

## DENS INVAGINATUS IN MAXILLARY CANINE

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### ABSTRACT

*During daily routine dental practice a dentist faces different types of dental anomalies. Some of these represent a real challenge, Dens in dente (Dens Invaginatus) is one of these challenging dental anomalies. It is a relatively rare dental anomaly and mainly affects permanent teeth. Maxillary lateral incisors, followed by the maxillary central incisors are most commonly affected with the invagination, while canines, premolars and molars are rarely affected. This report presents a successful root canal treatment of a maxillary canine with type II Dens invaginatus and a chronic apical abscess.*

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### INTRODUCTION

Dens invaginatus is a rare dental anomaly, that occurs before tissue calcification, in which the coronary tissue is invaded into the pulp chamber.<sup>1-3</sup>

The dens in dente incidence ranges from 0,03% to 10%.<sup>4</sup> The etiology of Dens invaginatus remains unclear, genetic and environmental factors seem to be involved.<sup>8</sup> Dens invaginatus may occur in association with other anomalies like hypertonia, hypodontia, and macrodontia.<sup>9-11</sup>

Usually dens in dente cases are diagnosed incidentally during routine examination. On radiographs, it appears as a well outlined radiopaque area, inside the dental organ, indicating the presence of enamel in the pulp chamber, giving the impression of “a small tooth inside the other”, reason for the name dens in dente.

Oehler has classified the anomaly into three variants depending on the extent of invagination.<sup>12</sup>

Type 1: Minor form of coronal enamel lining that does not extend below the cemento-enamel junction (CEJ).

Type 2: Form of enamel lining extending into the root but confined to a blind sac, that may or may not be communicating with the dental pulp.

Type 3 A: Invagination with no communication with the pulp but extends into the root with lateral communication with the periodontal ligament space by a pseudoforamen.

Type 3 B: Invagination completely lined by enamel and sometimes cementum, extending into the root, perforating at the apex by a pseudoforamen.

This anomaly mainly affects the permanent teeth, but in some cases deciduous teeth are affected.<sup>5</sup> Maxillary lateral incisors, followed by the maxillary central incisors are most commonly affected with the invagination, while canines, premolars and molars are rarely affected.<sup>6-7</sup>

This report presents a successful root canal treatment of a maxillary canine with type II Dens invaginatus and a chronic apical abscess.

### Case report

A 12 years male, came to the dental center of King Hussein Medical hospital in Amman, complaining of sinus tract related to upper left anterior quadrant.

After clinical examination and radiographic assessment, tracing of the sinus tract was done using gutta percha size 30, the offending tooth was the maxillary canine. The peri apical radiograph revealed Dens in Dente anomaly in the upper canine with the following diagnoses: necrotic pulp with chronic apical abscess. (Fig .1).

Access cavity was prepared, canal orifice was located using DG-16 endodontic explorer. An intracanal invaginated mass was removed by ultrasonic tips. Patency achieved and working length was taken using file #15

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k file. The root canal was prepared to size 80, and copiously irrigated with 5.25 % Sodium hypochlorite via side vented gauge 30 needle. Calcium hydroxide dressing was used for one week inter-appointment period.

Then root canal was obturated with customized gutta-percha and resin based sealer, using lateral condensation technique,( Fig. 2) the tooth was filled coronally as temporary restoration, to be replaced later by permanent filling.

Follow up visit was done after 6 months, clinical and radiographic examinations revealed healing of the sinus tract and of the peri apical lesion. (Fig .3).

## DISCUSSION

Dense invaginatus (dens in dente) is a developmental anomaly that is seen clinically as a deep pit lingually. Sometimes there is a soft tissue entrapped inside it, and this tissue may become necrotic when tooth erupt into the oral cavity. So, the key in these teeth is the early diagnosis, because pulpal contamination can occur, although no direct communication is apparent in the oral cavity.

