Dens Invaginatus, Clinically as Talons Cusp: An Uncommon Presentation

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Abstract

Talon cusp is an anomalous structure resembling an eagle's talon, projects lingually from the cingulum area of a maxillary or mandibular permanent incisor. It is composed of normal enamel and dentin and contains a horn of pulp tissue. Dens invaginatus is a malformation of the teeth characterized by an early invagination of the enamel and dentine that can extend deep into the pulp cavity and to the roots and sometimes reach the apex.

Dens invaginatus is classified as Type I, II and III by Oehlers depending on the severity of malformation. Frequently structural defects exist in the depth of invagination pits, as a consequence, the early development of caries and the subsequent necrosis of the dental pulp, as well as abscess and cyst formation are clinical implications associated with dens invaginatus. The treatment of dens invaginatus depends on the type of invaginatus and the degree of complexity of the root canal morphology.

Occasionally we can see more than one developmental anomaly occurring in a single tooth. In such cases it becomes important to identify the anomalies and initiate a proper treatment plan for a favorable prognosis. Herewith we are reporting an asymptomatic case of dens invaginatus which clinically presented as huge talon cusp and which was treated by grinding the talon and an intentional root canal treatment was done preserving the dens.

Key words: Dens invaginatus (DI), talon cusp, root canal treatment.

Introduction

Identification of developmental disturbances of teeth becomes important because they create problem to the clinician in diagnosis as well as treatment because of its complex crown and root canal morphology. Dens invaginatus and dens evaginatus are two such disturbances, the formation of which is exactly the opposite of the other.

Talon cusp is considered as a type of dens evaginatus. W. H. Mitchell was the first to describe it and Mellor and Ripa named the accessory cusp as "Talon cusp". Clinical problems associated with talon cusp include attrition, compromised esthetics, occlusal interference, accidental cusp fracture, interference with tongue space, TMJ pain, displacement of the affected tooth, irritation of tongue, periodontal problems, misinterpretation on radiographs before eruption and caries susceptibility.[1]

Dens invaginatus (DI) is characterized by an early invagination of the enamel and dentin that can extend deep into the pulp cavity and to the roots and sometimes reach the apex.[2] Ploquet discovered this anomaly in a whale's tooth, and in a human tooth by Socrates. Salter first described DI as "a tooth within a tooth".[3]

The frequency of DI varies from 0.04-10% and most affected permanent teeth are the maxillary lateral incisors, frequently bilateral (43%), followed by central incisors, canines, premolars and molars. Swanson and McCarthy were the first to present bilateral DI. Males are more affected than females in a ratio of 3:1.[4]

The anatomical defect leads to early carious involvement of the tooth. Even faster involvement of the periapical region occurs because of the complex root canal morphology. Depending on the degree of malformation of DI, and on the presence of clinical symptoms, there are different treatment modalities. Even without symptoms, dental treatment of dens invaginatus is considered necessary because access of irritants to the invagination may result in immediate or eventual contact with the dental pulp.[5] The invaginatus is usually removed during the treatment.

There are reports of co-occurrence of multiple developmental anomalies in a single tooth. A few might give rise to clinical symptoms early in life, with a few manifesting later. The identification and treating the co-existing anomaly is important in the treatment plan for a better prognosis. Herewith we are reporting a case of Oehlers Type II DI which clinically presented as a large talon cusp. Prophylactic grinding with intentional root canal treatment was done preserving the dens in order to maintain the resistance of the tooth.

Case report

A 14-year-old female patient visited the Department of Orthodontia because of irregular placement of teeth. On clinical examination patient showed crowding of upper and lower anterior teeth with deep bite and Angle's Class I molar relation. A projection from the cingulum of maxillary right lateral incisor was seen which was diagnosed as talon cusp (Figure 1). Since the talon cusp was large enough to cause occlusal disturbance during orthodontic treatment, patient was referred to the Department of Conservative and Endodontics for the further treatment.

The tooth was examined and since the talon cusp was large to expose the pulp on grinding an intraoral periapical radiograph was advised for the tooth. The radiograph revealed that the tooth showed a tooth-like structure within the pulp tissue which extended to the root. This was diagnosed as Oehlers Type II Dens invaginatus [Figure 2 (a)]. The contra-lateral lateral incisor showed Oehlers Type I DI on the IOPAR [Figure 2 (b)]. Intentional root canal treatment was advised for the maxillary right lateral incisor as the grinding of the talon cusp would expose the pulp.

