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Research Paper

Non surgical Endodontic Management of Dens Invaginatus: A case report

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Abstract
Dens invaginatus is a dental germ aberrant development caused by enamel invagination. It is distinguished by enamel and dentin invagination, which forms a lumen within the diseased tooth that can reach as deep as the apical foramen. Diagnosing and treating these illnesses might be challenging due to their canal morphology. Understanding dental anatomy and deviations is essential for successful endodontic therapy.Early and correct diagnosis is critical in determining the most effective treatment for such cases. This case report describes on such successful rehabilitation of case of dens invagiatus Oehler's type II with open apex.

Key words*: Dens in dente, dens invaginatus, endodontic treatment, Immature permanent teeth*

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I. Introduction

Dens invaginatus (DI) is an odontogenic abnormality that occurs when the enamel organ deepens or folds into the dental papilla before calcification.[1] After discovering it in a whale's tooth, Ploquet initially described the this deviation from natural anatomy in 1794.In 1856, Socrates, a dentist, first described dens in dente in human teeth.[1] Telescopic tooth, dilated odontoma, dens in dente, invaginated odontoma, dilated gestant odontoma, dilated composite odontoma and tooth inclusion are all the terms that are synonymous with this malformation.[2]

The aetiology of this phenomenon is unclear, as it could be caused by various factors such as external forces on the dental germ, pressure from dental arch growth, incomplete fusion of two dental germs, infection, genetics, and trauma.[2] It has been reported to occur in 0.04%-12% of cases, and is bilateral in almost 43% of cases.[3]

According to the length of the tooth tissue invagination, Oehlers classified dens invaginatus into three types: Type I—an invagination lined with enamel inside the crown which does not extend beyond the cement-enamel junction (CEJ); type II—an invagination lined with enamel up to the inside of the root, beyond the CEJ, terminating in a blind sac; type III—the invagination lined with enamel extends through the root to form an additional apical or lateral foremen.[4]

This case report describes successful rehabilitation of one such case of dens invaginatus Oehler's type II with an open apex and periapical abscess.

II. Case Report

A 19 year old female patient reported to the Department of conservative Dentistry and Endodontics with a chief complaint of pain in upper left front region of jaw since 3 days. The patient gave history of mild pain intermittently since past 3 months which exaggerated in last 3 days. She also gave history of night pain. On clinical examination the tooth 22 was peg shaped and tender on percussion , a small pit was noted on incisal surface. The area in buccal vestibule apical to 22 was tender on palpation. Investigation done were IOPA X-ray with 22 which revealed dens invaginatus (Ohler's type 2) along with open apex due to resorption and periapical radiolucency. Thus the provisional diagnosis made was symptomatic apical periodontitis with 22 secondary to periapical abscess. A conservative treatment plan was formulated of Root canal treatment along with apexification with biodentin and sealing of dens invaginatus to prevent further ingress of debris and bacteria to cause infection.

Clinical procedure

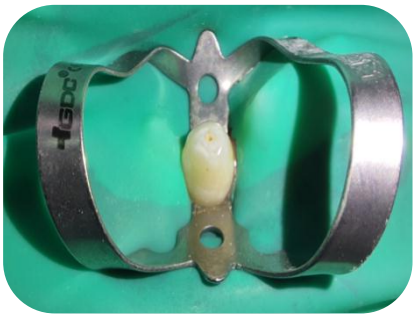
In first appointment, the tooth was first isolated under rubber dam isolation to prevent any further ingress of bacteria in the canal while performing the root canal treatment. Then access was obtained using Number 4 round bur. After opening of pulp chamber two access canals can be noted that is one of dens and other of main root canal. The access of the root canal was modified to remove the lingual shoulder with safe end bur. After which root canal working length was obtained using #10 K file. Length of blind sac was also obtained by #10K file. The canal was cleaned and shaped till #60 K file in apex. The root canal and the blind sac was irrigated by 5.25% sodium hypochlorite solution to remove the organic tissue and necrotic pulpal debris using a side vented 26 gauge needle. The solution was also agitated with ultrasonic device to reach unistrumented parts of the canal and blind sac. The final scrapping of canal and blind sac was done by #40 H file to remove the organic tissue layer to prevent resorption. The blind sac was sealed using Biodentin material as it shows adequate biocompatible properties along with it does not cause the discolouration of the tooth. Composite resin cement was not used as the length of the blind sac was 13mm which would have caused improper curing of composite resin thus leading to leaching of irritating uncured resin which would have caused weakening of the tooth structure. As the root canal was associated with periapical radiolucency intracanal medicament of calcium hydroxide was given for 14 days and root canal was sealed using temporary restoration of zinc oxide eugenol.

