

## **Endodontic management of Type II Dens Invagination**

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### **Abstract**

Dens in dente is a developmental malformation, incident due to the infolding of enamel and dentin or an accentuation of the lingual pit of an incisor before calcification sets in, posing challenges to diagnosis and treatment. The application of three-dimensional imaging techniques in endodontics, has made the diagnosis of teeth with a complex root canal system possible as such an anomaly remains unnoticed by the patient until any clinical sign appears. CBCT, as diagnostic tool helps to study “Dens in dente” in detail, especially the type, to decide the technique of cleaning and shaping, and obturation. The difficulty in endodontic treatment of such teeth is also due to the operator’s inaccessibility to the diseased pulp in the complex root canal anatomy. This case report describes Oehler’s type II dens invagination which was treated non-surgically and showed good prognosis.

Key-words: Dens invaginatus, microscope, nonsurgical

Key Messages : Non-surgical root canal treatment is successful in dens in dente cases with the availability of advanced armamentarium and devices available for the management of such complicated cases. This case also highlights the excellent peri-radicular healing which reiterates the fact that non surgical approach in such cases provides desired successful outcome.

**Introduction:**

An anomaly is defined as something that is noticeably different or that deviates from the ordinary or normal.<sup>1</sup> Dens in dente is one such commonly seen anomaly. Dens invaginatus or dens in dente is defined as a defect in tooth development, characterized by invagination of the enamel organ before the calcification phase.<sup>2</sup> The maxillary lateral incisor is the frequently involved tooth with a incidence of 0.25-5.1%.<sup>3</sup> Oehler's has classified dens invaginatus into three categories according to the depth of enamel invagination inside the tooth. Type I is seen in 79% followed by type II (15%) and type III (5%).<sup>4</sup>

Dens invaginatus offers a challenge for endodontic treatment, because of the presence of a complicated root canal system. The treatment modalities of dens in dente varies from restorative measures to nonsurgical root canal therapy, endodontic surgery, intentional replantation, or finally extraction. This case report describes a patient with dens in dente with periapical pathology in maxillary right lateral incisor, which was successfully treated with nonsurgical endodontic approach.

**Case History:**

A 21yrs old male patient reported to the Department of Conservative and Endodontics with pain in the upper right front tooth region. He reported intermittent dull pain in the permanent maxillary right lateral incisor that was aggravated on biting and at night and relieved only after taking medication. He had no relevant medical history. On clinical examination, patient had a fair oral hygiene. The right lateral incisor was found to be narrower mesiodistally with no evidence of caries. Tooth was tender on percussion. Vitality test were done using thermal and electric pulp tester. Tooth 12 gave a negative response. There was no evidence of swelling or sinus tract. Radiograph showed a well-defined oval shaped radiolucency in the periapical region of 12. An enamel invagination extending beyond the CEJ was noticed in the crown with the extension of the Dens invaginatus within the middle third of root but not communicating with the main root canal. CBCT was taken to confirm the diagnosis as dens invaginatus Type II. A clinical diagnosis was established as Oehler's type II Dens Invaginatus with pulp necrosis and

chronic apical periodontitis. Treatment Plan decided was Nonsurgical endodontic therapy with 12.

Initial access preparation was done under rubberdam isolation using a round diamond bur. Ultrasonic instrumentation (i-SuperTip # 30) was then used, under an operating microscope (Semor) of magnification ( $\times 12$ ) to refine the access preparation. With the aid of the DG-16 endodontic explorer two canal openings were located and their patency was maintained using No-10 K file (Mani, Japan). There was no communication with the main canal and the invagination canal had an obvious apical stop. Working length was determined using a #15 K-File and #10 K-File for the main canal and the invagination respectively. Cleaning and shaping was done using saline and 5.25% sodium hypochlorite till F3 Hand protaper in the main canal and F1 in the invagination (Dentsply, Maillefer, Switzerland). Passive ultrasonic irrigation was performed with a #25 ultrasonic file (Irrisafe; Satelec, Acteon equipment). Ethylenediaminetetraacetic acid (EDTA) liquid 17% was used as the final irrigant to remove the smear layer. Calcium hydroxide dressing was given twice for 2 weeks during the inter-appointment period. The canals were dried using paper points and obturated using thermoplasticized gutta purcha technique (Calamus dual 3D obturation system, Dentsply Maillefer, Switzerland) and AH Plus sealer (Dentsply De Trey, Konstanz, Germany). Post endodontic restoration was done with nanohybrid composite (3M ESPE).

