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NON SURGICAL ENDODONTIC MANAGEMENT OF TYPE 2 DENS INVAGINATUS WITH OPEN APEX – A CASE REPORT

Dental Science

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ABSTRACT

Endodontists sometimes encounter with malformed teeth such as dens invaginatus. The teeth have a tooth like hard structure in them, which is actually an invagination of the same tooth structure. Endodontic treatment in these teeth are always challenging because of their varied shape making access and biomechanical preparation difficult. Wide apical foramen and thin walls of root further complicates the matter. This case report presents a case of dens invaginatus with open apex and chronic periapical abscess which was treated non surgically.

KEYWORDS

INTRODUCTION

Dens invaginatus is a rare tooth anomaly resulting from invagination of the enamel organ into the dental papilla during tooth development. The involved teeth radiographically shows an in folding of enamel and dentine which may extend deep into the pulp cavity and into the root and sometimes even reach the root apex. This anomaly shows a spectrum of morphologic variations and results in early pulp necrosis. This tooth anomaly was first reported by Ploquet in a whales tooth in 1794 (1). In humans it was first described by a dentist named 'Socrates' in 1856(2). It may occur in deciduous, permanent or supernumerary tooth. Prevalence of dens invaginatus range from 0.04% to 10%(3)

Synonyms for this malformation are dens in dente, invaginated odontome, dilated gestant odontome, deep foramen caecum, dilated composite odontome, tooth inclusion, dentoid in dente, gestant odontome, dents telescopes.

Any teeth in the maxillary or mandibular arch may be affected. Maxillary lateral incisors are the most frequently affected, followed by permanent central incisors, premolars, canines and molar. One of the reasons for higher incidence in lateral incisors as being subjected to external forces in the stage of tooth bud by the developing central incisor or canine(4).

Etiology of Dens Invaginatus

Several theories have proposed to illustrate etiology of dens invaginatus, however it still remains unclear. According to Kronfeld (1934) dens invaginatus was caused by focal failure of growth of the internal enamel epithelium while the surrounding normal epithelium continues to proliferate (5). Rushton (1937) considered that rapid and aggressive proliferation of a part of the inner enamel epithelium invading the dental papilla producing the anomaly(6). As per Fischer (1936) and Sprawson (1937) infection was considered to be responsible for the malformation (7) (8). The other proposed causes are growth pressure of the dental arch causing buckling of the enamel organ (Euler 1939, Atkinson 1943), fusion of the two tooth germs (Bruszt 1950), trauma (Gustafson & Sundberg 1950)(9) and distortion of the enamel organ, Oehlers (1957) (3)

Classification of Dens Invaginatus

Of the various classifications to describe dental invagination, Oehlers classification is the most commonly used. He described the anomaly occurring in three forms:[Fig.1]

Type I: A minor form of invagination occurring within the confines of the crown not extending beyond the CEJ.

Type II: Invagination which invades the root but remains confined as a blind sac. It may or may not communicate with the dental pulp.

Type III: Invagination which penetrates through the root opens at the apical area showing a second foramen in the apical or in the periodontal area. There is no direct communication with the pulp.

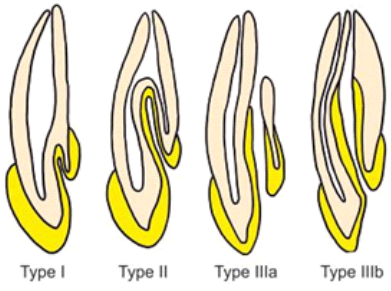
CASE REPORT

A 35-year old female patient was referred to the Department of Conservative Dentistry and Endodontics with a chief complaint of pain and swelling in the gingiva above the maxillary left lateral incisor for several months. She had a history of surgical removal of impacted canine 15 years ago. Clinical examination showed altered crown morphology of maxillary left lateral incisor with increased mesio-distal dimension of crown [Fig-2]. Tooth was tender to percussion. Sensibility testing using thermal (heat and cold) and electric pulp tester confirmed the loss of vitality of the maxillary left lateral incisor.

