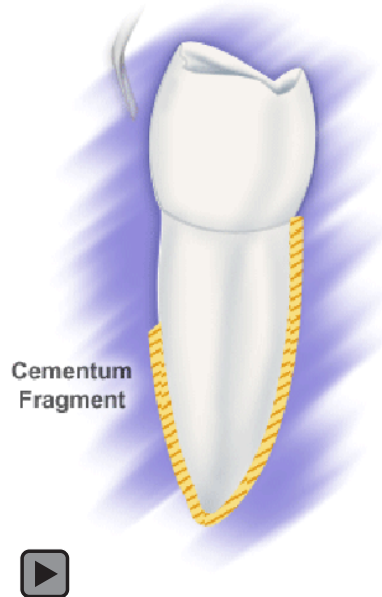


Atypical Localized Deep Pocket Due to a Cemental Tear: Case Report

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Abstract

A 71-year old patient with a history of minimal periodontal attachment loss presented with an asymptomatic, non-bleeding, isolated deep pocket on the mesio-facial of a central incisor. Such localized, deep pockets are most frequently associated with a root fracture or an abscess, but in this case an atypical ledge-like projection determined to be a cemental tear was detected at the base of the 6 mm pocket. Periodontal flap surgery revealed a partial detachment of the cementum. Uneventful resolution of the pocket was achieved following root planing to remove the cemental fragment and placement of a bone graft and resorbable membrane. This article reviews the nature, predisposing factors, causes, clinical significance, and treatment of cemental tears.

Keywords: Tooth injury, cemental tear, cemental separation, dental cementum

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Introduction

Cemental tears, also referred to as separations, may be more common than earlier believed and may represent an under-diagnosed entity.¹ Numerous articles based on the observation of extracted teeth¹⁻⁴ or on clinical cases⁵⁻⁸ present in-depth discussions about cemental tears, but periodontal textbooks often do not address the diagnosis and management of this injury.⁹⁻¹¹ Clinicians performing periodontal evaluations and debridements should be aware of this condition and be able to determine when it is present. This report is presented to help the practitioner recognize the signs and symptoms of these cemental injuries in order to aid in differential diagnosis and care planning.



Case Description

A mentally alert 71-year old male presented to the Dental Hygiene Clinic for routine periodontal maintenance procedures. He appeared to be a reliable historian and reported a history of coronary by-pass surgery and use of nitroglycerine on rare occasions. Daily medications included 10 mg Pravachol[®] for high cholesterol and .325 mg aspirin.

No significant findings were noted on the intra- or extra-oral dental examinations. There was generalized slight marginal plaque and gingival inflammation. Probing pocket depths ranged from 2 mm to 3 mm with isolated 4 mm pockets in molar interproximal sites. The maxillary left central incisor exhibited 2 mm of recession, and a 5 mm and 6 mm pocket were detected on the facial and mesial surfaces, respectively (Figure 1). Most molars had Class I furcation involvement on the facial and radiographs revealed generalized slight bone loss.

Evaluation and Treatment

The dental hygiene student noted the pockets on the central incisor had increased 2-3 mm over previous readings and also detected a hard, seemingly immovable, ledge-like projection on the root surface near the base of the pocket. The patient was unaware of the pocket, experienced no tenderness or bleeding, and reported no memory of a specific injury or trauma to the area.

A referral was made to the Graduate Periodontal Residency Clinic where flap surgery was performed. A partially detached cemental tear fragment was evident at the base of the pocket that was removed by root planing (Figure 2). A graft with .75 mg Biogran[®] was placed in the defect together with a resorbable membrane and the flap was replaced and sutured (Figure 3 and 4).



Figure 1.



Figure 2.



Figure 3.



Figure 4.

At one and two weeks following surgery, healing was progressing well and the sutures were removed. At one month, the membrane was exposed but healing continued and the patient had no complaints. Two months after surgery, gentle cleaning of the area and some minor occlusal adjustments were performed. At nine months, the pocket depths had been reduced by 2 mm and a slight increase in recession was noted on the facial aspect.

Radiographs taken prior to treatment and two years later were exposed at slightly different angulations but show little difference. (Figures 5, 6)



Figure 5.

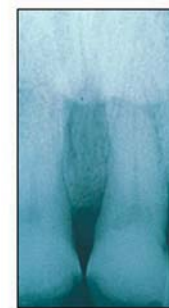


Figure 6.

Four years following the procedure, the pocket depths remained in the normal range, the gingiva appeared healthy, and no bleeding was present. (Figure 7)



Figure 7.

