Occurrence of Dens in Dente in Permanent Maxillary Lateral Incisors: A Case Report with Literature Review

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ABSTRACT

Aim: The aim of this case report is to give a detailed review about the etiology, prevalence, clinical features, radiographic features and treatment of dens in dente along with the presentation of a case report.

Background: Dental anomaly is a complex interaction between genetic and environmental factors during the process of dental development. One such commonly seen anomaly is dens in dente which represents as an exaggeration or accentuation of a lingual pit. It is a developmental malformation where the etiology is the alteration in the normal growth pattern of the dental papilla during tooth development, resulting in invagination of the surface of the crown or root before calcification.

Case description: A 10-year-old female patient presented to the department, for the routine dental check-up. There was a coincidental diagnosis of a dental anomaly following which a preventive protocol was followed to rescue the teeth from further damage.

Conclusion: Early diagnosis and preventive intervention are important to save the teeth from the further carious lesion.

Clinical significance: As a pediatric dentist, the knowledge about the malformations and making the right decision for management is important.

Keywords: Bilateral permanent lateral incisors, Dens in dente, Preventive protocol.

Source of support: None

Conflict of interest: None

INTRODUCTION

An anomaly is defined as something that is noticeably different or that deviates from the ordinary or normal. Dental anomalies are deviations of dental tissue origin and therefore are derived from the dental tissues, enamel, dentin, or cementum. Anomalies can be extreme variations or just slight deviations. Dental anomalies are the defects caused by genetic disturbances or environmental factors during the development of tooth. Dens invaginatus is one such uncommon dental developmental anomaly seen in the permanent teeth. It is seen as a deep surface invagination of the crown or root, which is lined by enamel and resulting from the invagination of the enamel organ into the dental papilla during odontogenesis. Several authors have given a different name for this anomaly, such as Busch 1897 who suggested the name ‘dens in dente’ which implies the radiographic appearance of a tooth within a tooth. Hunter in 1951 suggested the term ‘dilated composite odontome’ which infers an abnormal dilatation of the dental papilla, Whilst Colby in 1956 recommended the use of ‘gestant anomaly’. It is defined as a developmental anomaly characterized by a deep enamel-lined pit that extends for varying depths into the underlying dentine, often displacing the pulp chamber and sometimes altering the shape of the root. Some authors consider dens invaginatus as a deep folding of the foramen coecum during tooth development, resulting in a second apical foramen. The etiology of this condition has been presumed to be related to focal growth retardation, focal growth stimulation or localized external pressure on certain areas of the tooth bud. However, this fails to give an explanation regarding cases of bilateral dens invaginatus. The most common site of dens invaginatus is the maxillary lateral incisors. The identification of this anomaly is little difficult and needs a keen observation. In this article etiology, prevalence, classification, clinical and radiographic features, and treatment options for dens invaginatus is described in detail along with a case presentation. Choice of treatment varies from preventive aspects in lenient cases to extraction in severe cases.

CASE DESCRIPTION

A 10-year-old female patient reported to the Department of Pedodontics and Preventive Dentistry, College of Dental Sciences, Davangere, Karnataka for the routine dental check-up and follow-up. The patient was healthy with no significant medical history. History of the patient revealed that she had past dental experiences
and is undergoing required treatment for the fractured
tooth. The extraoral examination did not indicate any
significant finding. On detailed intraoral examination,
there was Ellis class III fracture in relation to 11 (perma-
nent maxillary right central incisor) which was under
endodontic treatment, initial proximal carious lesion in
relation to 54 (primary maxillary right first molar), coin-
cidental diagnosis of the dental malformation in relation
to 12, 22 (permanent maxillary lateral incisors bilaterally)
(Fig. 1). It was not associated with any swelling or sinus
tract. Radiographic evaluation was advised to the patient
to know the details of the dental malformation. The
radiographic evaluation revealed the malformations to
be dens invaginatus also popularly called dens in dente
in both the permanent lateral incisors (Figs 2 and 3).
The maxillary right lateral incisor being the prominent
one (Fig. 1). The periapical region had a normal radio-
graphic appearance with no significant changes. The
tooth also responded well, showing vital signs on elec-
tric and thermal pulp testing. However, clinically both
the lateral incisors had deep pits and fissures and plaque
accumulation, which predisposes dens invaginatus to
caries, cavitation and further to pulpitis. So, a preven-
tive protocol was followed to prevent and protect the
tooth from caries. Thorough oral prophylaxis of both the
arches was done to remove debris, plaque, and calculus.
Pits were sealed with a sealant (3M ESPE clinpro pit and
fissure sealant) (Fig. 4). Teeth were checked and made
sure had no occlusal interference. Regular recall visits
were contemplated to the patient.