- Dens invaginatus is rare to occur in maxillary permanent canine.
- Sathorn and Parashos in (2007) stated a case of type II Dense Invaginatus of a maxillary canine.<sup>22</sup>

According to the Oehlers's classification, dens in dente type I it is the most commonly seen (94%), then the second most common is type III (33%) and the lowest incidence is the type II (4%).<sup>23-24</sup> In the current case, upper maxillary canine with type II dens in dente was diagnosed.



Fig 1 : Pre operative radio graph showing the upper maxillary left canine with a Dens in Dente anomaly.

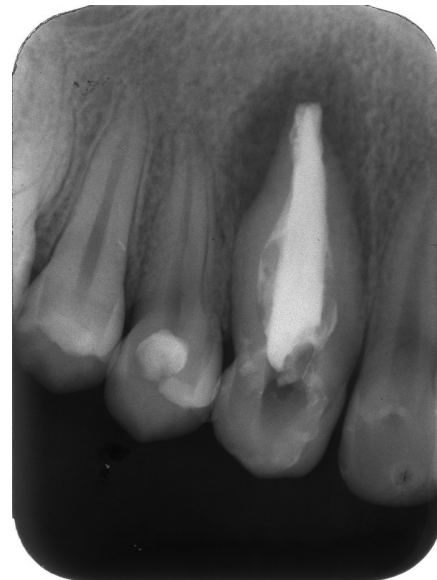


Fig 2 : post-operative radio graph.

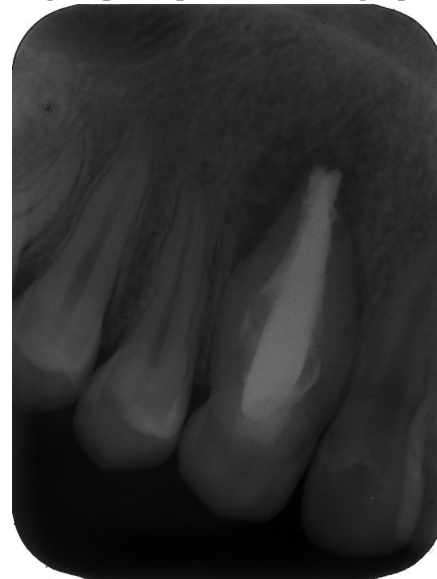


Fig 3: 6 month follow up radio graph shows healing of the peri apical lesion

Many theories proposed that dense invaginatus occurs as a result of a cell defect or agenetic defect that affects crown formation.<sup>13-14</sup> Some of these theories proposed that pressure of growth that occur in dental arch lead to strain in enamel organ.<sup>15-16</sup> Rushton proposed "benign neoplasm of limited growth." In which part of internal enamel epithelium is invading dental papilla aggressively.<sup>17</sup> Kronfeld stated that a local failure of growth inside internal enamel epithelium occur, while the external epithelium continues to grow normally and surround the static area.<sup>18</sup> Gustafson and Sundberg proposed that this defect is due to trauma, but this theory does not explain why it is more in laterals incisors and not in centrals.<sup>19</sup> Oehlers said that a defect in the enamel organ occur during tooth development. He

stated that protrusion of a small part of the enamel organ leads to the formation of an enamel-lined canal ending at the cingulum or sometimes at the incisal tip, which is associated with irregular crown shape.<sup>20</sup>

On conventional peri apical radiograph, we can see a radiopaque line inside pulpal lumen, as it is a tooth inside another tooth. So, these radiographs help us in determination of the type of this anomaly, but if you want to see its complexity and extension, it's better to take 3D image as cone beam computed tomography (CBCT).

Clinically, the crown of the dense in dente teeth may have normal morphology or it may also show unusual crowns such as a greater bucco lingual measurements, peg shaped form, barrel shaped, conical forms and talon cusps. sometimes a deep foramen coecum may be the most associated coronal alteration that indicating the suspicion of dens invaginatus.<sup>25</sup> So here patients will come complaining due to an aesthetic reason.

In the present case, the tooth has normal clinical crown morphology and the anomaly was diagnosed using conventional peri apical radio graphs with different angulations.

