

## *Dens evaginatus* and *dens invaginatus* in a maxillary lateral incisor: Report of a rare occurrence and review of literature

M Mupparapu,\* SR Singer,\* JH Goodchild\*

### Abstract

A case of *dens evaginatus* (DE) and *dens invaginatus* (DI) concurrently affecting the maxillary right permanent lateral incisor in a 25-year-old Hispanic male is reported. DE, referred to as Talon's cusp in the anterior teeth and Leong's premolar in the premolar teeth, is a relatively rare condition by itself. An association of DI with this rare anomaly within the same tooth has never been reported before although it has been known to occur within the same patient. Since it is known that DE may be composed of normal enamel and dentine, as well as varying amounts of pulpal tissue, care should be exercised while performing any aesthetic procedures to remove or recontour it.

**Key words:** Dens evaginatus, dens invaginatus, lateral incisor, talon cusp, pulp.

**Abbreviations and acronyms:** CEJ = cemento-enamel junction; DE = dens evaginatus; DI = dens invaginatus.

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### INTRODUCTION

*Dens evaginatus* (DE) is a relatively rare developmental anomaly characterized by the presence of an accessory cusp-like structure projecting from the cingulum area or cemento-enamel junction (CEJ) of the maxillary or mandibular anterior teeth in both the primary and permanent dentition. Premolars are the most commonly affected posterior teeth.<sup>1-3</sup> *Dens invaginatus* (DI) is a developmental anomaly characterized by an infolding of enamel and dentine. It is most commonly found in permanent maxillary lateral incisors. The literature contains case reports of other teeth being affected.<sup>1-2</sup> While the morphology of the lingual surface of the tooth might suggest a groove or fissure, the diagnosis of DI is made based on radiographic evidence.

Although both DE<sup>3-19</sup> and DI<sup>20-24</sup> have been reported extensively in the literature, concurrence of DE and DI within the same tooth is a rarity and has never been reported. For the practicing general dentist, it is important to recognize these anomalies and to be knowledgeable about their management.

### CASE REPORT

A 25-year-old Hispanic male was referred to an Oral and Maxillofacial Radiology clinic for a full mouth series of radiographs subsequent to an initial interview and examination in the Division of Oral Diagnosis. The patient presented to the Dental School clinic for dental care and was not experiencing any discomfort. The patient's medical history was unremarkable. He had reported an earlier street altercation and resultant fracture of tooth #22 (Fig 1). The patient expressed a desire to have the fractured tooth restored and carious teeth treated. An intra-oral exam revealed a DE on tooth #12 (Fig 1). There were no associated swellings, sinuses or fistulae in the vicinity of the maxillary right lateral incisor. Radiographic examination was conducted as planned and the patient was dismissed with an appointment for a future treatment-planning visit. Upon review of the radiographs, it was noticed that, in addition to the DE, a DI was present in the right maxillary lateral incisor (Fig 2).

The DI was located apical to the DE at the level of the CEJ. The apical periodontium appeared to be intact radiographically. There was neither a carious lesion nor any restoration evident in the tooth. Examination of the remaining dentition exhibited other findings, including caries, periodontal disease and restorations. No treatment was performed for this tooth beyond routine scaling and prophylaxis. There were no occlusal discrepancies or interferences involving this tooth. Functional or aesthetic impairment was not evident. A clinical and radiographic follow up of that tooth was suggested to the patient. A treatment plan was completed for the rest of the quadrants and the patient is currently undergoing treatment at the Dental School.

### DISCUSSION

While the aetiology of accessory cusps is unknown, it is known that they are commonly found in mandibular premolars and can affect anterior teeth. Mitchell<sup>4</sup> first described the accessory cusps, DE, in *Dental Cosmos* in 1892. Although the aetiology of DE is still not well understood, it does appear that both genetic and environmental components exist. Similar to other

\*Department of Diagnostic Sciences, New Jersey Dental School, Newark, New Jersey, USA.



**Fig 1.** Intra-oral photograph of the maxillary arch showing the *dens evaginatus* on the maxillary right lateral incisor. Note the fractured lateral incisor on the left.