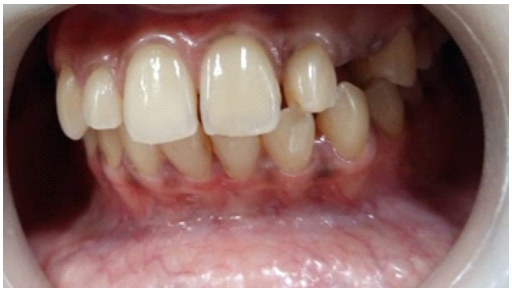
A diagnostic periapical radiograph revealed the presence a radiopaque invagination extending through CEJ to middle third of root. In addition the tooth showed open apex with diffuse periapical radiolucency measuring 10mm* 5mm in size [Fig- 3]. For further confirmation of the extent and depth of lesion and tooth abnormality CBCT was advised. After CBCT evaluation diagnosis of type II Dens Invaginatus (DI) with necrotic pulp and chronic periapical abscess was established [Fig- 4].

The treatment options were discussed with the patient and nonsurgical management of 21 was planned. After administration of local anesthesia (lidocaine 2% with epinephrine 1:200 000) and under rubber dam isolation a single access cavity was opened which was sufficient to view both the main canal and invagination. The canals were prepared using hand instrumentation after establishment of working length by apex locator (J Morita). The canals were intermittently irrigated with 5% NaOCl and saline using 30 gauge side vented needle. Intracanal calcium hydroxide dressing was given. Dressing was changed every 2 weeks for a period of 1 month.

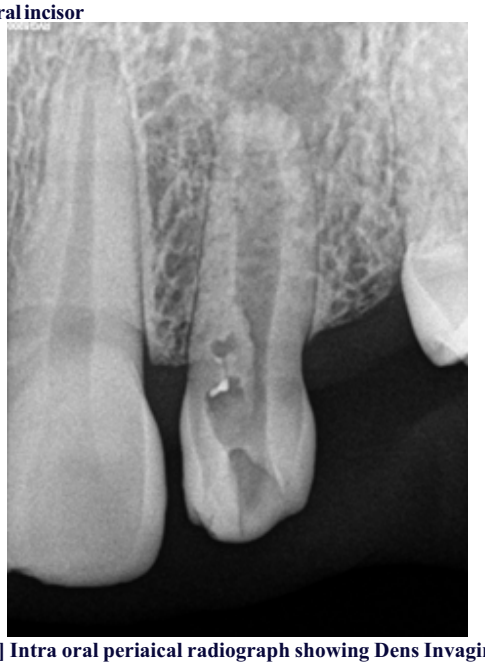
After one month with the complete absence of symptoms and reduction in periapical radiolucency, an apical barrier of 4mm thickness was created with biodentine (Septodont, USA). At the same appointment, after verifying the setting of biodentine, the rest of the canals were filled using thermo plasticized gutta-percha. Gutta-percha backfill was performed using Obtura III (Spartan, USA) and the access cavity was sealed using composite resin. A radiograph confirmed the completion of the endodontic therapy[Fig-5]. Radiographic evaluation after three months shows better healing [Fig-6].



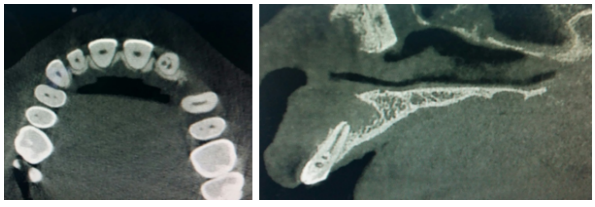
(Fig.1) Oehler's classification of Dens Invaginatus



