should only be confirmed by histologic examination.

The present case report presents an atypical case of cemen
todental tear associated with a periodontal-endodontic combined lesion, which was indicated by CBCT examination and affirmed through histologic evaluation of the removed fragment. The combined lesion was successfully treated by multidisciplinary therapy with a recorded 9-month follow-up.

Case Report

A 38-year-old woman came to the Hospital of Stomatology of Wuhan University with the chief complaint of intermittent gingival swelling on her maxillary left anterior teeth for more than 1 year. The patient had received fixed orthodontic treatment at a local dental clinic. She denied any history of trauma involving the maxillary left anterior teeth. There was a fistula on the buccal mucosa of the maxillary left canine without pus drainage (Fig 1a). It showed no response to a thermal test and slightly tender to palpation and percussion. The pocket probing depths (PPD) were 7 mm, 9 mm, and 10 mm at the distobuccal, midpalatal, and distopalatal sites, respectively. A periapical radiograph showed an S-shaped maxillary left canine root with an irregular radiolucent area on the distal and apical aspects. The film also revealed slight resorption of the root apex in the maxillary left canine and adjacent teeth (Fig 1b). Based on these findings, the site was diagnosed with a periodontal-endodontic combined lesion. The initial treatment plan included root canal therapy and nonsurgical periodontal therapy for the maxillary left canine.

After 1 month, following root canal disinfection with calcium hydroxide iodoform paste, the labial fistula still existed. To investigate further, CBCT examination was conducted. It revealed an incompletely separated fragment on the palatal root surface of the maxillary left canine, with a large area of bone loss (Fig 2). Therefore, a presumptive diagnosis referred to cemental tear associated with a periodontal-endodontic combined lesion. Root canal therapy was then completed (Fig 3), followed by nonsurgical root debridement to remove the separated fragment. One month after treatment, the labial fistula disappeared (Fig 4a). However, there was still a deep PPD of 8 mm at the
palatal aspect of the canine (Fig 4b). Thus, two treatment procedures were presented to the patient: (1) periodontal flap surgery to remove the fragment and to regenerate the periodontal bone defect if an intrabony component was detected, or (2) extraction of the maxillary left canine and restoration with an implant or fixed partial denture.

After communicating with the patient, the first plan was chosen. Under local anesthesia, a palatal full-thickness flap was elevated (Fig 5a). First, the tear fragment was totally removed with Gracey scalers, fixed in 10% formalin, and sent for histologic examination (Fig 5b). Then, the root surface was debrided with both mechanical and chemical methods (using 24% ethylenediaminetetraacetic acid [EDTA]) (Figs 5c to 5e). Finally, the flap was repositioned and sutured tightly (Fig 5f).

The histologic examination demonstrated that the fragment comprised radicular dentine and cellular cementum. A crack had formed along the cementum-dentin junction within the fragment (Fig 6). At 3 months postsurgery, the PPD was reduced to 5 mm, without bleeding on probing (Fig 7a), and a periapical radiograph showed increased bone density (Fig 7b). Due to the COVID-19 outbreak, the patient did not return to Wuhan until October 2020. After 14 months, the PPD at the palatal site was 4 mm, without bleeding on probing (Figs 8a and 8b). The CBCT images showed that the palatal root surface of the canine was smooth, and the radiolucent area had reduced (Figs 8c and 8d).

Discussion

CTs/cementodontinal tears are a kind of root surface anomaly that may cause periodontal destruction, endodontic lesions, or both. At an individual level, the results of a multicenter CT study comprising 71 patients showed that CTs occurred more often in men (74.1%), and the average patient age was 66.1 years.7 At the site level, it was reported that most CTs (79.6%) occurred on proximal surfaces.7 The present case involved a 38-year-old woman with a cementodontinal tear on the palatal surface of her maxillary left canine; these characteristics are distinct from aforementioned features and may indicate a specific pathogenesis within this case.

