

Talon Cusp on a Maxillary Central Incisor: A Case Report with Clinical and Radiological Findings, and Management

Maksiller Santral Kesici Dişte Talon Tüberkülü: Klinik ve Radyolojik Bulguları ve Tedavisi ile bir Vaka Sunumu

Tuğçe GÜNGÖR¹, Ezgi TÜTER BAYRAKTAR², Bilge TARÇIN³, Birsay GÜMRÜ⁴

ABSTRACT

Dens evaginatus (DE) is a developmental dental anomaly and is defined as a tubercle-like structure that may contain pulp tissue as well as enamel and dentin. Although it is usually associated with premolars, it is also seen in incisors (talon cusp). This anomaly, which is more common among Asians, may affect both genders and may be observed unilaterally or bilaterally. Clinically, it may cause complications such as caries, malocclusion, occlusal trauma, and pulp necrosis. Radiologically, the V-shaped radiopaque structure superimposed over the affected crown may mimic the appearance of a mesiodens, compound odontoma, or supernumerary tooth. Clinical and radiological examination of a 16-year-old male patient who admitted to our clinic with aesthetic concerns and treatment of decayed teeth was performed. In the intra-oral examination, a conical accessory cusp was noted on the lingual surface of the left maxillary central incisor. A typical V-shaped radiopaque structure superimposed on the affected crown was observed on the periapical radiograph taken from the relevant area. Cone beam computed tomography (CBCT) imaging was used to evaluate the restorative treatment options by examining the pulp extension in

the relevant tubercle. The patient was referred to the Department of Restorative Dentistry for restoration of the retentive areas and caries. DE, which is a rare anomaly, should be evaluated together with clinical and radiological findings. Consideration of genetic transmission is quite important for early diagnosis. CBCT imaging will provide significant advantage to the clinician in preventive and minimally invasive applications.

Keywords: dens evaginatus, talon cusp, accessory cusp, cone beam computed tomography, management

ÖZ

Dens evaginatus (DE) gelişimsel bir dental anomali olup, mine ve dentin dokusunun yanı sıra pulpa dokusunu da içerebilen tüberkül benzeri yapı olarak tanımlanmaktadır. Genellikle premolar dişlerle ilişkilendirilmekle birlikte, kesici dişlerde de görülmektedir (talon tüberkülü). Asya kökenlilerde daha sık rastlanan bu anomali, her iki cinsiyeti de etkileyebilmekte ve unilateral veya bilateral olarak izlenebilmektedir. Klinik olarak; çürük, maloklüzyon, oklüzal travma ve pulpa nekrozu gibi komplikasyonlara sebep olabilir. Radyolojik olarak, etkilenen kuron üzerine süperpoze olan "V" şeklindeki radyo-opak yapı mesiodens, compound odontoma veya sürnumerer diş görüntüsünü taklit edebilir. Estetik kaygılar ve çürük dişlerinin tedavisi için kliniğimize başvuran 16 yaşındaki erkek hastanın klinik ve radyolojik muayenesi gerçekleştirilmiştir. İntra-oral muayenede, sol maksiller santral kesici dişin lingual yüzeyinde konik şekilli aksesuar tüberkül saptanmıştır. İlgili bölgeden alınan periapikal radyografide, etkilenen kuron üzerine süperpoze olmuş tipik "V" şekilli radyo-opak yapı izlenmiştir. İlgili tüberküldeki pulpa uzantısının incelenmesi ve restoratif tedavilerin bu doğrultuda şekillendirilmesi için konik ışınli bilgisayarlı tomografi (KIBT) görüntülemeye başvurulmuştur. Hasta, retatif alanların ve çürüklerin restorasyonu için Restoratif Diş Tedavisi Anabilim Dalı'na sevk edilmiştir. Nadir rastlanan bir anomali olan DE, klinik ve radyolojik bulgularla birlikte değerlendirilmelidir. Genetik aktarımın göz önünde bulundurulması erken tanı açısından oldukça önemlidir. Koruyucu/önleyici ve minimal invaziv uygulamaların KIBT görüntüleme ile desteklenmesi klinisyene önemli avantaj sağlayacaktır.

Anahtar Kelimeler: dens evaginatus, talon tüberkülü, aksesuar tüberkül, konik ışınli bilgisayarlı tomografi, tedavi

Tuğçe Güngör (✉)

Department of Oral and Maxillofacial Radiology, Faculty of Dentistry, Marmara University, 34854, Istanbul, Turkey.

