Dents Telescopes of Maxillary Incisor and Supernumerary Tooth: Report of two cases with Review
Shalini Gupta, Kavita Nitish Garg, Anuragh Tripathi, O.P.Gupta

Abstract
Dens invaginatus is a developmental malformation of teeth also known as dens in dente, resulting from invagination in the surface of a tooth crown before calcification has occurred. Affected teeth show a deep infolding of enamel and dentine starting from the foramen caecum or even the tip of the cusps and which may extend deep into the root. Teeth most affected are maxillary lateral incisors. Root canal treatment of teeth with complex root canal anatomy such as Dens Invaginatus can be problematic because infected pulpal tissues may remain in the inaccessible areas of the canal system. We here present a rare clinical case of type II and Type III dens invaginatus (DI) on the supernumerary tooth and maxillary central incisor respectively and a review of the same.

Key Words: Stomatognathic System Abnormalities; Mouth; Tooth; Congenital Abnormalities; Dens Invaginatus; Developmental Anomaly; Growth Disorders; Dens in Dente.


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Introduction
Dental anomalies are associated with both the primary and the permanent dentitions and can affect either the morphology or the number of teeth. Although these anomalies occur infrequently, they can cause aesthetic and periodontal problems.1 Dens invaginatus (DI) is a developmental malformation resulting from an invagination of enamel organ into the dental papilla, beginning at the crown and sometimes extending into the root before calcification occurs.2 DI are of two types, coronal and radicular type.3 DI was first described by Ploquet4 in 1794 in whale’s tooth and was first described as “a tooth within a tooth” by Salter in 1855. DI in human tooth was first described by a dentist named Socrates in 1856.5 Literature review has shown maximum reported cases of DI in maxillary incisors. While the present case report reveal two cases of dens invaginatus in supernumerary tooth and maxillary incisor.

Case Report 1
A 16-year-old male presented with a chief complaint of pain in extra tooth in upper anterior region of jaw since 5 - 6 years. Medical and dental history was non-contributory. Clinical evaluation indicated that the patient was a healthy man with no other physical abnormalities. Extraoral examination revealed mild swelling on the left side of the upper lip. Intraoral examination revealed supernumerary maxillary central incisor positioned in between two central incisors which is located in the usual anatomic position of the permanent central incisors. Intraorally the gingiva was normal on labial aspect along with mild inflammation and ulceration present on palatal aspect near mesial surface of supernumerary central incisor (Fig 1, 2). The solitary ulcer was approximately 0.5 x 0.3 cm in dimension with granulation tissue seen on the base suggestive of healing ulcer. The supernumerary tooth showed no significant periodontal pocketing but was tender on vertical and horizontal percussion and gave a negative response to electrical pulp test.

Intraoral periapical radiograph showed invagination extending beyond the cementoenamel junction extending towards the apex suggestive of dens in dente. The radiograph also revealed atypical curved root with irregular diffuse periapical radiolucency suggestive of chronic periapical abscess (Fig 3). The treatment advised to the patient was removal of the tooth; however, he refused for the extraction of the supernumerary tooth. The patient was later referred to department of conservative and endodontics, where root canal treatment of the supernumerary tooth was carried out (Fig 4).
Case Report 2
A 15 year old male patient reported to our outpatient department for a swelling on his palate since 15 days. The patient also complains of spontaneous, moderate pain in his maxillary left central incisor tooth. The patient was in good general health. There was no significant medical or dental history. Extra oral examination revealed no significant findings. Intra-orally, the gingiva on the labial aspect and the oral mucosa were normal in appearance while on palatal aspect diffuse swelling in between two palatal shelves. The swelling was approximately 4 x 3 cm in dimensions and extending anteriorly from the palatal rugae to the junction of hard and soft palate posteriorly (Fig 5). The tooth was tender on percussion. Radiographic examinations (periapical) showed left maxillary central incisor has atypical root. The left central incisor has dens in dente on distal surface and periapical radiolucency. The coronal DI is a pear shaped invagination of enamel and dentine with a narrow constriction at the opening on the surface of tooth along with second apical opening (Fig 6). Hence, the diagnosis of Type III DI according to Oehlers was made. The patient was referred to conservation and endodontic department for needful.

The clinical extraoral photograph showing swelling on left side of upper lip (1) and intraoral photograph showing ulceration on palatal surface of supernumerary tooth (2). The intraoral periapical radiograph showing Type II dens invaginatus (3) and endodontic treatment (4). An intraoral photograph showing swelling on midline of palate (5). The intraoral periapical radiograph showing Type III dens invaginatus along with periapical pathology (6).

