Combination of dens evaginatus and dens invaginatus in a maxillary lateral incisor

ABSTRACT
Dens evaginatus of the anterior tooth, also referred to as a talon cusp, is a developmental anomaly comprising the formation of a well-delineated additional cusp that extends to at least half the distance from the cementoenamel junction to the incisal edge. Dens invaginatus is a developmental anomaly caused by invagination of the surface of the tooth crown before calcification has occurred. Dens evaginatus and dens invaginatus usually present in isolation, and their concomitance is highly unusual and requires documentation. This report is of a 32-year-old man with a combination of dens evaginatus and dens invaginatus in the right maxillary lateral incisor (tooth 12). A tooth with this combination is susceptible to carious invasion due to its unusual morphology, and early diagnosis can lead to prophylactic therapy. This patient also had a mesiodens in relation to the maxillary central incisors, but was otherwise symptom-free.

Key words: Adult; Dens in dente; Incisor

Introduction
Dens evaginatus (DE) is a rare developmental anomaly of a tooth, which results in the formation of an accessory cusp comprising enamel, dentin, and varying amounts of pulp tissue. Dens evaginatus frequently resembles an eagle’s talon in shape, and usually arises from the lingual surface of the primary or permanent anterior teeth. Dens evaginatus was first described by Windle in 1887, and Mitchell coined the term ‘talon cusp’ in 1892. Dens evaginatus is usually found on the occlusal surface of the premolars or projecting from the lingual surface of the anterior teeth in both primary and permanent dentitions. Dens evaginatus can present unilaterally or bilaterally, and has a strong predilection for the permanent maxillary incisors. The etiology of DE remains unknown. However, there is a hypothesis that DE could be caused by a combination of environmental and genetic factors. Dens evaginatus is thought to occur at the morphodifferentiation stage of tooth development as a result of excessive localized elongation and abnormal proliferation of inner enamel epithelial cells, and transient focal hyperplasia of the peripheral cells of the mesenchymal dental papilla. Hattab et al. classified this anomaly into three types—type I (talon), type II (semi-talon), and type III (trace talon). The maxillary lateral incisors are the most commonly affected teeth (67%) followed by the central incisors (24%) and canines (9%). A review of the literature found that the prevalence of talon cusp in a northern Indian population was 7.7%. Since DE has been reported to contain pulp tissue in 42%...
of patients based on radiographic assessment, a fracture or attrition of the tubercle may cause pulpal injury and further complications. Hence, clinical and radiographic assessments made to determine whether the cusp contains pulp horn. However, this may not always be possible due to overlapping of the structures.

Introduced by Hallett in 1953, ‘dens invaginatus’ (DI) is the preferred term to describe this anomaly, although ‘dens in dente’ is still often used. Dens invaginatus presents as an invagination in the crown of the tooth surface before calcification has occurred. The etiology of DI remains controversial and unclear. Atkinson suggested that DI may be due to growth pressure of the dental arch resulting in buckling of the enamel organ. Rushton proposed that the invagination was a result of rapid and aggressive proliferation of part of the internal enamel epithelium invading the dental papilla. The most popular and commonly used classification of DI is the one proposed by Oehlers, who classified DI based on the X-ray appearance. In type I, the invagination is confined within the crown, and does not extend beyond the level of the external cementoenamel junction. In type II, an enamel-lined invagination invades the tooth, but remains confined as a blind sac; there may be a communication with the pulp and the invagination may or may not be grossly dilated. In type III, the invagination penetrates through the root, and ‘bursts’ apically or laterally at a foramen.

This report is of a patient with a rare simultaneous occurrence of two different dental development phenotypes, DE and DI, in the same tooth. The early detection of these conditions, especially in patients where their concomitant appearance is seen, can help the practitioners take preventive measures to maintain the health and integrity of the tooth.