In second appointment the tooth 22 was non tender on percussion, also patient gave history of no pain. No swelling was associated with the concerned tooth. Thus in second appointment it was decide to go ahead with process of apexification. The tooth was again isolated under rubber dam isolation. The temporary restoration was removed and access was opened. The intracanal medicament of calcium hydroxide was removed using #20 H file and irrigating with normal saline solution. The canal and blind sac was irrigated with 17% EDTA solution with side vented 26 gauge needle to remove the smear layer. Final irrigation was done using normal saline to avoid irritating the periapical tissues. 5 ml blood was collected from the patient and was centrifuged for 20 min at 20000 rpm to obtain PRF (Platelet rich fibrin). This PRF was placed beyond the apical foramen to act as barrier on which the biodentin can be condensed. Then the biodentin powder and liquid was mixed and made a roll which was placed in the canal and pushed in apical region using finger plugger to obtain a apical plug of 4mm. The rest of the canal was filled using thermoplasticized gutta purcha system. The coronal seal was then completed using composite resin cement.

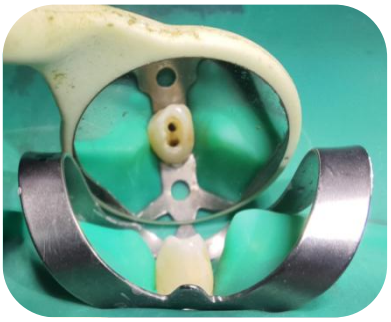
Pre Operative Clinical Photograph

Pit Traced With Probe On Incisal Surface

Pre Operative Radiograph

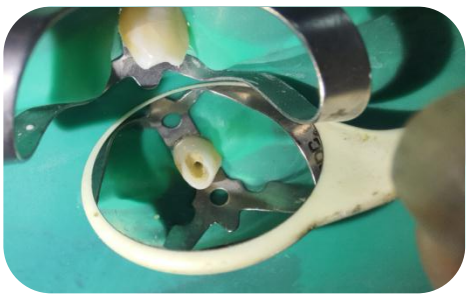


Rubber Dam Isolation



Clinical Photograph After Access Opening And Extirpation Of Necrotic Pulp Tissue

Working Length Determination Along With Length Determintion Of Dens Invginatus



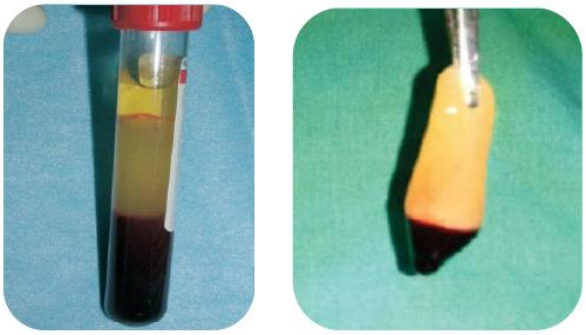
Biodentin Was Placed In Blind Sac Of Dens Invaginatus For Complete Sealing

Iopa Xray After Biodentin Placement In Blind Sac Of Dens Invaginatus

Biodentin placed in blind sac

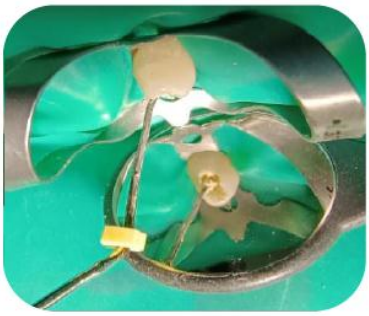
Intracanal Medicament Of $Ca(OH)_2$ was Given For 2 Weeks