**Fig 2.** Periapical radiograph of maxillary right lateral incisor. The large arrows indicate the *dens evaginatus* and the small arrows are pointing to the *dens invaginatus*. Note that the dens invaginatus is distinct from the pulp chamber.

abnormalities of tooth shape, the DE originates during the morpho-differentiation stage of tooth development.<sup>7</sup> It may occur as a result of the outward folding of the inner enamel epithelial cells and the transient focal hyperplasia of the peripheral cells of mesenchymal dental papilla. A DE can occur as an isolated finding or in association with other dental anomalies such as peg-shaped lateral incisors, agenesis of canines, mesiodens, complex odontomas, megadont, DE of posterior teeth, shovel-shaped incisors, DI and exaggerated cusp of carabelli.<sup>8,9,16</sup> In its typical shape, the DE has a close resemblance to an eagle's talon,<sup>9</sup> but

it could also be presented as a pyramidal, conical or teat-like.<sup>4,6</sup> According to some studies,<sup>14,15</sup> the prevalence of talon cusp varies from 0.06 per cent to 7.7 per cent.

*Dens evaginatus* are found on the lingual surfaces of anterior teeth. Given that they arise from an evagination of the enamel during the morpho-differentiation stage of development,<sup>5</sup> both the primary and the permanent dentition can be affected. While many authors have reported of the DE in the primary dentition,<sup>6-10</sup> the primary dentition is still affected less frequently than the permanent dentition and the anomaly is more common in males than in females.<sup>16-18</sup> DE is also reported to be more prevalent in patients with certain syndromes.<sup>8,18,20</sup>

The anomalous tooth structure is composed of normal enamel and dentine, either with varying extensions of pulp tissue or without a pulp horn. It can occur alone, or in conjunction with other dental anomalies, as was seen in the Hattab and Hazza'a report of a combined DE and gemination case.<sup>7</sup> Shay reported that the pulp tissue can extend to the centre of the tubercle and once the tubercle is fractured, the pulp is exposed.<sup>11</sup> Cases of DE where the pulp canal extends into the tubercle can be successfully treated endodontically, although there may be substantial diagnostic treatment planning and procedural difficulties.<sup>12</sup> A similar case was reported by Ngeow and Chai<sup>13</sup> where the DE was clinically fractured in a mandibular third molar and presented as severe toothache. The patient's complex medical history warranted a tooth extraction instead of the more preferred endodontic treatment. Dankner *et al.*,<sup>18</sup> in studying and using a sample of affected teeth, concluded that the majority of the teeth with DE in the permanent dentition were found in the maxilla (92 per cent). Of the maxillary teeth, the lateral incisors were affected most often (55 per cent) followed by the central incisors (36 per cent) and canines. Rare instances of mandibular incisor involvement were seen and reported both in primary and permanent dentition.<sup>19</sup>

On this specific patient, generalized pulp calcifications were noticed during the radiographic examination. The appearance of the DI is different from that of the pulpal extension of the DE. The border of the DI is distinct with an opaque rim consistent with the radio density of enamel.

Although DE and DI are relatively common anomalies, the combination of both in a single tooth is a novelty. Fukuta *et al.*<sup>25</sup> described a somewhat similar case of a lateral incisor with DI. In that case, the authors described a tubercle rather than a true DE on the lingual surface of an upper lateral incisor. Clearly, careful clinical and radiographic examination is beneficial for optimal treatment planning. Endodontic implications of case seen by Fukuta *et al.* include prophylactic endodontic therapy, if recontouring or physiologic reconstruction of the DE is anticipated to prevent intra-operative pulpal exposure.<sup>25</sup> In addition, the thin enamel and inaccessibility to cleansing in the

DI have been shown to carry an increase in pulpal involvement secondary to caries. Conventional endodontic therapy, which may include prior microscopic removal of the dens, is usually the treatment of choice in such cases.

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### *Address for correspondence/reprints:*

Dr M Mupparapu  
Associate Professor and Director of Radiology  
Department of Diagnostic Sciences, D-860  
UMDNJ – New Jersey Dental School  
110 Bergen Street  
Newark, New Jersey 07101, USA  
Email: mupparmu@umdnj.edu