Dens evaginatus of anterior teeth (talon cusp): Report of five cases

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The talon cusp, or \textit{dens evaginatus} of anterior teeth, is a relatively rare dental developmental anomaly characterized by the presence of an accessory cusp-like structure projecting from the cingulum area or cementoenamel junction. This occurs in either maxillary or mandibular anterior teeth in both the primary and permanent dentition. This article reports five cases of talon cusp, two of them bilateral, affecting permanent maxillary central and lateral incisors and canines that caused clinical problems related to caries or occlusal interferences. (Quintessence Int 2003;34:272–277)

Key words: \textit{Dens evaginatus}, dental anomalies, occlusal interference, talon cusp

\textit{Dens evaginatus} is a developmental anomaly characterized by the presence of an extra cusp, occurring more frequently in mandibular premolars. In canines and incisors, \textit{dens evaginatus} originates usually in the palatal cingulus as a tubercle projecting from the palatal surface; however, the anomaly also has affected the labial surface of the tooth. Mitchell first described this dental anomaly as a “process of horn-like shape, curving from the base downward to the cutting edge” on the lingual surface of a maxillary central incisor of a female patient. Mellor and Ripa named the accessory cusp \textit{talon cusp} because of its resemblance in shape to an eagle’s talon.

Talon cusp occurs more frequently in the permanent than in the primary dentition and shows a predilection for the maxilla over the mandible. The maxillary lateral incisors are the most frequently involved (67%), followed by the central incisors (24%), and canines (9%).

Family histories of cases reported previously revealed that sometimes talon cusp affected patients who had consanguineous parents. Moreover, there are several data in the literature that support the hereditary character of talon cusp: the anomaly has been described affecting two siblings, two sets of female twins, and two family members, and the prevalence of talon cusp is high in some racial groups. The family involvement and the association of the talon cusp with other dental abnormalities, suggest that genetics may be a major causative factor.

However, sporadic occurrences of this abnormality probably are induced by trauma or other localized insults affecting the tooth germ. Talon cusp affects both sexes and commonly is unilateral, but one fifth of the cases are bilateral.

The anomalous talon cusp is composed of normal enamel and dentin with varying extensions of pulp tissue. Shay reported that pulp tissue can extend to the center of the tubercle and, once fractured, the pulp is exposed. When talon cusp interferes with the normal occlusion, an occlusal adjustment by grinding the palatal projection must be performed, with the possibility of exposure of the dentin-pulp complex and, consequently, pulp necrosis.
The cases reported in the literature as talon cusp are very different since this anomaly varies widely in shape, size, structure, location, and site of origin. The tip of the cusp may stand away from the crown or may be in close approximation to the lingual surface. Some cusps are quite sharp and spiked, while others are teatlike and have rounded and smooth tips. Talon cusps may be markedly enlarged or exaggerated cingula on the maxillary incisors. Others have described them as hornlike, conical, or pyramidal. Davis and Brook stated that talon cusp may represent the extreme of a continuous variation progressing from a normal cingulum, to an enlarged cingulum, to a small accessory cusp, to a talon cusp.

This article reports five cases of talon cusp, two of them bilateral, affecting permanent maxillary central and lateral incisors and canines that caused clinical problems related to caries or occlusal interferences.

CASE REPORTS

Case 1

A healthy 21-year-old female was seen for a routine dental examination. Her medical and dental history were uneventful. The right maxillary canine exhibited a small prominent cusp on the palatal surface (Fig 1). The accessory cusp on the right canine, conical in shape, was projected from the cementoenamel junction and extended less than halfway to the incisal edge. The cusp measured 3.3 mm in length (incisocervically), 4.5 mm in width (mesiodistally), and about 2.6 mm in thickness (labiolingually). A small bridge of enamel connected the accessory cusp to the palatal surface of the tooth. The developmental grooves on the distal and the mesial side of the cusp were darkly stained and packed with dental plaque. A carious lesion was detected clinically in the distal groove. The affected tooth was responsive to electric pulp testing. The cusp did not irritate the tongue during speech and mastication and did not interfere with the occlusion. Radiographs showed the presence of enamel, dentin, but not pulp horn in the palatal accessory cusp (Fig 2). The left canine did not show talon cusp.