Many treatment options are available for treatments of dens in dente, Dentists will choose the most appropriate one, according to the morphology and the severity of the affected tooth. These modalities are ranging from simple sealing of a healthy tooth to protect it, non-surgical endodontic treatment, combined endodontic and surgical treatment, intentional replantation, or extraction.

According to the most widely used classification for Oehlers in 1970, class 1 is minimal, can be detected either in a clinic or on a radiograph. Here we do just sealing with acid-etched flowable composite or glass ionomer to prevent the progression of caries, if there are a signs or symptoms of root canal infection, then one can for root canal treatment, with incorporation of invagination inside the access cavity.

In class 2 invaginations, a more progressed defect is present. Caries can be seen deep in these lesions, as the enamel surface appearing intact and the deep caries clinically not seen. Here it's not preferable to seal these defects using the methods described for Class I defects. Opening the beginning of the invagination will allow caries to be detected and removed with long-shank burs. The invagination should be completely debrided using ultrasonic instruments and sodium hypochlorite. If the tooth does not reveal any signs of pulpal pathology the invagination can be filled without accessing the entire root canal system. In Class II, lesions may be close to the pulp, the invagination can be dressed with a material that will induce hard tissue formation such as mineral

trioxide aggregate (MTA).<sup>26</sup> The remaining invagination can then be restored and sealed with composite resin.

However, MTA has some drawbacks as an extended setting time, difficulty during manipulation, expensive and has the ability to discolor the tooth, which is not preferable in the anterior dental region. An alternative material calcium hydroxide cement could be used as, a Dycal, when you manage an Oehler's Class II invagination. If the invagination and extended caries lead to pulpal necrosis, root canal therapy is necessary. As with Class I invagination, the defect should be included using suitable long shank diamond burs, stainless steel round burs, and ultrasonic tips.

In the management of Class 3 invaginations, here it's a more complex defect. Type 3 DI is usually associated with changes in the morphology of the root canal itself. Therefore, endodontic treatment is a challenging task due to the unusual anatomy in both the pulp space and the invaginated channel. Also, there is an absence of a true constriction apically, in case the invagination opens into the periodontal space, which further contributes to making endodontic procedures complicated.<sup>28-29</sup>

Peri-invaginatus periodontitis seen in class 3 invagination, in which the tissue inside an invagination becomes infected. The pulp itself may remain vital and healthy, and the tooth responding to pulp testing. Treatment of these defects involves attempting to endodontically treat the infected invagination. This is not easy and referral to an endodontic specialist is recommended. Depending on the relation of the invagination and the root canal system, the invagination can either be treated alone or in combination with the root canal system if both the pulp and invagination are infected. Endodontic treatment of both systems is useful and will allow the patient to have the tooth treated in its entirety.<sup>30</sup> To treat such lesions, good quality peri-apical radiographs with different angles, and an operating microscope are crucial. The invagination is lined with enamel and cementum. Endodontic files are not helpful to debride these lesions as they will be ineffective. Ultrasonic alloy tips can be used to clean the lesions, and irrigants must be ultrasonically activated to maximize their efficacy and ensure that they reach all parts of the anomaly.<sup>31</sup> When the invagination communicates with the periodontal ligament space it need obturating with MTA to increase healing of the peri-radicular tissues. The pulpal canal of the tooth should be managed conventionally with endodontic files, thorough irrigation of sodium hypochlorite, before being obturated with thermal compacted gutta percha to be sure that the complex anatomy has been completely filled.

In the present case, it was decided to treat the tooth endodontically, the invagination was removed using

ultrasonic tips, the root canal system was thoroughly irrigated with sodium hypochlorite and disinfected with non-setting calcium hydroxide before obturation.

Teeth with more complex and teeth that can't be treated may need to be extracted and then replaced with a prosthesis. After that the resulting space can be orthodontically closed or reopened to allow prosthetic rehabilitation later.

## CONCLUSION

Dense invaginatus has different etiology, and its prevalence varies according to tooth region, and the studies performed. But the most important thing is the proper and early diagnosis, that facilitate the management, and help preventing tooth loss.

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**CONTRIBUTIONS BY AUTHORS**  
All authors contributed substantially