In Second Appointment, Blood Was Collected From Patient and Placed In Centrifuge For Obtaining PRF



PRF Obtained From Patient's Blood

PRF Was Placed Beyond Apex



Biodentin Was Placed As Apical Barrier

Obturation Of Remaining Canal With Thermoplastisized Gutta Purcha Technique

Post Obturation IOPA Xray

Post Obturation IOPA Xray After 6 Months Follow Up

Pre Operative Radiograph

Post Operative Radiograph

III. Discussion

While endodontically treating any variation in dental anatomy a clinician must have sound knowledge to diagnose, to formulate a treatment plan and skills to execute it. Dens invaginatus or "Dens in dente" is a developmental malformation incident due to the in folding of enamel and dentin or an accentuation of the lingual pit of an incisor before calcification sets in.[5] Dens Invaginatus presents an endodontic challenge, particularly because of the complex root canal morphology inherent in the condition and because of difficulty in accessing the regular and invaginated canal.[6] This case proved more challenge because of preexisting resorbed open apex.T he blind sac results in a deep opening, which becomes an environment for bacterial development.[7] The enamel in these abnormalities is typically deformed or has several fine channels linking the invagination to

the pulp area. Endodontic treatment can be challenging because to complicated root canals and invagination.[7,8] Thus a manual or rotary instrumentation can be used independently in such cases but irrigant agitation is of ultimate importance for cleaning the complex canal system of Dens Invaginatus. The agitation is usually performed by applying sonic or ultrasonic devices on irrigation solution.[9]

Calcium hydroxide served as an antimicrobial and tissue disintegrating agent in this case.[10]Calcium hydroxide has been shown to promote root dentine healing at the apical and periapical levels According to Nerwich et al., the calcium hydroxide intracanal dressing's hydroxyl ions take a few hours to diffuse into the inner root dentin, 1-7 days to reach the outer root dentin, and 2-3 weeks to achieve peak levels.[10]

Many materials like blood clot, platelet-rich plasma and PRF, collagen scaffolds, polyglycolic acid, polylactic glycolic acid are suggested as scaffold to place beyond apex. PRF has shown to be the most successful on basis of biocompatibility and growth factor release.[11] PRF a second generation platelet concentrate, found to have more advantageous as compared to PRP as PRF causes maintained release of growth factors such as platelet derived growth factor, transforming growth factor β1 for atleast 1week and up to 28 days which are known to promote proliferation of mesenchymal stem cells to help regeneration of tissues.[11,12]

Biodentine is a bioactive replacement dentine based on 'Active Biosilicate Technology,' launched by Septodont in September 2010.[12] Biodentine consists of powder in a capsule and liquid .Its compressive strength, elasticity and micro stiffness is similar to that of natural dentine.[13] It can produce a tag-like crystalline structure in the dentinal tubules that can help to micromechanically bind the dentine with new calcium silicate substances.[13] Furthermore, as the time limit is lower, it is possible to complete the procedure on the same day unlike MTA, where a two-stage technique is necessary.[14] Biodentine has a shorter setting time of 12 min as compared to MTA which is 2 hours and 45 min. Biodentin was used as root end filling material due to its better handling properties and faster setting time and also it does not cause discoloration like MTA thus it does not hamper the esthetics of the patient. It was also used to seal the blind tract of dens as the depth was 13 mm which may would have cause improper curing of composite resin if it would have been used. As biodentin is a bioinductive material it is well suited for closure of open apex as well.[14]

IV. Conclusion

The practitioner should always give more attention to all endodontic cases, especially those with complex root canal morphology such as Dens Invaginatus. Knowledge about deviations from normal anatomy, use of agitation of the chemical irrigation, selection of the suitable obturation and/or restoration materials will assure better prognosis

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