Case 2

A 28-year-old male was seen for oral prophylaxis. Clinical examination disclosed prominent cusplike structures on the palatal surfaces of both the left maxillary lateral incisor and the left maxillary canine (Fig 3). The accessory cusp of the lateral incisor was pyramidal in shape and extended from the cementoenamel junction one third to the incisal edge. It was attached to the palatal surface and extended distally. The cusp tip was pointed and slightly sharp. The cusp measured 3.7 mm in length (incisocervically), 3.9 mm in width (mesiodistally), and 3.3 mm in thickness (labiolingually). Noncarious, but stained, developmental grooves were observed laterally. A caries lesion was evident in the mesial surface of the tooth.

The accessory cusp of the canine also was pyramidal in shape and extended from the cementoenamel junction one quarter to the incisal edge. It was attached to the palatal surface and extended perpendicular to the mesiodistal surface of the crown. Noncarious developmental grooves were observed laterally. The cusp measured 2.9 mm in length (incisocervically), 2.7 mm in width (mesiodistally), and 2.4 mm in thickness (labiolingually).

The talon cusps did not irritate the tongue during speech and mastication, but, due to the reduced overbite, the taloned teeth, mainly the left lateral incisor,
Case 3

A 19-year-old male presented to the dental clinic for a routine dental examination at the end of an orthodontic treatment. The patient appeared healthy and of normal physical development for his age. There was no reported history of orofacial trauma. The occlusion was a Class I molar relationship. Both maxillary right and left lateral incisors showed an accessory cusp on the palatal aspect (Fig 4). The accessory cusp on the left maxillary lateral incisor measured 2.7 mm in length (incisocervically), 3.9 mm in width (mesiodistally), and 2.2 mm in thickness (labiolingually). The talon cusp was pyramidal in shape and located in the distal half of the crown, with the tip of the cusp attached to the crown. The accessory cusp extended from the cementoenamel junction more than one third to the incisal edge. Noncarious but slightly stained developmental grooves were present at the junction of the talon cusp and the palatal surface of the tooth. The talon cusp was conical in shape and located in the distal half of the crown, with the tip of the cusp attached to the crown. The accessory cusp extended from the cementoenamel junction one third to the incisal edge. Both maxillary canines showed a bifid cingulum. Neither of the taloned teeth interfered with the normal occlusion.

Case 4

A 10-year-old male presented for the treatment of several carious lesions. Clinical examination disclosed a prominent cusplike structure on the palatal surface of the maxillary right lateral incisor (Fig 5). The accessory cusp was pyramidal in shape and extended from the cementoenamel junction halfway to the incisal edge. It was attached to the palatal surface and extended perpendicular to the mesiodistal surface of the crown. The cusp tip was pointed and sharp and coincided with the midline of the long axis of the tooth, forming a Y-shaped crown outline. The cusp measured 4.5 mm in length (incisocervically), 4.0 mm in width (mesiodistally), and 3.5 mm in thickness (labiolingually). Noncarious developmental grooves were observed laterally. The tooth appeared normal and responded to electric pulp testing. Due to the reduced overbite, the talon cusp interfered with the occlusion.
wear facets were present on the cusp and the incisal edge of the opposing tooth. No other dental variations were detected. An occlusal adjustment by grinding slightly the accessory cusp of the lateral incisor was performed in one appointment.

**Case 5**

A 20-year-old female presented to the dental clinic for an oral prophylaxis. Both maxillary right and left central incisors showed an anomalous anatomy on the palatal surface (Fig 6). Very prominent bifid cingula were apparent on the palatal aspects of both central incisors. Furthermore, cusplike structures extending from the cemento enamel junction more than halfway to the incisal edge were evident. The talon cusp on the left central incisor was located in the center of the crown and was teatlike in shape, with an enamel ridge extending from the cemento enamel junction more than one third to the incisal edge. The accessory cusp on the right central incisor had the same form, showing a similar enamel ridge pointing to the mesial side of the incisal edge.

Both taloned teeth showed accentuated marginal ridges surrounding a deep lingual fossa taking a shovel-shaped form. In both teeth, noncarious but stained developmental grooves were observed laterally. A periapical radiograph (Fig 7) showed a V-shaped radiopaque structure superimposed on the image of the affected crowns, with the "V" pointing toward the incisal edge. Both talon cusps were outlined by two distinct white lines converging from the cervical area of the affected tooth toward the incisal edge. Pulp extension could be traced radiographically to the middle of the cusps.

The lateral incisors and the canines also showed abnormal structures on their palatal surfaces (Fig 8). A small, sharp and pointed cusplike structure was evident in the cingulum of the right lateral incisor. The anomalous structure was pyramidal in shape and located on the center of the crown, with its tip attached to the crown and extending from the cemento enamel junction more than one third to the incisal edge. Noncarious developmental grooves were present. The left lateral incisor and both canines showed bifid cingula. Both the lateral incisors and the canines showed accentuated marginal ridges and shovel-shaped form.

