

# A Retrospective Study of the Prevalence of Cemental Tear in a Sample of the Adult Population Applied Ondokuz Mayıs University Faculty of Dentistry

*Ondokuz Mayıs Üniversitesi Diş Hekimliği Fakültesi'ne Başvuran Yetişkin Popülasyonda Semental Ayrılma Prevalansının Retrospektif Analizi*

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## Keywords

Radiography, prevalence, cemental tear

## Anahtar Kelimeler

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## Abstract

**Objective:** The present study aimed to determine the prevalence of cemental tears and evaluate its relation with patient gender, age and tooth type in a population of adult dental patients applied to the university hospital in the center Black Sea Region of Turkey.

**Materials and Methods:** Periapical radiographs of 4629 permanent teeth of 1451 adult patients were examined and teeth with cemental tears were recorded. The patients' biographic data and dental history (age, gender and treatment history) from the patient database were also recorded. Possible relationships with the patient age, patient gender, tooth type, tooth region, presence of previous root canal treatment and the presence of apical periodontitis lesions were evaluated. Pearson chi-square test was used to analyze data statistically.

**Results:** Cemental tears were detected in the periapical radiographs of 13 patients (0.89%) of the total 1451 patients. The prevalence of the cemental tears showed no significant relation with the age and gender of the patients or tooth type ( $p>0.05$ ). Maxillary teeth showed more cemental tears than the mandibular teeth did ( $p<0.05$ ) and significantly more frequent cemental tears were detected in teeth showing periapical lesions ( $p<0.05$ ).

**Conclusion:** The presence of cemental tears is a rare entity in dental clinics. However clinicians should consider the presence of cemental tears especially in the examination and treatment planning of teeth with periodontal or periapical involvement.

## Öz

**Amaç:** Bu çalışmanın amacı, Türkiye'nin Orta Karadeniz Bölgesi'nde üniversite diş hastanesine başvuran yetişkin popülasyonda görülen semental ayrılma prevalansının belirlenmesi ile semental ayrılmanın hasta yaşı, cinsiyeti ve diş tipi ile ilişkisinin değerlendirilmesidir.

**Gereç ve Yöntemler:** Bin dört yüz elli bir yetişkin hastanın 4629 daimi dişine ait periapikal radyografiler incelenerek semental ayrılma saptanan örnekler kaydedildi. Hastaların sistemde kayıtlı olan kişisel bilgileri ile dental tedavi kayıtları (yaş, cinsiyet ve uygulanan tedaviler) incelendi. Semental ayrılma ile hasta yaşı, cinsiyeti, diş

tipi, dişlerin ait oldukları çeneler, kök kanal tedavisi varlığı ve periapikal lezyon varlığı ilişkileri değerlendirildi. Elde edilen verilerin istatistiksel analizi için Pearson ki-kare testi kullanıldı.

**Bulgular:** İncelenen hastaların 13'ünün periapikal radyografilerinde semental ayrılma saptandı (%0,89). Semental ayrılma prevalansının hasta yaşı, cinsiyeti ve diş tipi ile anlamlı ilişki göstermediği saptandı ( $p>0,05$ ). Maksiller dişlerin mandibular dişlere göre daha fazla semental ayrılma gösterdikleri ( $p<0,05$ ) ve periapikal lezyonlu dişlerde semental ayrılmanın daha sıklıkla olduğu bulundu ( $p<0,05$ ).

**Sonuç:** Semental ayrılma diş hekimliği kliniklerinde nadir görülmektedir. Buna rağmen klinisyenler özellikle periodontal veya periapikal tutulum gösteren dişlerin muayenesinde ve tedavi planlamasında semental ayrılmayı akılda tutmalıdırlar.

## Introduction

Cemental tear is an uncommon type of root fracture, which is associated with periodontal tissue destruction (1). A cemental tear is defined as an incomplete or complete separation within root surface along the cementodentinal tissue or along an incremental line (1-3). Development mechanism of cemental tears is not completely elucidated, but several etiologic factors have been attributed to cemental tears such as age, traumatic occlusion, trauma, previous periodontal treatment and attrition (1,4,5). Lin et al. (4) reported that age, sex, tooth type and attrition were the major predisposing factors of teeth with cemental tears.