After isolation of tooth access cavity was prepared (Figure 1). Access to the invagination and the main canal was

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Figure 1: Clinical photograph of the patient showing the pretreatment photograph with 12 showing a large talons cusp and the access cavity prepared. 22 showing a deep lingual pit

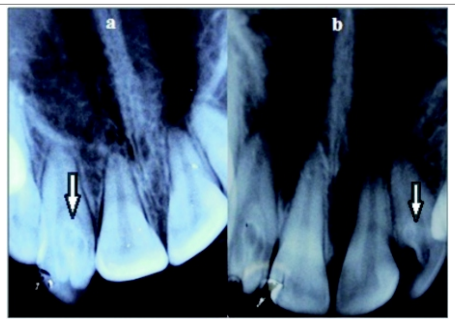

Figure 2: Preoperative IOPAR. (a) Showing 12 with Oehlers Type II dens invaginatus and (b) 22 with Oehlers Type I dens invaginatus

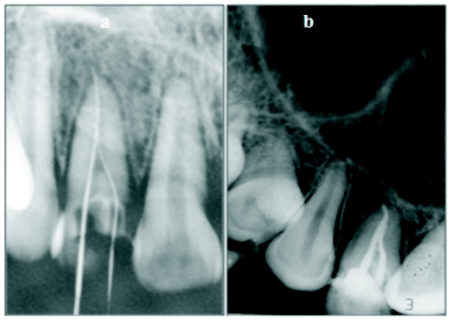

Figure 3: IOPAR of 12 (a) Showing the working length determination. Two files were placed on either side of the invaginatus. (b) Post obturation IOPAR of 12

gained. On opening the access it was seen that the main canal was irregular and narrow since the invaginated tissue occupied and compressed the main canal [Figure 3 (a)]. As the tooth had no pulpal pathology decision was taken to preserve the invaginated tooth so that the resistance of the tooth would not be compromised.

Working length of the canal was established radiographically, and the canal was shaped around the invagination to size 35 with step-back technique. The canal was irrigated with hydrogen peroxide and 5.5% sodium hypochlorite. The canal was dried with paper points. AH Plus (Dentsply Maillefer) was used as a sealer. The root canal was filled around the invagination with gutta-percha with Schilder's lateral condensation technique. A periapical radiograph showed that the canal was filled to the level of apex [Figure 3 (b)]. A ketac-fil base was placed. The talon was ground and the access cavity was restored with a composite restoration. The patient was referred back to the Department of Orthodontia for further treatment.

After two year follow up, the maxillary right lateral incisor was asymptomatic. The contra-lateral lateral incisor showed no signs of carious involvement. Hence it was kept under periodic observation.

Discussion

Talon cusp is an uncommon dental abnormality in which an accessory cusp like structure is thought to arise by evagination on the surface of a tooth crown before calcification has occurred. It occurs with a frequency of 0.04-10%. The permanent dentition is involved three times more commonly than the deciduous dentition with males having a higher predilection than the females.[1]

Talon cusp need to be treated because of various clinical problems that are associated with it. Sometimes pulpal horn might project into it, which dictates an intentional root canal treatment. Our patient had a large talon cusp which had to be ground as it would cause occlusal interference for orthodontic tooth movement. Periapical radiograph showed an invagination into the pulp which extended into the root of the tooth which was categorized as Oehlers Type II Dens invaginatus.

The presumed etiology of this phenomenon has been related to focal growth retardation, rapid and aggressive proliferation of a part of inner enamel epithelium , growth pressure of the dental arch, localized external pressure in certain areas of the tooth bud, distortion of the enamel organ, fusion of two tooth-germs , infection and trauma.[6]

The radiograph gives the appearance of the tooth within a tooth and hence it is also refered as dens in dente. It is also called invaginated odontome, dilated composite odontome, dents telescope, gestant anamoly.[5,7]

In order to characterize the degree of malformation associated with dens invaginatus, Oehlers classified DI as - Type I (an enamel-lined invagination within the crown and not extending beyond the cementoenamel junction), Type II (the enamel invagination into the root, beyond the CEJ, ending as a blind sac) and Type III (the extension of the enamel-lined invagination through the root to form an additional apical or lateral foramen; usually, there is no direct communication with the pulp).[5,8] Oehlers recognized

a coronal type (DI coronalis) when invaginatus originated from the crown and a radicular type (DI radicularis) when the invaginatus originated from the root.[2]

The clinical appearance of dens invaginatus varies considerably. The crown of the affected teeth can be of normal morphology but can also be associated with unusual forms like greater labiolingual diameter, peg-shaped, barrel-shaped, conical and talon cusp. A deep foramen caecum might be the first clinical sign indicating the presence of an invaginated tooth.[5,7] Our case had a clinical appearance of a talon cusp on the right lateral incisor and a deep foramen caecum on the left lateral incisor.