Phone: +90 216 777 50 00;

e-mail: tugce.gungor@marmara.edu.tr

Ezgi Tüter Bayraktar

Asst. Prof. Dr., Department of Restorative Dentistry, Faculty of Dentistry, Marmara University, Istanbul, Turkey

Bilge Tarçın

Assoc. Prof. Dr., Department of Restorative Dentistry, Faculty of Dentistry, Marmara University, Istanbul, Turkey

Birsay Gümrü

Prof. Dr., Oral and Maxillofacial Radiology, Faculty of Dentistry, Marmara University, Istanbul, Turkey

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INTRODUCTION

Dens evaginatus (DE) is a relatively uncommon developmental abnormality of teeth, which is typically observed in the premolars and/or incisors as an accessory cusp involving normal enamel and dentin tissues and may contain an extension of the pulp. Usually, it is seen in the premolars symmetrically (Levitani et al., 2006). When the protuberance is on an incisor, it is specifically referred to as “talon cusp” (TC). Relatively large TCs protruding from the surface of the crown most likely contain also pulp tissue (Hattab et al., 1996).

A horn-like protuberance extending from the palatal surface of a maxillary central incisor was first reported in 1892 (Mitchell, 1892), and Mellor and Ripa subsequently named the anomaly as TC (Mellor and Ripa, 1970). In the classification system proposed by Hattab et al., 3 types of TC (namely talon, semitalon, and trace talon) were listed considering the degree of formation and extension (Hattab et al., 1996):

Type 1 (talon): A well-defined accessory cusp that protruding prominently from the palatal surface of a primary or permanent anterior tooth and exceeding half the distance between the cemento-enamel junction (CEJ) and the incisal edge.

Type 2 (semitalon): An accessory cusp of a millimeter or more but not exceeding half the distance between the CEJ and the incisal edge. It may blend with the palatal surface or stand apart from the rest of the crown.

Type 3 (trace talon): Large or prominent cingulum and variations such as conical, bifid, or tubercle-like. Typically, it may appear on radiographs as a V-shaped radiopaque structure arising from the cervical third of the root as for the talon and semitalon.

The term “TC” and this classification system have been widely used in most studies to name and classify this dental anomaly (Mellor and Ripa, 1970; Hattab et al., 1996; Al-Omari et al., 1999; Özkan et al., 2016).

In this study, a case of unilateral dens evaginatus in a maxillary central incisor is presented along with the clinical and radiological findings and its restorative treatment.

CASE REPORT

A 16-year-old male patient applied to our clinic with aesthetic concerns and complaint of caries. He reported

no systemic diseases, history of severe illness, or orofacial trauma. The patient stated that his primary teeth erupted uneventfully; however, he recognized an abnormality in the permanent dentition, in his words “double teeth.” No other member in his family had similar dental anomalies.

Intra-oral examination revealed poor oral hygiene, gingivitis, multiple white spot lesions, and carious teeth. In addition, an accessory cusp on the palatal surface of the maxillary left central incisor was observed and diagnosed as TC. The well-defined, large, conical-shaped TC extending from the CEJ to 0.5 mm of the incisal edge on the palatal surface of the affected tooth was diagnosed as Type 1 (talon) considering the classification of Hattab et al. (1996). The taloned tooth with normal response to electrical pulp testing had a deep, prominent developmental groove with plaque accumulation as well as a carious lesion (Figure 1A). Bodily labial displacement of left maxillary central incisor and lingual displacement of the left mandibular central incisor in the opposite arch caused a mild crowding in the anterior region (Fig 1B).



Figure 1. A) Well-defined, large, conical-shaped TC extending from the CEJ to 0.5 mm of the incisal edge on the palatal surface of the maxillary left central incisor. **B)** Mild anterior crowding caused by bodily labial displacement of left maxillary central incisor and the lingual displacement of the tooth in the opposite arch.

Although various pathologies such as supernumerary teeth, double teeth, hypodontia, megadontia, dens invaginatus, exaggerated cusp of Carabelli, bifid cingula, shovel-shaped incisors, and ectopic canine have been associated with TC in many studies (Davis and Brook, 1986; Hattab, 2014), no other pathology was observed in the panoramic radiographic examination (Figure 2A). The pulp tissue was not fully visualized on the periapical radiograph, presumably because of the sharp cusp tip protruding from the crown (Figure 2B). The cone beam computed tomography (CBCT) scan confirmed extension of the pulp tissue into the TC (Figures 3A&B). The enamel-dentin thickness was measured as 1.5 mm at the relevant tubercle.

