CASE REPORT

Dens invaginatus type II associated with an impacted mesiodens: a 3-year follow-up

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SUMMARY

Dens invaginatus is a developmental anomaly resulting in a deepening or invagination of the enamel organ into the dental papilla prior to calcification of the dental tissues. The prevalence has been reported to vary from 0.04% to 10%. Dens invaginatus commonly affects lateral incisors and very rarely affects the mesiodens. This article presents a rare case of type II dens invaginatus affecting an impacted mesiodens in a 13-year-old boy and describes its gross and histological features. The associated tooth was dilated and showed invaginated enamel and dentin extending beyond the cement enamel junction. In this case, the clinical diagnosis was confirmed by histological evaluation of the internal morphology using a hard tissue microtome to section the tooth.

BACKGROUND

Occurrence of dens invaginatus with mesiodens is very rare and its diagnosis and treatment considerations are even more critical. To confirm the radiographic diagnosis, a histological evaluation of the tooth using a hard tissue microtome to section and view the internal morphology of the tooth was performed. Lack of awareness on part of a layman had caused the delay in approaching a dentist, which prolonged the treatment duration.

CASE PRESENTATION

A 13-year-old boy reported with an unerupted tooth in the maxillary anterior region. Intraoral examination revealed a missing right central incisor and space loss in the maxillary anterior region. The patient's mother gave a history of an over-retained deciduous tooth in the same region and hence, thought that on its exfoliation the permanent tooth will erupt spontaneously. When even after exfoliation of the deciduous tooth the permanent tooth did not erupt for about a period of 2 months, they approached our institution.

INVESTIGATIONS

Radiographic investigations consisted of intraoral periapical radiograph and orthopantomograph. Radiographic examination revealed impacted mesiodens and 11 (figures 1 and 2). Impacted mesiodens showed dilated invagination of the enamel extending beyond cement–enamel junction suggesting type II dens invaginatus.¹

Histological investigations consisted of sectioning using a hard-tissue microtome and ground section of tooth.

DIFFERENTIAL DIAGNOSIS

Dens in dente 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.

Dens in dente type III B

A form which penetrates through the root and perforates 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. Radiographically the mesiodens did appear to have a communication with the periodontal ligament through the root and perforating at the apical area; hence, longitudinal sectioning was performed using a hard tissue microtome confirming an enamel-lined blind sac invading the root portion of the extracted mesiodens.

TREATMENT

The impacted mesiodens was extracted and histological examination confirmed the clinical diagnosis (figures 3 and 4). As the impacted mesiodens

Figure 1 Intraoral periapical radiograph showing impacted central incisor and a dilated impacted tooth with invaginated radiopaque line extending beyond cement–enamel junction.

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Figure 2 Orthopantomogram of mesiodens showing bulkier root portion and space loss due to mesial tipping of 21 and 12, hence impairing the eruption of the mesiodens as also 11. Also note the clear resemblance of a tooth within a tooth in the present case a mesiodens.

impeding the eruption of the right maxillary permanent central incisor was a supernumerary tooth, extraction was planned followed by fixed orthodontic therapy. The boy was already 13 years old, space loss had occurred and the mesiodens was bulky in the root portion. Also, 11 was highly placed (figure 5) and the root formation was completed; however, the tooth had less chances of spontaneous tooth eruption, and keeping the space loss in mind orthodontic alignment was advised. After space regaining through orthodontic tooth movements, surgical exposure of 11 was carried out and by means of orthodontic extrusion the central incisor was finally aligned. Periodic follow-up revealed 11 is finally aligned after 2 years. Also, one can notice root resorption in 12 (figure 6). The total time taken from the time of extraction of the mesiodens till the alignment of 11 is 3 years.

OUTCOME AND FOLLOW-UP

The impacted right maxillary central incisor has been aligned after a follow-up of 3 years following diagnosis and extraction of the mesiodens associated with dens in dente type II. Mandibular arch alignment still remains.

DISCUSSION

Dens invaginatus is a developmental anomaly resulting in a deepening or invagination of the enamel organ into the dental

Figure 3 Gross photograph of longitudinally cut mesiodens demonstrating deep surface invagination that extends close to root apex, but remains confined as a blind sac.

Figure 4 Ground section demonstrating invaginated dystrophic enamel.

papilla prior to calcification of the dental tissues.² Dens invaginatus commonly affects lateral incisors with the reported prevalence varying from 0.04% to 10%.³ Association of dens invaginatus with mesiodens is a very rare phenomenon. To the best of our knowledge and review of English language literature through PubMed search showed only six case reports of dens invaginatus in mesiodens.⁴⁻⁷

The first classification of invaginated teeth was published by 'Hallet' in 1953. Most commonly used classification was proposed by Oehlers in 1957. He described the anomaly occurring in three forms (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 pseudoforamen. The invagination may be completely lined by the enamel, but frequently cementum will be found lining the invagination.^{8,9}

In 1958, Oehlers also described the radicular form of invagination.⁹

The treatment of dens invaginatus varies from conservative restoration to extraction.¹⁰ In the present case, since the affected

Figure 5 Orthopantomogram postextraction of mesiodens showing highly placed impacted central incisor with completely formed root and space loss due to mesial tipping of 21 and 12.

Figure 6 Orthopantomograph showing aligned 11 after 3 years follow-up, but notice the root resorption irt 12.

tooth was mesiodens, leading to the impaction of 11 and affecting the aesthetics of the child, extraction was carried out. Also, the patient's parent gave history of over-retained deciduous tooth, so they did not approach a dentist as they thought that after its shedding, the permanent tooth will erupt spontaneously. After its exfoliation at the age of 13, when the permanent tooth failed to erupt, they approached our institution and hence the prolonged duration of treatment. Early diagnosis and appropriate treatment of such cases can help to prevent physiological, aesthetics and functional problems associated with dens invaginatus.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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Learning points

- Identification of the tooth associated with dens invaginatus is very important, as in the present case, it being a supernumerary tooth, that is, mesiodens, it was extracted; if it was a normal tooth, it might have to be saved.
- Diagnosis of the type of dens invaginatus is extremely important as it decides the treatment plan. It is very commonly associated with lodging of debris; hence a few treatment options are:
 - Dens invaginatus with no caries; it should be sealed prophylactically with pit and fissure sealants.
 - Types I, II and III with periapical involvement might require conventional endodontic therapy.
 - Types II and III with periapical involvement might even require a combination of endodontic and surgical therapy.
 - Sometimes extraction might be indicated.
- Various radiographic investigations can be performed to arrive at a diagnosis, ranging from spiral CT to radiovisiography following injection of radiopaque dye.
- Histological investigations might include longitudinal sectioning, using a hard tissue microtome to ground sections and also scanning electron microscope analysis for enamel. Clinical identification of the invagination entrance can be difficult as entrances can be unremarkable and be similar to normal fissures. To aid in the identification process, the use of methylene blue dye can be utilised.

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