Dens Invaginatus and Talon Cusp Co-occurring in a Mandibular Central Incisor: A Case Report

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ABSTRACT

Talon cusp and dens invaginatus are tooth shape anomalies that rarely affect mandibular teeth. Their co-occurrence in a single tooth is uncommon. The purpose of this report was to present a rare case of both talon cusp and dens invaginatus in a permanent mandibular central incisor. The diagnosis of dens invaginatus was made from routine radiographs taken to investigate a possible pulpal extension within the taloned cusp. Since the invagination did not communicate with the oral cavity, no treatment was indicated. The talon cusp was slightly grinded and smoothened to eliminate tongue irritation. **(J Dent Child 2008;75:177-80)**

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Talon cusp, by definition, is an additional cusp that projects predominately from the lingual surface of primary or permanent anterior teeth. It is morphologically well delineated and extends at least half the distance from the cementoenamel junction (**CEJ**) to the incisal edge.[1] The prevalence of talon cusp is low, with estimates ranging from less than 1% to approximately 8% of the population. While cusps can occur in both dentitions, its prevalence, however, is reported to be 3 times higher in the permanent dentition.[2]

Composed of normal enamel and dentin, the cusp may or may not contain pulpal tissue.[3] As with other dental abnormalities, talon cusp occurs during the morphodifferentiation stage of odontogenesis. Sicher and Bhaskar[4] suggest that disturbances during morphodifferentiation (such as altered endocrine function) might affect a tooth's size and shape without impairing the function of the ameloblasts or odontoblasts. Another theory, by Hattab et al,[5] suggests that talon cusp might occur as a result of an outward folding of the inner enamel epithelial cells and a transient focal hyperplasia of the mesenchymal dental papilla Although this anomalous cusp has not been reported as an integral part of any specific syndrome, it appears to be more prevalent in patients with Rubinstein-Taybi syndrome, Mohr syndrome (oral-facial-digital syndrome, type II), Sturge-Weber syndrome (encephalotrigeminal angiomatosis), or incontinentia pigmenti achromians.[6-9]

Clinical problems associated with talon cusp cases include attrition, compromised esthetics, occlusal interference, accidental cusp fracture, interference with tongue space, temporomandibular joint pain, displacement of the affected tooth, irritation of the tongue during speech and mastication, periodontal problems because of excessive occlusal force, misinterpretation of radiographs of taloned teeth before eruption, and caries susceptibility because of developmental grooves on the talon.[2-10]

Talon cusp may also be associated with dens invaginatus[1,5,11] and other dental anomalies, such as peg-shaped lateral incisors, impacted mesiodens and canines, odontoma, megadontia, supernumerary teeth, bifid cingulum, additional tubercle on incisors, exaggerated Carabelli cusps, and microdontia.

Dens invaginatus (dens in dente) is defined as a deep surface invagination of the crown or root that is lined by enamel. It is one of the developmental anomalies affecting the teeth.

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It commonly affects, in order, the maxillary lateral incisor, central incisor, premolar, canine, and molar tooth. It usually occurs unilaterally, although 43% occur bilaterally.[12] Kronfeld[13] speculated that dens invaginatus is caused by a failure in growth of the internal dental epithelium. Concurrently, there is also a proliferation of the surrounding normal epithelium, producing a static area of engulfing. Oehlers1[4,15] considered that distortion of the enamel organ during tooth development and subsequent protrusion of a part of the enamel organ will lead to the formation of an enamel-lined channel ending at the cingulum or occasionally at the incisal tip. The latter might be associated with irregular crown form.

The incidence of dens invaginatus has been reported to be in a range of 0.04% and 10%.[16,17] Comparing findings is difficult due to the differences in study design, sample size, and composition, and the diagnostic criteria used.

Most cases of dens invaginatus are detected after a routine radiographic evaluation and confirmed with a periapical film. Radiographically, the affected teeth show an infolding of enamel and dentine, which may extend deep into the pulp cavity and into the root and sometimes even reach the root apex.[18] The infolding of the enamel lining is more radiopaque than the surrounding tooth structure and can be easily identified.[12] Clinically, a morphologic alteration of the crown or a deep foramen coecum can serve as an indication for the diagnosis of dens invaginatus. On the other hand, the main reasons for consultation are acute pain and inflammation. Histologically, fragile hypomineralized enamel is frequently seen at the site of the invagination. This condition facilitates the formation of dental caries and the penetration of microorganisms from the saliva directly into the pulp, leading to pulp necrosis and the development of a periradicular inflammatory process.[18]

The purpose of this article was to report the co-occurrence of talon cusp and dens invaginatus in a mandibular right permanent central incisor.