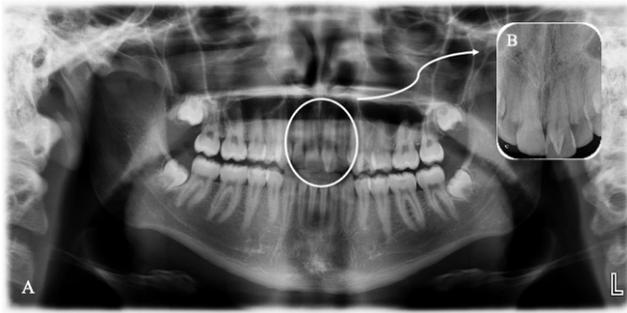


Figure 2. A) Panoramic radiography of the patient with no other pathology. B) Periapical radiograph of taloned tooth in which pulp tissue was not fully visualized.

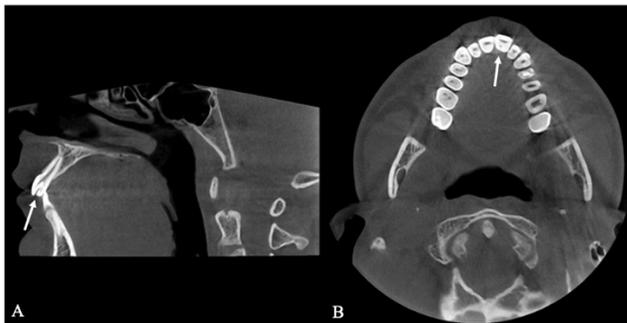


Figure 3. Sagittal (A) and axial (B) CBCT images of the taloned tooth showing the extension of the pulp.

The patient was referred to the Restorative Dentistry Department with the diagnosis of TC, and the measurements of the enamel-dentin thickness were provided to the clinicians for consideration in case of pulpal exposure during restorative procedures. Considering the pulp extension in the TC, a consensus was reached on the steps of the restorative treatment as follows:

1. Removal of the carious lesion on the affected tooth (Figures 4A&B).
2. Shaping the cusp into a prominent cingulum by removing 1.5 mm of enamel-dentin tissue so as to avoid exposure of the pulp (Figure 4B).
3. Filling the retention areas and the groove with a resin-based restorative material (Figure 4C&D). In this specific case, dline 37% phosphoric acid etching gel (UAB Medicinos Linija, Lithuania), G2-Bond Universal bonding (GC, Japan), Nexcomp Flow flowable composite resin (Meta Biomed, Korea), G-aenial A'Chord composite resin (GC, Japan) were respectively used in the restorative procedure.

4. Occlusion control and removal of the interferences that may cause occlusal trauma.
5. Application of Ionite APF (acidulated phosphate fluoride) thixotropic gel (1.23% fluoride ion; Dharma Research Inc., USA) for 4 minutes.

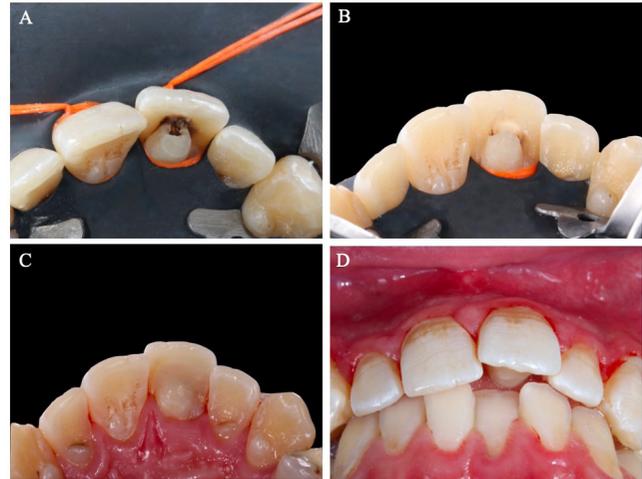


Figure 4. A) Removal of the carious lesion, B) Shaping the cusp into a prominent cingulum, C) Filling the retention areas and the groove with a resin-based restorative material, D) Final restoration of the taloned tooth following occlusion control and removal of the interferences.

DISCUSSION

TC is a developmental dental anomaly in the form of an accessory tubercle-like structure protruding from the cingulum or CEJ of the primary or permanent maxillary or mandibular anterior teeth. It may appear as a pyramidal, conical, bifid, tubercle-like, or horn-like cingulum. The tip of the abnormal cusp may be spike-like and sharp, or vice versa, smooth and rounded (Hattab et al., 1996). TCs may be observed unilaterally or bilaterally on the labial, lingual, or palatal surfaces of the affected teeth (Hattab, 2014).