DISCUSSION
In this case report, dens invaginatus was seen in the per-
manent maxillary lateral incisors which were accidentally
diagnosed during the intraoral examination.

Etiology
The exact etiology of dens invaginatus still remains contro-
versial. The etiology of dens invaginatus has been explained

Fig. 1: Permanent maxillary lateral incisors with deep pits
(arrows)

Fig. 2: Radiograph showing dens invaginatus in 12 (right lateral
incisor) (arrows)

Fig. 3: Radiograph showing dens invaginatus in 22 (left lateral
incisor) (arrows)

Fig. 4: Pits sealed wrt 12, 22 using a pit and fissure sealant
(arrows)
by a number of theories. It has been put forward by Atkinson et al., that the growing pressure of dental arch results in buckling of enamel organ.7 Rushton et al., suggested that the invagination is a result of a rapid and aggressive pro-
liferation of a part of internal enamel epithelium invading the dental papilla.8 Oehler’s et al., proposed that distortion of the enamel organ during tooth development and sub-
sequent 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.9 Kronfeld et al., suggested that it results from a focal failure of growth of internal enamel epithelium.10 The “twin-theory” suggested that dens invaginatus is the result of the fusion of two tooth germ.11 Infection was also considered to be responsible for the malformation of the tooth.12 Gustafson and Sundberg et al. stated trauma as a causative factor for dens invagi-
natus.13 The genetic factor was also taught to play a role in the etiology of dens in dente.3 Shulze et al. stated that it may result from a deep infolding of foramen caecum during tooth development which in some cases may result in a second apical foramen.5 Ketunen et al., in his article, mentioned about the ectomesenchymal signal system between dental papilla and the internal enamel epithe-
lium that affects tooth morphogenesis. These signals have specific roles such as tooth morphogenesis and the folding of enamel organ which might lead to the formation of dens invaginatus.14

Prevalence

The prevalence of dens invaginatus ranges from 0.04 to 10%.15 It is a common dental anomaly encountered in the permanent lateral incisors, central incisors, premolars, canines, and molars. Involvement of dens invaginatus in primary teeth has been reported uncommon. A strong maxillary predominance is seen with no gender difference. Studies have shown, type I as commonly involved with prevalence of 81.25%.16 Table 1 shows the case report of dens in dente in permanent maxillary lateral incisors.

Classification

The most popularly known classification is Oehler’s clas-
sification, given in 1957. He described them as coronal invaginations and radicular invaginations and classified them as:9

• Type I: An enamel-lined minor from occurring within the confines of the crown not extending beyond the cementoenamel junction.