Figure 1. Intraoral presentation of a taloned tooth.

Figure 2. Periapical radiograph showing talon cusp and dens invaginatus on the same tooth.

CASE REPORT

A 7-year-old girl was referred to the Pediatric Dentistry Clinics of Faculty of Dentistry at Hacettepe University. Her parent complained about the abnormal shape of one of her lower teeth. The patient's medical history was noncontributory, and there were no apparent systemic manifestations. Clinical examination showed that the patient was in the early mixed dentition stage with good oral hygiene. She had a Class I occlusal relationship. A prominent lingual talon cusp with a tip extending to the incisal third of the right mandibular central incisor was noticed. An eruption difficulty of the tooth was stated by the parent. Tongue irritation during speech and mastication was also noted (Figure 1).

On radiographic examination, a radiopaque V-shaped appearance of a tubercle-like structure originating from the cervical third of crown was seen. A dens invaginatus extending apically beyond the CEJ was also detected on the same tooth. The apical closure of the tooth was not completed. No sign of periapical pathology was noticed (Figure 2). Due to the limitations of clinical and radiographic examination, a conclusion could not be reached whether an association existed between talon cusp and dens invaginatus.

The treatment plan comprised the prophylactic sealing of the developmental grooves of the taloned cusp and elimination of tongue irritation. Sealing was performed with the use of the flowable composite resin Filtek Flow (3M ESPE, St Paul, Minn) following acid etching and bonding agent application. A slight grinding of the talon cusp was performed, and the cusp tip was smoothened. Three months later during on a follow-up visit, the patient did not report any complaint (Figure 3). She did not, however, attend the clinic for further evaluation.

Figure 3. Intraoral photograph of the mandibular anterior area (lingual aspect).

DISCUSSION

Mandibular talon cusps have been rarely reported in the dental literature. In a recent review, Oredugba[19] has stated that 10 cases of talon cusps occuring on mandibular teeth have been reported. Of these 10 cases, 7 were lingual talon cusps. On the other hand, the presence of dens invaginatus in mandibular permanent teeth is extremely uncommon.[12] The lack of articles reporting the co-occurrence of mandibular talon cusp and dens invaginatus on the same tooth makes the present case unique.

Talon cusp in the present report is a "true talon," according to the classification made by Hattab et al,[2] which includes 3 types:

1. Type 1, true talon, is a morphologically well-delineated additional cusp that prominently projects from the palatal surface of a primary or permanent anterior tooth and extends at least half the distance from the CEJ to the incisal edge.
2. Type 2, semi talon, is an additional cusp of 1 mm or more that extends less than half the distance from the CEJ to the incisal edge and blends with the palatal surface or stands away from the crown.
3. Type 3, trace talon, is an enlarged or prominent cingulum with variations such as conical, bifid, or tubercle-like.

Oehlers[14] has proposed a classification of dens invaginatus which comprises 3 categories, according to the depth of penetration and communication with the periodontal ligament or periapical tissue:

1. Type 1 cases are those in which the invagination ends as a blind sac confined to the crown.
2. In type 2, the invagination extends apically beyond the external CEJ, ending as a blind sac and never reaching the periapical tissues.
3. With type 3, the invagination also extends beyond the CEJ and a second "apical foramen" is evident in either the periapical tissues or the periodontal ligament. The radiographic appearance of dens invaginatus in the presented case agrees with type 3.

The invagination frequently communicates with the oral cavity, allowing the entry of irritants and micro-organisms either directly into pulpal tissues or into an area that is separated from pulpal tissues by only a thin layer of enamel and dentin. Hence, the condition may lead to pulpal and periapical pathology.[20] In a recent case presentation by Muppparapu and Singer,[21] a mandibular lateral incisor having dens invaginatus was reported. The tooth was vital, and no apical rarefaction was detected. Their literature review revealed 3 other cases of dens invaginatus occuring in mandibular incisors. Two of the reported cases involved central incisors (one is bilateral),[22,23] while the other was associated with a lateral incisor.[24] Although necrotic pulp/apical periodontitis have been reported in these cases, no periapical pathology was observed in the present case.

The treatment objectives for the taloned tooth presented included caries prevention in developmental grooves, and elimination of tongue irritation. Since talon cusp did not interfere with occlusion, only a slight grinding was performed and the cusp tip was smoothened. Due to the difficulty of performing endodontics in dens invaginatus, further reduction of the lingual projection was not planned, which could result in possible exposure of the dentin-pulp complex's underlying talon cusp. Developmental grooves were sealed as a prophylactic measure to prevent caries initiation.

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