Discussion
Dens invaginatus is a rare malformation of tooth showing a wide spectrum of morphological variations. Tomes first described a case of coronal DI as early as 1859. Swanson and McCarthy almost a century later described the features of DI in depth in their article on bilateral DI. Oehlers et al. and Pindborg reviewed multiple instances of occurrence of dens in dente in the general population. The incidence of DI has been reported to occur more frequently in the maxillary dentition. The frequency of occurrence in descending order is, lateral incisor, central incisor, premolar and molar. DI may occur in 6.6 - 9.7% of maxillary incisors. Bilateral involvement often is
reported. Hovland calculated the DI incidence to be from 0.04 to 10.00%. Of the various terms ‘dens invaginatus’ would appear to be the most appropriate as it reflects the infolding of the outer portion (enamel) into the inner portion (dentin) with the formation of a pocket and dead space. Other synonyms for this malformation are: invaginated odontome, dilated gestant, odontome, dilated composite odontome, deep foramen caecum, tooth inclusion, dentoid in dente, gestant odontome, and dents telescopes.

Its etiology is not well understood, but over the last few decades, several theories have been proposed to explain the aetiology of this malformation but it is still unclear (Table 1). The first classification of invaginated teeth was published by ‘Hallet’ in 1953. According to Oehlers dens invaginatus can be classified into three categories depending on enamel invagination depth inside the tooth. (Coronal invaginations);

**Type I**: An enamel-lined minor form occurring within the confines of the crown not extending beyond the cemento-enamel junction.

**Type II**: An enamel-lined form which invades the root but remains confined as a blind sac. It may or may not communicate with the dental pulp.

**Type III A**: A form which penetrates through the root and communicates laterally with the periodontal ligament space through a pseudo-foramen. There is usually no communication with the pulp, which lies compressed within the root.

**Type III B**: A form which penetrates through the root and perforating at the apical area through a pseudo-foramen.

The invagination may be completely lined by enamel, but frequently cementum will be found lining the invagination. In the present case according to Oehlers description in invagination degree of first case was “type II” because invagination cavities are extending beyond the cemento-enamel junction while DI of second case was type III, as the large invagination extending towards the root and forming new apex. In 1958, Oehlers also described the radicular form of invagination.

<table>
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<th>Etiology</th>
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<td>1. Compressed areas in permanent teeth during the formation and eruption</td>
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<td>process may result in dental crowns with peaks of invaginated enamel in</td>
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<td>the root canal</td>
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<td>2. Atkinson suggested that DI may be due to growth pressure of the dental</td>
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<td>arch resulting in buckling of the enamel organ</td>
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<td>3. Invagination was a result of rapid and aggressive proliferation of the</td>
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<td>internal enamel epithelium invading the dental papilla</td>
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<td>4. Focal failure of growth of internal enamel epithelium</td>
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<td>5. Distortion of the enamel organ during tooth development and subsequent</td>
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<td>protrusion of a part of the enamel organ will lead to the formation of an</td>
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<td>enamel-lined channel ending at the cingulum or occasionally at the incisal</td>
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<td>tip.</td>
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<td>6. It may result from a deep in-folding of foramen caecum during tooth</td>
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<td>development which in some cases may result in a second apical foramen by</td>
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<td>Shulze</td>
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<td>7. Trauma</td>
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<td>8. Brust discussed ‘twin-theories’ suggested a fusion of two tooth germs.</td>
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<td>10. Infection.</td>
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<td>11. Ectomesenchymal signaling system between dental papilla and the internal</td>
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<td>enamel epithelium can affect tooth morphogenesis.</td>
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Table 1: Enumerating various theories for the etiology of dens invaginatus.

Clinically, DI appears in the tooth crown at the site of an anatomical lingual pit susceptible to caries. Radiographically, it shows a radiopaque invagination, equal in density to enamel, extending from the cingulum into the root canal. The defects
may vary in size and shape from a loop like, pear-shaped or slightly radiolucent structure to a severe form resembling a “tooth within a tooth”.15 It can be identified easily because infolding of the enamel lining is more radiopaque than the surrounding tooth structure. DI is clinically important due to the possibility of the pulp being affected. Because of the lingual anatomy, it is possible for dental caries to easily reach the pulp chamber. The patients are usually detected by chance with the help of intraoral periapical radiographs. All the patients reported here were symptomatic but unaware of this condition.

There are several reports of dens in dente associated with other abnormalities such as taurodontism, microdontia, gemination, supernumerary tooth and dentinogenesis imperfecta. The cases reported here had no other abnormalities.

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