**DISCUSSION**

_Dens evaginatus_ is an anomaly of great clinical significance, sometimes causing occlusal interference. The cleaning of the area between the nodule and the tooth is difficult, and caries are often found.18

Talon cusp originates during the morphodifferentiation stage of tooth development but the etiology of the
condition remains unknown. In the majority of cases reported, the talon cusp is isolated rather than an integral part of any disorder. Nevertheless, the anomaly has been reported in patients with Sturge-Weber syndrome (encephalotrigeminal angiomatosis), Mohr syndrome (orofacial digital II syndrome), Ellis-van Creveld syndrome, and Rubinstein-Taybi syndrome. None of the cases reported here were associated with any known abnormal systemic developmental syndrome.

Control of the complex processes of dental development appears to be multifactorial, that is, primary polygenetic with some environmental influence. Talon cusp is usually associated with other dental variations: bifid cingula, dens invaginatus, exaggerated cusps of Carabelli, and particularly with shovel-shaped maxillary incisors, a polygenic inheritable trait characterized by accentuated marginal ridges that surround a deep lingual fossa. In case 5, several of these dental anomalies were present.

As in the case of talon cusp, the maxillary lateral incisors are the most commonly affected with shoveling and dens invaginatus. The susceptibility of the lateral incisors to abnormalities could partly be related to compression of the tooth germ of the lateral incisor by the adjacent central incisor and canine, which develop about 7 months earlier than the lateral incisor. Increased localized external pressure on a tooth germ during the morphodifferentiation stage may result in either outfolding of the dental lamina (in the case of talon cusp) and shoveling or infolding of the dental lamina as in dens invaginatus.

Hattab et al. classified the anomaly based on the degree of their formation and extension into three types: type 1 (talon): additional cusp that projects from the palatal surface of an anterior tooth and extends at least half the distance from the cementoenamel junction to the incisal edge; type 2 (semitalon): an additional cusp of a millimeter or more but extending less than half the distance from the cementoenamel junction to the incisal edge; and type 3 (trace talon): enlarged and prominent cingula and their variations.

According to the classification by Hattab et al., the talon cusps described in the current cases classified as follows:

The anomalous conical cusp on the left canine in case 1, the accessory pyramidal cusps on the left maxillary lateral incisor and the left maxillary canine in case 2, the talon cusps present in case 3, and the talon cusp evident on the palatal surface of both central incisors and the right lateral incisor in case 5 were classified as type 2 or "semitalon."

The talon cusp in case 4, pyramidal in shape and extending from the cementoenamel junction more than halfway to the incisal edge, was classified as type 1 or "talon cusp."

Anomalous palatal structures on the left lateral incisors and both canines in case 5, representing a variation of enlarged or prominent cingula and their variations, could be classified as type 3 or "trace talon."

Large talon cusps may cause clinical problems including occlusal interference, displacement of the affected tooth, irritation of the tongue during speech and mastication, carious lesion in the developmental grooves that delineate the cusp, pulp necrosis, periapical pathosis, attrition of the opposing tooth, and periodontal problems due to excessive occlusal forces.

Early diagnosis and management of talon cusp is important in order to prevent occlusal interference, compromised esthetics, carious developmental grooves, periodontal problems due to excessive occlusal forces, or irritation of the tongue during speech and mastication. In cases 2 and 5, an occlusal adjustment by grinding the palatal projection of the talonized tooth was performed to eliminate the premature contact.

The treatment of talon cusp implicates careful clinical decision. The aid of radiographs is essential to assess whether the accessory cusp contains or is devoid of a pulp horn. However, radiographic tracing of the pulpal configuration inside the talon cusp has inherent difficulties because the cusp is superimposed over the affected tooth crown. However, in case 5 the pulp extensions inside the talon cusps were radiographically evident. Gungor et al. reported a case of bilateral talon cusps on primary maxillary central incisors whose histologic evaluation revealed the existence of pulpal tissue in the anomalous cusps. Thus, a previous radiographic study must have been performed before the removal of the cusp to avoid the pulp exposure that would require endodontic treatment.

REFERENCES


DENTIN/PULP COMPLEX
Proceedings of the International Conference on Dentin/Pulp Complex 2001
Edited by Tatsuya Ishikawa, et al

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