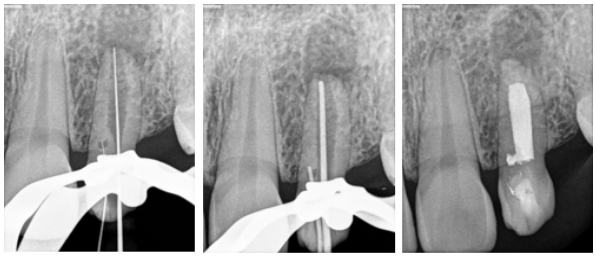
[Fig-2] Intra oral clinical examination showing altered morphology of lateral incisor



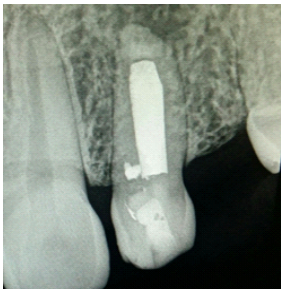
[Fig-3] Intra oral periaical radiograph showing Dens Invaginatus with periapcal lesion



[Fig-4] CBCT images to confirm Dens Invaginatus



[Fig-5] Images of working length determination and apexification with biodentine



[Fig-6] Radiograph of 3 months review

DISCUSSION

Dens invaginatus constitutes a treatment challenge to dentist since it may have a complicated morphology and complex system of root canals. This anomaly requires early diagnosis, intervention and interferes with endodontic treatment.

Clinically, diagnosis of dens invaginatus can be done by unusual crown morphology, deep lingual pit is often present on the affected tooth. However in some cases, the tooth may show no clinical features of any abnormal structure and might appear normal. In the present case, tooth showed abnormal morphology of increased mesiodistal dimension but lingual pit was absent. The involved tooth was open apexed, loss of vitality possibly occured during root development. From the history there is a clear evidence of pressure from impacted canine which may be a cause for loss of vitality

Different treatment modalities have been described for these teeth based on degree of complexity of its anatomy. The current treatment protocol includes early detection of the lesion, prophylactic or preventive sealing of the invagination, root canal treatment, endodontic apical surgery, intentional replantation and finally extraction.

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Nonsurgical endodontic treatment in teeth with dens invaginatus should be the first treatment alternative. Nonsurgical root canal treatment has excellent long-term prognosis, better than those of surgery, because it disinfect the entire root canal system, rather than just sealing the apex. Meghana and Thejokrishna suggested that the nonsurgical root canal treatment should be attempted first irrespective of the size of lesion, and surgical intervention should be the second option and is only indicated when non-surgical root canal treatment has failed or the anatomic variations of the canals do not allow access for the biomechanical preparation of the canal(10). Periapical surgery is indicated only in cases of unsuccessful apexification in immature teeth with dens invaginatus and nonvital pulp(11).

A complete disinfection of the canal is essential to promote healing of affected periradicular tissues. In this case, sodium hypochlorite for irrigation and calcium hydroxide as intracanal medication, in between appointments, were used to obtain disinfection. Calcium hydroxide has a very high therapeutic index. Like sodium hypochlorite, calcium hydroxide may reach inaccessible parts of the complex invaginated root canal system that may not be amenable to mechanical cleaning. it augments sodium hypochlorite irrigation during root canal debridement and treatment(12).

Conventional apexification using calciumhydroxide has several drawbacks like weakening of dentinal wall, long duration for treatment completion and porous barrier formaton. So recent approach is to form artificial apical plug using calcium silicate based materials. MTA has excellent biocompatibility and sealing property but it's main drawbacks are slow setting kinetics, discoloration potential and difficult handling characteristics. Biodentine is a bioactive dentine substitute for repair of root perforation, apexification and retrograde filling. In the present case apexification done using a bioceramic material biodentine. It has several advantages such as better handling property, shorter setting time, better sealing property and bioactivity which stimulate healing. A review of the case after 3 months showed better healing of the periapical tissues and tooth remains functional and asymptomatic.

CONCLUSION

Dens invaginatus is a rare malformation of the teeth, showing a broad spectrum of morphologic variations in form and size of the crowns and roots. Early detection and appropriate preventive measures are very important in managing these types of dental anomalies. This case report has shown that type II Dens Invaginatus with an open apex and chronic periapical abscess can be successfully treated nonsurgically.

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