Cemental tears are usually diagnosed during radiological examination as an angular bone loss along the root surface, which causes attachment loss and deep probing defects. Tissue swelling, pulp vitality and periodontal/periapical bone loss are major diagnostic signs of cemental tears (4,6). Cemental tear diagnosis can be further confirmed by histopathological examination of fractured fragments that are removed by surgically or nonsurgically (6). This entity can be misdiagnosed as periodontal and/or endodontal lesion and cause progressive bone loss or even tooth loss if left untreated (4). The treatment of cemental tears depends on apicocoronal location of fractured fragments with the aim of regeneration of periodontal tissues and retention of affected tooth (7). Cemental tears can be removed by scaling and root planning without periodontal surgery (1,8). When nonsurgical treatment option is not available, surgical interventions including surgical debridement with periodontal/apical surgery, surgical debridement combined with guided tissue regeneration, bone grafting, and extraction are other treatment options (7). Therefore accurate diagnosis of cemental tears is crucial for the prognosis of affected teeth. To the authors' knowledge no study has investigated the incidence of cemental tear in a population, yet.

The present retrospective study aims to determine the prevalence and distribution of cemental tears regarding tooth type, age and gender of the patients in adult dental patients in the center Black Sea region of Turkey.

## Materials and Methods

This retrospective study, which utilized both clinical and radiological examinations of patients, was conducted from June 2015 to January 2017. A total of 1451 patients, who applied Ondokuz Mayıs University Endodontics Department were evaluated. Patients who were younger than 18 at the time of radiological examination, had records without periapical radiographs or with radiographs showing poor quality were excluded from the study. Impacted teeth, retained primary dentition were not evaluated. Consequently, 4629 teeth of 1451 patients were included to the study.

Demographic data, medical and dental history and clinical examination were recorded at patient information sheets. The patients were radiographed by the same operator using phosphor plates (Dürr-Dental, Bietigheim, Germany) with the parameters set at 65 kVp, 7.5 mA and 0.2 s exposure time. All radiographs were acquired with the bisecting technique. All of the phosphor plates were scanned with the scanner (Dürr-Dental) and obtained images were recorded in TIFF format. Images were evaluated by the two researchers using the same conditions with no adjustment in contrast, brightness and magnification properties independently. Cemental tears were searched and detected as described by Lin et al. (6). Radiopaque fractured root fragments alongside the root surfaces were selected and evaluated. 96.1% interexaminer agreement was achieved as result of independent evaluations. Any discrepancies were reevaluated and resolved in a second joint session.

No interexaminer analysis was performed because the diagnosis of the presence of cemental tear was an objective assessment. Differences by age, gender, tooth type (incisor, premolar or molar), tooth region (maxillary or mandibular), previous treatment (no treatment or previous root canal treatment) and presence of apical periodontitis lesions were analyzed by Pearson chi-square test with significance rate set at 5%. All statistical analyses were performed using SPSS (SPSS version 21.0, Chicago, IL).

## Results

Out of 1451 patients 508 (35.01%) were from male patients. The largest concentration of people by age group was between 30-40 years of age (32.9%) and a mean age was 33.6. Table 1 and 2 give an overview of the data distribution according to the gender and age.

Cemental tears were detected in the periapical radiographs of 13 patients (0.89%) (Figure 1). Chi-square tests revealed that there were no significant

differences regarding the occurrence of cemental tears related to age, gender and tooth type ( $p>0.05$ ). On the other hand, significantly greater cemental tears were detected in maxillary region compared to mandibular region ( $p<0.05$ ). Ten of the 13 subjects (76.9%) had no previous root canal treatment and statistical analysis revealed that cemental tears were detected more frequently in teeth with no previous root canal treatment ( $p<0.05$ ). Eleven of the 13 subjects (84.6%) had apical periodontitis lesions. The difference between the presence and absence of apical periodontitis lesion was significant ( $p<0.05$ ).

## Discussion

The cemental tear is an important however neglected endodontal-periodontal entity due to its uncommon nature (1,4). Most of the cemental tears might reveal the radiological characteristics that mimic periapical and/or lateral lesions (4,9-11). In some of these cases that actually required root canal treatment, the completion of treatment might not result in full periapical healing, which might lead to the misdiagnosis of persistent apical periodontitis and unnecessary retreatment procedures. There also might be cases with primary periodontal involvement and vital pulps that do not necessitate root canal treatment, will be root canal treated in vain. In these cases unnecessary root canal treatment could not solve the problem. Therefore, clinicians should consider the cemental tears during preoperative periapical radiographic examinations. Examination of pulp vitality in an untreated tooth and investigation of a radiopaque foreign body structure near the root might help clinicians to diagnose this rare entity.