Cemental Tear

Description and Location

Cemental tears or separations can occur either as a split within the cementum that follows one of its incremental lines^{1,4} or more commonly as a complete separation along the cemento-dentinal border.^{1,2,4} Tears have been observed within unexposed cementum^{3,4,9,12} as well as in cementum exposed within the pocket.^{2,6,8} The cemental fragment can remain partially attached^{1,2,6} as in this case or be completely detached from the root surface.^{3,5,6,9,12} (Figure 8) In a study of 135 periodontally involved teeth that included both surgical and autopsy specimens, Moscow reported finding a number of tears. The vast majority were located directly adjacent to the CEJ and were distinguishable from preparation artifacts.²

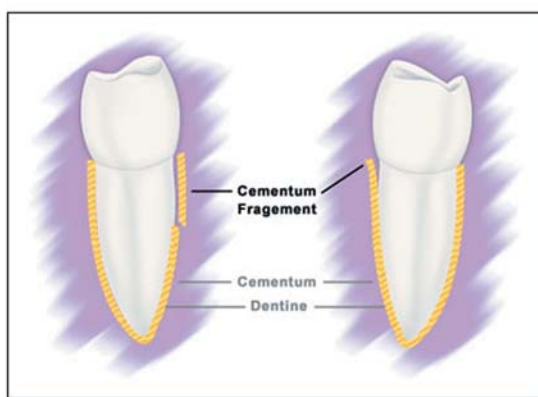


Figure 8. Complete and partial cemental tears

Causes and Predisposing Factors

Trauma is postulated to be the primary cause of cemental tears.^{4,5,9,12} Trauma can occur from an acute injury^{4,13} or from chronic excessive tensional

forces placed upon the periodontal ligament fibers due to severe occlusal overloading such as occurs in parafunctional habits.^{1,5,8} Forces exerted by ligament fibers when the tooth is under stress could lead to a separation of the cementum due to a weaker interconnection between unexposed cementum and dentin than between cementum and ligament fibers.^{1,13,14} This theory is strengthened by the fact a fiber connection does not appear to exist between cementum and dentin.¹ Instead, a glycoprotein-like layer has been reported to be deposited along the cementum-dentin interface.¹⁵

Functional forces on the teeth may also affect the quality and quantity of cementum deposition over time.¹ Significantly thicker cementum has been observed on tear surfaces than on like-surfaces without tears and may predispose the cementum to mechanical separation.^{1,5} Because more separations are observed in people over 50, other age-related changes such as impairment of the repair capacity, decreased extensibility of collagen, increased strength of principal fibers³, and reduced occlusal support have been suggested as predisposing factors.^{1,5} Within the subgingival environment, cementum lining the walls of periodontal pockets becomes more mineralized^{1,6} which may render it more brittle.² Localized trauma from hard foods, toothpicks or other objects, and gouging of cementum due to improper root instrumentation could conceivably cause cemental separations.²

In several case reports⁶⁻⁸, cemental tears appear to occur with equal frequency on vital and non-vital teeth. Although treated, non-vital teeth are more susceptible to root fractures. No link to cemental tears has been suggested in the literature.

Although no reports of tears have surfaced, Müller suggests clinicians be alert to the possibility of a cemental separation occurring subsequent to tissue regeneration procedures employed routinely in periodontal therapy. Histologic evidence is lacking that shows the regenerated cementum-dentin interface is as secure as the original interface.⁷

Clinical Significance and Treatment

A cemental separation may be asymptomatic, whether it is exposed to the oral environment within the pocket such as in this case report or occurs within periodontal tissues apical to the junctional epithelium. A fracture not exposed to the oral environment has the capacity to readily repair¹² and reattach to the dentin^{11,13,14} if the traumatic forces are removed.² Detached fragments of cementum can drift into surrounding tissues,^{6,14} marrow spaces, or even become fused to bone.²

If the detached cementum becomes exposed within the sulcus or pocket to the oral microflora, acute swelling, exudation, and pain can occur.^{5,6} In patients with preexisting periodontal disease, localized periodontal bone loss and pocket progression can be tremendously accelerated⁶⁻⁸ and accompanied by increasing hypermobility.⁷ Even in a non-infected site or mouth, a partial or complete cemental tear may initiate a rapid, site-specific periodontal breakdown⁵ which could lead to eventual tooth loss. Haney et al. describes a case in which a 79-year old female with “an intact periodontium (pocket depth 2 to 3 mm with no recession)” presented with an isolated 9-10 mm pocket on the distal of a vital mandibular premolar that served as an abutment tooth in a three-unit fixed bridge. The patient had noticed a painless swelling in the area for one week. Clinical examination revealed edema with suppuration, and a periapical radiograph disclosed an extensive vertical defect with a long, narrow “foreign body” lying parallel with and adjacent to the distal root surface (Figure. 9). After surgical removal, examination of the “foreign body” revealed two specimens of cementum 7 mm long and ranging between 2 mm to 4 mm wide. A freeze-dried bone allograft was placed after removal of the cementum fragments and the site healed uneventfully. Haney states the therapeutic prognosis may be different on non-vital teeth.⁵ A more recent report documents successful therapeutic results on non-vital teeth with tears.⁶