The etiology of CTs/cementodontinal tears remain unknown, but two have been proposed: external
factors and internal factors. Structural weakness of the cementum combined with stronger stress than normal within a short time may predispose a site to CTs. In the present report, the patient had a history of orthodontic treatment, and the radiographic examination at the first visit revealed the presence of root apex resorption on the maxillary left lateral incisor and canine. Further, the canine root contour was S-shaped, which may lead to an uneven stress distribution. Thus, the pathogenesis of the present case...
Clinical manifestations of CTs/cementodentinal tears included tissue swelling, pain, localized unexplained deep pocket, normal pulp vitality or unvital pulp irresponsive to endodontic treatment, concomitant apical periodontitis, etc. It was reported that 95.2% of CT cases presented vertical lesions along the root surface of the involved tooth, with the appearance ranging from D-shaped to J-shaped and having thin or thick vertical lines. However, these symptoms and signs were not specific for CTs, and differential diagnosis of CTs is more difficult in clinical practice. According to Lin et al, only 56.3% of CTs could be detected on preoperative radiographs. Two-dimensional radiographic techniques could not fully detect a complicated anatomic abnormality, potentially leading to clinical misdiagnosis and subsequent mistreatment. According to the European Academy of Dento-maxillofacial Radiology, basic CBCT use should potentially add new information to aid in patient treatment/management. In the present case, based on the patient’s medical history, clinical symptoms, and radiographic manifestations, the initial diagnosis was a periodontal-endodontic combined lesion. CBCT was not used until the initial endodontic treatment failed. Therefore, CBCT examination was suggested to investigate possible reasons for persisting periapical or periodontal lesions that could not be detected by periapical radiographs or other two-dimensional techniques. However, the definitive diagnosis of CTs/cementodentinal tears could only be confirmed by histologic examination of tear fragments.

The present case had an interesting histologic finding: The removed fragment’s components were cellular cementum and dentin (cementum had been historically classified into cellular and acellular). Cellular cementum was predominantly seen in the radicular and apical regions of root. The question emerged: Why did the cellular cementum appear at the cervical third of the root in this case? The functions of different kinds of cementum are diverse. Unlike acellular cementum, the function of cellular cementum was adaptation. It could...
also appear as reparative cementum filling resorbed root surfaces. In the present case, the presence of cellular cementum in the cervical third of the root may be a result of previous orthodontic treatment.

The key point of treatment of CTs/cementodentinal tears is to remove the stimulation (tear fragment). The next is to repair the periodontal and periapical defects. Successful outcomes can be achieved with both nonsurgical and surgical methods. CT prognosis can be affected by apicocoronal location of CTs and treatment techniques. The apicocoronal CT location could be noted in the cervical, middle, and apical thirds of the root. The middle third and apical third were more often seen (45.3% and 41.5%, respectively). When nonsurgical removal of the tear fragment is not working or the bony defects need to be restored through a regenerative method, surgical treatment should be conducted. Several regeneration methods have been reported to successfully treat intrabony defects associated with CTs, such as enamel matrix derivatives, barrier membranes, bone grafts, hyaluronic acid and platelet fibrin, etc. In some cases, extraction of the hopeless tooth is advisable for further restoration. The patient’s preference should also be considered. In the present case, because the location of the tear fragment was on the cervical third of the root, nonsurgical scaling and root planing of the canine were performed after root canal therapy. However, at the follow-up visit, the deep pocket did not reach a normal threshold. Thus, an exploratory surgery was conducted. Follow-up results showed that the combined endodontic and periodontal therapies were effective for this combined lesion.

**Conclusions**

CTs/cementodentinal tears are special types of root fracture. Owing to the low specificity of clinical manifestations and the high difficulty in discovering CTs in conventional two-dimensional radiographs, they pose great challenges for the clinician regarding diagnosis and treatment. The present case shows a persisting endodontic-periodontal lesion associated with a cementodentinal tear. Assisted radiographic examination using CBCT and a comprehensive plan were necessary for long-term success of the case.

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**References**