### **Discussion**

Dens invaginatus is challenging to treat since the root canal system is complex, it usually needs a specific treatment plan that may be different from a normal tooth. Periapical radiographs are inadequate in identifying the complexities of the dens invaginatus. Recent imaging methods, such as CBCT, helps diagnose and plan the treatment for teeth with this developmental defect. CBCT is a valuable aid for the management of complex endodontic cases, because it enables one to attain three-dimensional images of the root canals, teeth, and its surrounding areas at radiation exposure lesser than the conventional CT. 5 Magnification tools such as a surgical operating microscope may reveal an aberrant canal, which emphasizes its benefit during the treatment of a Dens invaginatus. Cleaning and shaping may be difficult because of the complex morphology associated with invaginations, including the large and irregular volume of the root canal system. NiTi instrumentation with greater flexibility, along with ultrasonic cleaning of the pulp space, may be a proficient means of disinfection. Thermoplastic filling techniques have been

recommended for obturation of such teeth, as they compact the softened material into major irregularities within the root canal system. Root invagination treatment or root canal treatment of only the invagination was first recommended by Grossman and Creaven; prior to that, extraction was the only preferred treatment.<sup>6</sup> Root canal treatment of the invagination is indicated in cases where the invagination has a separate apical or lateral foramen. Giuliani et al. (2002), highlighted that a complete pulp space disinfection of such cases is compulsory to encourage healing of affected periradicular tissues. The use of 5.25% sodium hypochlorite as irrigant and calcium hydroxide as intracanal medicament between appointments is the gold standard. Removal of the invagination may facilitate root canal disinfection but may result in compromising the tooth structure.<sup>7</sup> In cases where the primary root canal and the invaginated canal do not communicate, and when the invagination does not hamper full access to the apical portion of the primary canal, both canals are individually disinfected and obturated. In the present case calcium hydroxide, ultrasonic instruments and dental operating microscope were a valuable adjunct to disinfect and visualize the canals.

#### Conclusion

Non surgical root canal treatment is successful in dens in dente cases with the availability of advanced armamentarium and devices available for the management of such complicated cases. This case also highlights the excellent peri-radicular healing over a period of 1 year and 7 months which reiterates the fact that non surgical approach in such cases provides desired successful outcome.

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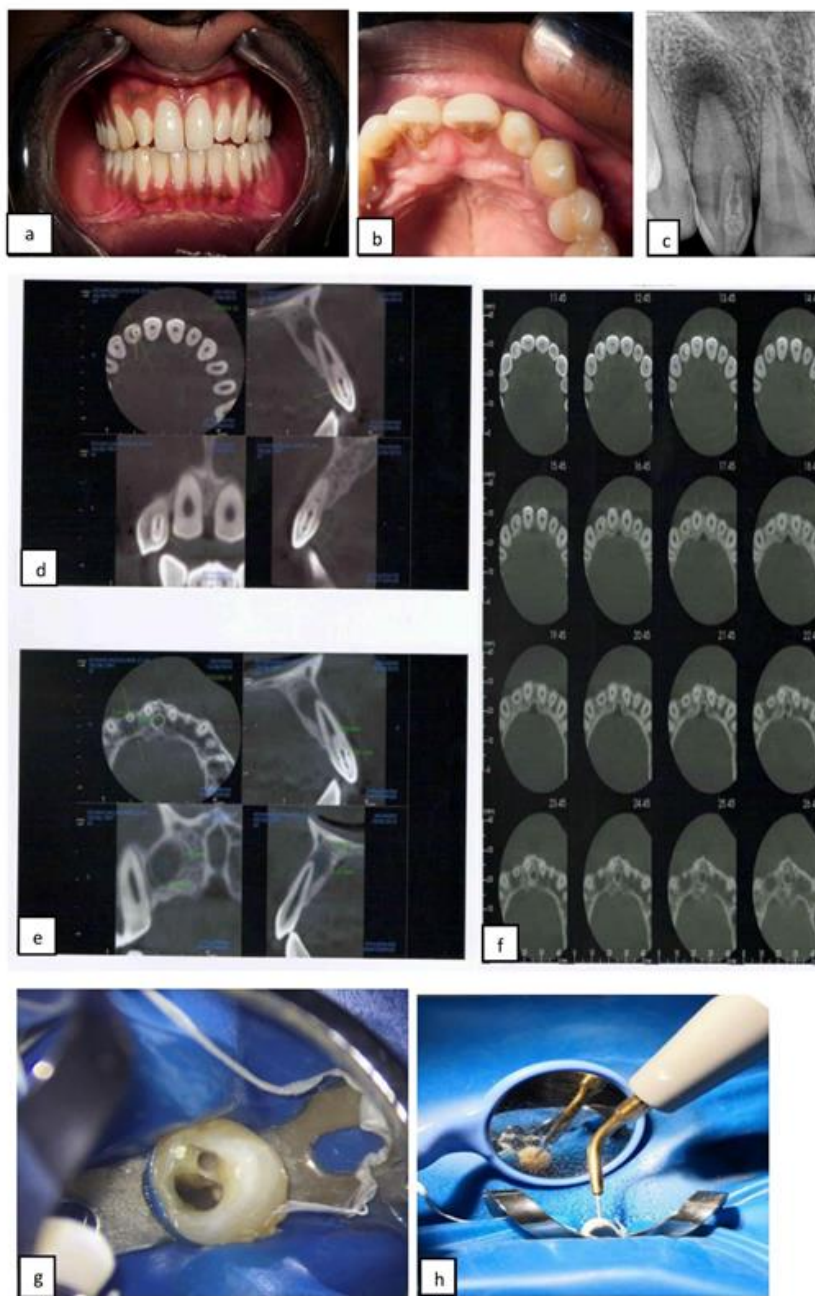