Case report

A 32-year-old man was referred to the Department of Oral Medicine and Radiology, Dr Syamala Reddy Dental College, Hospital and Research Center, Bangalore, India, in 2009, for a full oral examination. The patient had poor esthetic appearance due to the presence of stains on his lower front teeth and wanted them cleaned. No one in his family had any dental abnormalities. His mother’s pregnancy, labor, and delivery were normal and she had not taken any medications during the pregnancy. The patient had no history of severe illness or orofacial trauma, except for occasional gastritis when taking analgesic medication such as ibuprofen. Extraoral examination showed a normal facial appearance. At intraoral examination, it was noticed that the palatal surface of the right maxillary lateral incisor (12) exhibited well-defined developmental grooves with a projection, extending to more than half the tooth crown, suggestive of a DE type I talon cusp according to Hattab et al. (Fig 1). There was no associated swelling, sinus, or fistula in the vicinity of the tooth of interest.

There was a brownish-black discoloration on the palatal aspect of 12, which did not reveal a ‘catch’ on probing and could have been an arrested carious lesion. However, no periodontal pathology was present nor was there a loss of vitality after pulp testing. A mesiodens was also noted between the maxillary central incisors, but it did not trouble the patient other than being of slight esthetic concern, in addition to the yellowish-brown extrinsic stains he had on his teeth due to improper maintenance of oral hygiene. Two maxillary canines were found to be labially placed in relation to the rest of the dental arch. Radiographic examination of 12 revealed a well-defined radiopaque shadow indicative of a DE containing enamel, dentin, and pulp. In addition, an enamel invagination (with a density equal to that of enamel) was observed extending from the cingulum apically into the pulp giving a tooth within a tooth appearance. According to Oehlers’ classification, the invagination was a type II DI (an
enamel-lined form that invades the root but ends as a blind sac without communication with the pulp) [Fig 2].

The patient was referred to the Department of Periodontology and Implantology for oral prophylaxis and oral hygiene instructions. He was also referred to the Department of Conservative Dentistry and Endodontics for placement of a fissure sealant in 12. However, once his oral prophylaxis was done, the patient did not attend for restorative treatment or follow-up.

**Discussion**

Based on the classification by Hattab et al. 6, this patient had a type I (talon cusp) DE. Dens evaginatus may pose a challenge to maintenance of oral hygiene, with the stagnation of food around the grooves, caries, irritation to the tongue during mastication and speech, occlusal discrepancies, breast-feeding problems, temporomandibular joint pain, compromised esthetics, and periodontal problems due to excessive forces, so early occlusal adjustments may be required to eliminate any premature contact. After occlusal reduction is performed, the tooth can be treated with topical fluoride to enhance its caries resistance. However, due to the absence of premature contact and symptoms, no treatment was planned for the ‘taloned‘ tooth for this patient.

The most widely used classification for DI was proposed by Oehlers 12 according to the X-ray appearance. Based on the radiographic examination of this patient, following which the second anomaly was discovered, the DI was classified as type II, in which the invagination was lined by enamel and dentin but remained confined as a blind sac and did not have contact with the pulp. Dens invaginatus may have a complicated morphology with a complex root canal system and radiographic examination is the gold standard for a correct diagnosis. The management of DI ranges from the application of fissure sealant for conservative restoration of the opening to endodontic treatment or even extraction 13. The narrow accessibility may hinder cleaning and may cause pulpal pathology secondary to caries. Therefore, early detection and conservative management is preferred.

Iwamoto et al. 14 used computed tomography (CT) to examine the three-dimensional relationship of the enamel and dentin in their report. However, there is some controversy about subjecting a patient to CT examination unless there is a marked indication.

The coexistence of DE and DI in the same tooth is extremely rare and, to date, the authors have only noted five reports worldwide, which makes this an extremely interesting finding 1,2,14-16. This patient was unconcerned about the importance of prophylactic treatment, probably because of the lack of pain in relation to the tooth, and this may explain the reason for his non-compliance with the treatment plan. However, after the initial visual examination of a DE, the dental practitioner must remain vigilant and perform more investigations on the tooth of interest in case of a hidden anomaly (DI), as for this patient.

**Conclusion**

It is important to be aware of potential complications that may occur with a DE and DI in a single tooth. As this is a rare phenomenon, it is necessary for the clinician to carry
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References