Table 1: Reported cases of dens in dente in permanent maxillary lateral incisors

<table>
<thead>
<tr>
<th>Sl no</th>
<th>Author and year</th>
<th>No of teeth involved and type of dens in dente</th>
<th>Treatment done</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Frank et al.17 1965</td>
<td>Upper left lateral incisor, type I</td>
<td>Root canal therapy</td>
</tr>
<tr>
<td>2.</td>
<td>William et al.18 1975</td>
<td>Upper right lateral, upper left lateral incisor, type I</td>
<td>Pit and fissure sealants</td>
</tr>
<tr>
<td>3.</td>
<td>Eric et al.15 1977</td>
<td>Upper right lateral incisor, type I</td>
<td>Root canal therapy</td>
</tr>
<tr>
<td>4.</td>
<td>Feruguson et al.19 1980</td>
<td>Upper right lateral incisors, type III</td>
<td>Apexification</td>
</tr>
<tr>
<td>5.</td>
<td>Carlos et al.20 1999</td>
<td>Upper left lateral incisor,type I</td>
<td>Root canal therapy</td>
</tr>
<tr>
<td>6.</td>
<td>William et al.21 2002</td>
<td>Upper right lateral incisor, type II</td>
<td>Microscopic removal of dens invaginatus</td>
</tr>
<tr>
<td>7.</td>
<td>Nalapatti et al.22 2004</td>
<td>Upper right lateral incisor, type I</td>
<td>Devitalization</td>
</tr>
<tr>
<td>8.</td>
<td>Steffen et al.23 2005</td>
<td>Upper left lateral incisor, type II</td>
<td>Root canal therapy</td>
</tr>
<tr>
<td>9.</td>
<td>Subay et al.24 2005</td>
<td>Upper right lateral incisor, type I</td>
<td>Conventional root canal therapy</td>
</tr>
<tr>
<td>10.</td>
<td>Jimenez et al.25 2006</td>
<td>Upper left lateral incisor, type I</td>
<td>Pit and fissure sealant</td>
</tr>
<tr>
<td>11.</td>
<td>Sauveur et al.26 2007</td>
<td>Upper left lateral incisor, type I</td>
<td>Conventional root canal therapy</td>
</tr>
<tr>
<td>12.</td>
<td>Zengin et al.27 2009</td>
<td>Upper right lateral incisor, type I</td>
<td>Preventive restoration in palatal surface</td>
</tr>
<tr>
<td>13.</td>
<td>Keles et al.28 2008</td>
<td>Upper right lateral incisor, Type I</td>
<td>Root canal therapy</td>
</tr>
<tr>
<td>14.</td>
<td>Kotoor et al.29 2011</td>
<td>Upper right lateral incisor, Type I</td>
<td>Root canal therapy</td>
</tr>
<tr>
<td>15.</td>
<td>Jie et al.30 2013</td>
<td>Upper left lateral incisor, type II</td>
<td>Revascularization</td>
</tr>
<tr>
<td>16.</td>
<td>Ali et al.31 2015</td>
<td>Upper left lateral incisor, type II</td>
<td>Two visit root canal therapy</td>
</tr>
<tr>
<td>17.</td>
<td>Asma et al.32 2015</td>
<td>Upper right lateral incisor, type II</td>
<td>Root canal therapy</td>
</tr>
<tr>
<td>18.</td>
<td>Azar et al.33 2015</td>
<td>Upper right lateral incisor, type III</td>
<td>Root canal therapy</td>
</tr>
<tr>
<td>19.</td>
<td>Nagaveni et al.34 2015</td>
<td>Upper right and left incisors, type II</td>
<td>Pit and fissure sealants</td>
</tr>
<tr>
<td>21.</td>
<td>Negar et al.36 2017</td>
<td>Upper right lateral incisor, type I and type III</td>
<td>MTA in apical plug</td>
</tr>
<tr>
<td>22.</td>
<td>Shaik et al.37 2018</td>
<td>Upper right lateral incisor, type I</td>
<td>Root canal therapy</td>
</tr>
<tr>
<td>23.</td>
<td>Mohsen et al.38 2018</td>
<td>Upper right lateral incisor, type II</td>
<td>Conventional root canal therapy</td>
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</tbody>
</table>
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immature apex and most cases present with a well-defined root canal. This apical formation can present with an opaque layer of enamel.

The outline of the defect is generally well defined with an opaque layer of enamel and dentine and presents a predisposition for the development of dental caries.

Therefore, pulp necrosis often occurs rather early, within a few years of eruption, sometimes even before root end closure. While other cases have reported sequelae of undiagnosed and untreated coronal invaginations which includes abscess formation, retention of neighboring teeth, and displacement of teeth, cysts, internal resorption, and facial cellulitis. General features of teeth with dens invaginatus include peg-shaped formation, incisal notching, increased labiolingual and mesiodistal diameter, conical morphology and the presence of an enlarged palatal cingulum or cusp.

Radiographic Features

The radiographic features of types I and II dens invaginatus are similar. The anomaly may vary in size and shape from a loop like pear-shaped or slightly radiolucent structure to a severe form resembling tooth within a tooth. The outline of the defect is generally well defined with an opaque layer of enamel.

Type III type of dens invaginatus is more difficult to identify and fully locate, as it is superimposed on the root canal system exiting apically from within the root canal. This apical formation can present with an immature apex and most cases present with a well-defined periapical lesion. The radiograph of the present case shows dens in dente in both right and left permanent maxillary lateral incisors. There is loop like radiolucent area in the crown part of 12, 22 (right and left permanent maxillary lateral incisors) which resembles tooth within a tooth confirming the anomaly as dens in dente. The outline of the loop is well defined in the right maxillary lateral incisor and not very prominent in left lateral incisor. The periapical region shows an open apex with no significant changes.

Treatment Choices for Dens Invaginatus

Choice of treatment varies from preventive aspects in lenient cases to extraction in severe cases. In this case report, sealing of the pits as a preventive protocol has been applied. Similar cases which have been reported with the different treatment modalities of dens invaginatus are:

- Sealing of deep pits in dens invaginatus.
- Root canal treatment.
- Endodontic apical surgery.
- Microscopic removal of dens invaginatus.
- Extraction.

CONCLUSION

As the etiology is still controversial and prevalence is not clear, clearly further scientific investigation is required regarding dens invaginatus. Also, as in this case report, early identification and preventive intervention rescued the teeth from further dental diseases, careful diagnostics and adequate treatment planning are required.

REFERENCES


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