Root surfaces with cemental tears show greater attachment loss than intact cemental surfaces.¹ Leknes et al. examined seventeen extracted single-rooted teeth which exhibited one surface with a cemental tear and attachment loss. Mean attachment loss on the surfaces with the cemental tear was 9.7 mm and ranged from 5.0 mm to

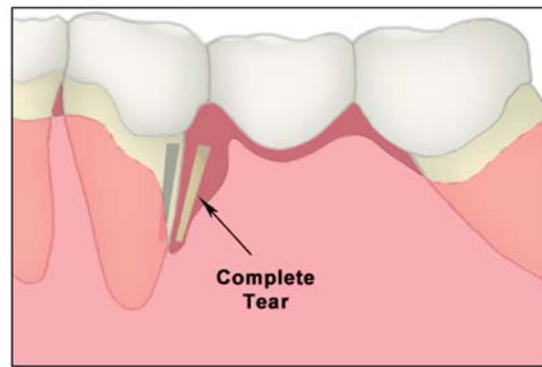


Figure 9. Complete cemental tear fragment on distal aspect of premolar (radiographic representation).

15.2 mm. Mean loss on intact surfaces was 6.1 mm and ranged from 2.0 mm to 12.0 mm. Three tears were located on mesial surfaces and seven tears were observed on both the distal and facial surfaces. Nine of the seventeen teeth were non-vital.¹

In 1969, Moscow drew attention to the role of cemental tears in calculus formation and proposed that cemental separations be considered another mode of calculus attachment² in addition to the universally recognized four modes originally described by Zander.¹⁸ Calculus formation relative to cemental tears within periodontal pockets has obvious implications during periodontal instrumentation. A summary of the clinical consequences of exposed and unexposed cemental tears appears in Table 1.

Table 1. Consequences of Cemental Tears

1. Repair if unexposed to oral environment
2. Rapid loss of periodontal attachment
3. Acute swelling
4. Pain or pain that is difficult to diagnose
5. Retentive site for plaque and calculus

Several case reports describe successful therapeutic outcomes for cemental tears.^{5,8} Essential to treatment is the removal of the cementum fragment by mechanical instrumentation. Chlorhexidine gluconate rinses (0.12% to .20%)^{5,8} and locally delivered⁶ or systemically administered antibiotics have been used to aid in post-surgical healing.^{5,8}

Successful treatment of accelerating pre-existing periodontal defects with guided tissue regenera-

tion procedures has been reported.^{7,8} Harrel and Wright describe the use of a minimally invasive surgical approach that has been shown to result in apparent bone regeneration and helps to preserve papillary contours and tissue height.⁸

Discussion

This case report presents an example of an atypical, localized pocket associated with a cemental tear that resolved uneventfully following appropriate periodontal therapy. No histologic examination of the removed fragment was conducted, as the partially attached tissue was clinically typical of a partial cemental tear. The surgical removal of the cementum fragment and subsequent graft procedure has been used successfully in other cases of cemental tears.⁵⁻⁷ Although this 71-year old patient presented with no symptoms and had no memory of trauma to the area, it is conceivable age-related changes predisposed the tissues to injury from an acute traumatic event, such as hitting the tooth with a drinking glass. Other predisposing factors to cementum tears are listed in Table 2.

Table 2. Predisposing Factors for Cemental Tears

1. Age-related tissue changes
2. Occlusal loading
3. Increased thickness of cementum on distal root surfaces
4. Increased mineralization and brittleness of cementum lining the periodontal pocket

An accurate diagnosis was essential for the effective treatment of this localized, deep defect. Differential diagnoses includes root fractures (particularly in endodontically treated teeth or bridge abutments), periapical infection, periodontal abscess caused by a foreign body or incomplete instrumentation, and loss of attachment due to cemental tears (Table 3).

Table 3. Differential Diagnosis of Isolated Deep Pockets

1. Root fracture — especially in endodontically treated teeth
2. Periodontal abscess
3. Endo-perio infection
4. Cemental tear

Cemental separations may be asymptomatic, as in this case report, or present with acute swelling with or without pain. Diagnosis is complicated if a cemental tear occurs on a non-proximal surface as radiographic evidence would be non-existent. In such cases, surgery may be necessary to establish a definitive diagnosis.⁵

Conclusion

Detection of a deep, isolated defect or rapidly advancing pocket, especially in a mouth with minimal periodontal disease or involvement should raise suspicion of a non-periopathogenic etiology. To improve the likelihood of effective pocket resolution, periodontal debridement should be delayed until a diagnosis has been established. Defects exhibiting partial or complete cemental tears have been successfully treated using periodontal surgical approaches.

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