TC is more common in males in comparison to females. The higher gender ratio in primary teeth (3.5:1) compared to permanent teeth (1.8:1) may be attributed to the limited number of TC diagnosis in primary teeth (Hattab, 2014). However, in a recent study, no association was found between the anomaly and gender (Decaup et al., 2021).

In different populations, considerable variation in the prevalence of TC ranging from 0.06 to 40.8% is reported. In a recent systematic review and meta-analysis, the anomaly is reported to be observed in 1.67% of the population

(Decaup et al., 2021). There are considerably more reports of Mongoloid or Arabic patients. Apart from racial variations, the lack of strict criteria for defining an accessory cusp as “talon” has also resulted in variations in prevalence (Hattab, 2014).

Although the exact aetiology of TC is uncertain, it is suggested to be a normal consequence of the outward bulging of the inner enamel epithelial cells and focal hyperplasia of the mesenchymal peripheral cells of dental papilla during the morphodifferentiation stage of tooth development (Hattab et al., 1996). Some researchers emphasized on genetic factors by reporting twins, siblings, and cousins (Liu and Chen, 1995; Hattab et al., 1998; Segura and Jimenez Rubio, 1999; Elmubarak, 2019). Moreover, remarkable racial and gender differences, bilateral distribution in some cases, and association with other syndromes and dental anomalies suggest the genetic aetiology of TC (Hattab et al., 1995).

TC cases have frequently been associated with various entities including mesiodens, odontoma, supernumerary teeth, hypodontia, hyperdontia, dens invaginatus, fused teeth, geminated teeth, and radicular anomalies, and syndromes such as Mohr syndrome, Rubinstein-Taybi syndrome, Sturge-Weber syndrome, incontinentia pigmenti achrominas, Eлли-van Creveld syndrome, Alagille’s syndrome, oculo-facio-cardio-dental syndrome, and KGB syndrome (Goldstein and Medina, 1974; Gardner and Girgis, 1979; Chen and Chen, 1986; Tsutsumi and Oguchi, 1991; Hattab et al., 1998; Çubukçu et al., 2006; Gündüz and Açıkğöz, 2006; Chatterjee and Mason, 2007; Danesh et al., 2007; Almandey et al., 2010; Babaji et al., 2010; Dinesh Rao and Hegde, 2010; Nagaveni et al., 2010; Lozic et al., 2012; Jaya et al., 2013; Bargale et al., 2014; Hattab, 2014; Babaji, 2015).

TC is an important dental abnormality that may result in several problems such as displacement of the affected and opposing teeth, malocclusion, occlusal trauma, plaque retention, caries, attrition of the opposing teeth, periapical pathosis as a result of excessive attrition, temporomandibular joint pain related to excessive occlusal forces, periodontal problems, hypersensitivity, accidental cuspal fracture, pulpal necrosis, irritation of the tongue while speaking and chewing, speech disturbance, interference with the tongue space in both primary and permanent dentition (Mitchell, 1892; Al-Omari et al., 1999; Elmubarak, 2019).

The steps to be taken after the diagnosis of TC may differ from follow-up to the extraction of the affected tooth (Decaup et al., 2021). A taloned tooth may need a

prophylaxis, restorative, endodontic and/or orthodontic treatment, or may not require any treatment at all (Levitan and Himel, 2006). Treatment options for each case should be evaluated in its own merits.

In teeth with a mature apex and normal pulp, the opposing surface should be reduced to prevent traumatic occlusion caused by the tubercle, and subsequently topical fluoride application should be performed in order to increase the hydroxyapatite resistance of enamel. A flowable light-cured resin is applied to the surrounding surface and the tubercle. Follow-up at 6-month intervals is recommended for occlusion control, any necessary adjustments, and assessment of the need for additional resin. Annual radiographic examination is recommended to evaluate the progression of pulp recession (Levitan and Himel, 2006).

The presented case was a 16-year-old male patient with TC on the palatal surface of the maxillary left central incisor causing displacement of the affected and opposing teeth, malocclusion, occlusal trauma, plaque retention, periodontal problems, and caries. Clinical and radiological examinations and restorative treatment were performed before the emergence of serious dental problems such as cuspal fracture, pulp necrosis and/or periapical pathosis. Contrary to most reports on TC, no other concomitant developmental pathologies or syndromes were present, and in this case, it was a solitary entity.

CONCLUSION

Early diagnosis of TC, which is a dental anomaly that causes several problems, is crucial for the prevention of these problems. This report provides significant evidence on the importance of early diagnosis together with preventive restorative treatment of a potentially problematic dental anomaly. In addition, the case presented in this report is unique given that it is unilateral with no genetic aetiology and it is not associated with other developmental pathologies or syndromes.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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