The incidence of cemental tears is not known and possibly under-reported according to the Leknes et al. (1). The present study aimed to evaluate the incidence

Gender	Number of patients	Number of patients with cemental tears (%)
Female	943	8 (61.6%)
Male	508	5 (38.4%)

Age interval	Number of patients	Number of patients with cemental tears (%)
19-30	443	4 (30.7%)
31-40	478	4 (30.7%)
41-50	254	2 (15.38%)
51-60	276	3 (23.07%)



**Figure 1.** Appearance of cemental tears in periapical radiographs depicted in circled areas

of cemental tears from a prospective point of view and possible correlations between the cemental tears and age, gender, tooth type, tooth region, presence of apical periodontitis and the presence of previous root canal treatment. The results of the present study indicated that the incidence of cemental tears was rare and the presence of the cemental tears was not dependent on the age or the gender of the patient. There is only one study reporting the associated clinical factors related to the occurrence of cemental tears over 20 years data collection (6). Authors collected 54 teeth showing cemental tears and reported that cemental tears were more prevalent in males and patients over 60 (6). The differences between the results of the study could be attributed to the difference study populations and smaller sample size of the present study compared to the previous. On the other hand the present study is the first to provide information on the prevalence of the cemental tears in the center Black Sea region of Turkish subpopulation, which applied to the Ondokuz Mayıs University Faculty of Dentistry for dental care. The prevalence rate was detected as 0.89% and the teeth with apical periodontitis lesions tended to present with the cemental tears more frequently. Literature research revealed no study on the prevalence rate of apical periodontitis, however a previous study conducted on the same region reported the prevalence rate of posttreatment apical periodontitis as 39.4% (12). Despite the low prevalence rate clinicians should consider the occurrence of cemental tears during preoperative periapical examinations.

Panoramic and periapical radiographs or both are the main diagnostic materials that might be used for evaluating periapical status in an epidemiological study (13,14). Similar diagnostic accuracy rates have been reported by the studies comparing the periapical and panoramic radiographs (15,16). Periapical radiography was utilized as survey tool for this study because of the advantages such as showing higher sensitivity than panoramic radiography when detecting periapical lesions of the anterior teeth and mandibular molars (17).

Main limitation of this retrospective study was the use of the radiographs to diagnose cemental tears. The certain diagnosis of cemental tears is based on the histopathological examination of the surgically or nonsurgically removed fragments (7). The conditions

of the cases were not known due to the retrospective nature of the study. No further treatment to remove the cemental tears was also recorded in the patient database. The periapical radiographs presented no information about the elapsed time of root canal treatment and the effect of cemental tears on the healing capacity of apical lesions. Moreover, periapical radiographs taken at varying angulations can detect cemental tears located in mesial or distal aspect of the roots, however it would be unable to diagnose cemental tears located in buccal or lingual/palatal aspects.

There is a recent report on the treatment outcome of the teeth with cemental tears and the authors reported that teeth with cemental tears would be inevitably extracted due to extensive periodontal and periapical bone loss if left untreated (7). Marquam (11) reported that cemental tears might be self-repaired or remain without symptoms if they are unexposed to oral environment. However, they might also cause rapid periodontal attachment loss, acute swelling and pain when exposed to oral environment. Furthermore, they might present retentive areas for plaque accumulation and lead further calculus formation (11). It has been reported that the majority of teeth showing cemental tears can be retained following nonsurgical or surgical periodontal and endodontic treatments. Treatment options of the cemental tears are variable such as scaling/root planing, root canal treatment, periodontal flap operation, and apical surgery in order to remove fractured fragments (7). Selection of the appropriate treatment option depends on the clinical and radiological features of the teeth as well as the systemic health of the patient.

## Conclusion

Within the limitations of this retrospective study, overall prevalence of the cemental tears is reported as 0.89%. The occurrence of the cemental tears was not dependent on the age and the gender on the patients, while they were more frequent in teeth with periapical lesions. Clinicians should know about this disease entity to make accurate diagnosis for the improved treatment outcome of teeth showing periapical pathosis. The presence of cemental tears might be considered when endodontic treatment of the affected tooth fails to heal sinus tracts or in the presence of localized periodontal defects.

**Ethics****Ethics Committee Approval:** Retrospective study.**Informed Consent:** Retrospective study.**Peer-review:** Externally peer-reviewed.**Authorship Contributions**

Concept: C.K., D.H.G., Design: C.K., D.H.G., Data Collection or Processing: C.K., D.H.G., Analysis or Interpretation: C.K., D.H.G., Literature Search: C.K., Writing: C.K., D.H.G.

**Conflict of Interest:** No conflict of interest was declared by the authors.

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