The mineralized tissue appears to be opposite to normal, with enamel located in the center and the dentin on the edges.[2] Frequently structural defects exist in the depth of invagination pit. As a consequence, the early development of caries and the subsequent necrosis of the dental pulp, as well as abscess and cyst formation, are clinical implications associated with dens invaginatus. The morphology of the main canal may be irregular, circular or narrow and a possible explanation is that the invaginated tissue occupied and compressed the main canal at different levels.[9] Our case had a tooth like structure in the pulp chamber compressing it to a thin ribbon like structure on either side. It also extended to the root canal. Two files could be passed on either side of the obstruction.

Histopathologic study of the dens is not commonly done, but very few reports mention the findings. Dentin below the invagination may be intact without irregularities but also may contain strains of vital connective tissue or even fine canals with communication to the dental pulp. Hypomineralized or irregularly structured dentin is also reported. The structure and thickness of the enamel lining the invagination also may vary widely. The internal enamel exhibit atypical and more complex rod shapes and its surface sometimes presents typical honeycomb pattern but no perikymata.[6]

Management of malformation aims to prevent possible complications. Teeth with deep palatal or incisal invagination or foramina coeca should be treated with fissure sealing before carious destruction can occur. If no entrance to the invagination can be detected and no signs of pathosis are visible clinically and radiographically no treatment is indicated, but strict observation is recommended. This is similar to our case in which the left side lateral incisor which had a deep foramina coeca was not treated but kept under periodic observation. If there are radiographic signs of pulp pathosis and no communication between the invagination and the root canal, root canal treatment or, in minor cases, even a composite or amalgam filling of the invagination will be adequate.[6]

Depending on the degree of malformation and on the clinical symptoms, there are different methods of the therapy as preventive and restorative treatment, root canal treatment, surgical treatment, intentional re-implantation or extraction (in teeth with severe anatomic irregularities that cannot be treated nonsurgically or by apical surgery).[10]

Nonsurgical root canal treatment has been considered impractical with Type II and III dens invaginatus because of the challenge in adequately cleaning the root canal without the removal of dens. In the past, the removal of the dens was considered unfeasible, but the technological advancements of operating microscopes and ultrasonic instruments have now made this option possible.[11]

Sathorn et al., reported a case of Type II DI of maxillary right canine, in which the dens and infected necrotic pulp tissue was removed, followed by mineral trioxide aggregate (MTA) apexification.[11] Kristoffersen et al., repo rted an immature maxillary right lateral incisor, with Type II DI in which dens was removed, calcium hydroxide was applied and apical barrier was created using MTA.[12] Cases of Type III DI treated by root canal treatment by Lichota et al., on maxillary right canine, Fregnani et al., and M Jung on maxillary right central incisor and Adrian Siberman et al., on maxillary left central incisor.[3,5,9,10]

Our case is unique by itself because the patient was asymptomatic and unaware of the presence of the lesion. Dens invaginatus clinically presented as a huge talon cusp or dens evaginatus. Investigations revealed the tooth was not infected. Dens was hence preserved during intentional root canal treatment to maintain the resistance of the tooth structure.

Conclusion

It is important to be aware of potential complications that may occur with dens invaginatus and dens evaginatus in the same tooth. As this is a rare phenomenon, it is necessary for the clinician to carry out comprehensive clinical and radiographic assessments to identify the defects. Appropriate care has to be taken for the intervention so as to be sure of a favorable prognosis. Presence and severity of the infection plays a major role in its treatment plan. Preservation of what is normal is one of the main goal of any treatment. Hence the dens was preserved in the present case to maintain the resistance of the tooth. This report will add to the literature, one more case of the rare lesion of co-existent developmental anomalies of teeth.

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