Figure I: (a) Intra oral Labial view of tooth 12, (b) Palatal, (c) (d) (e) (f) cone beam computed tomography images to confirm dens invaginatus, (g) Root canal orifice and (h) Ultrasonic activation

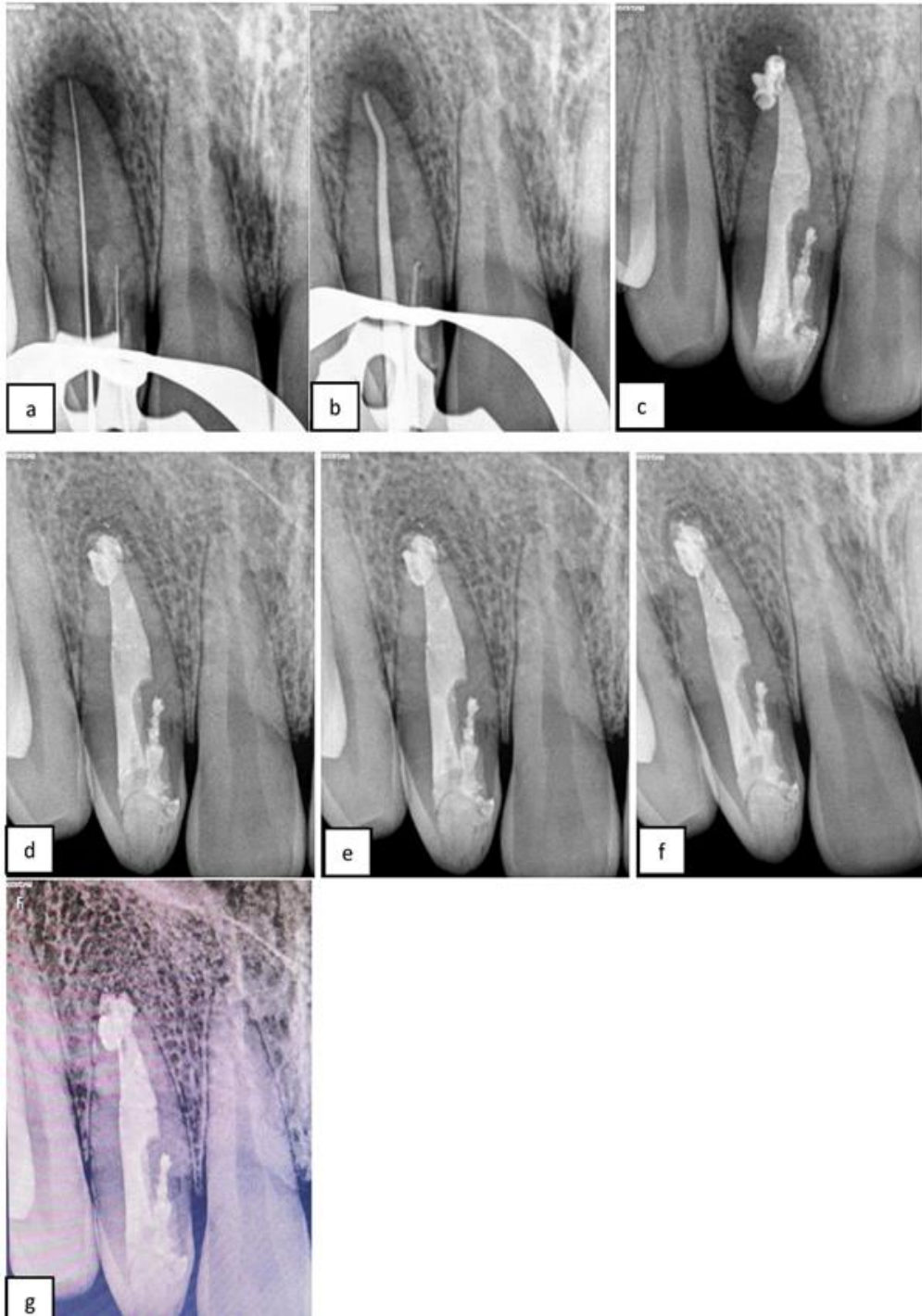


Figure II: (a) Working Length, (b) Master cone, (c) Obturation (d) 3months (e) 6 months (f) 9months and (g) 1year and 7 months