**Case Report:**

**Nonsurgical retreatment of type III DENS invaginatus**

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**Abstract:**

Thorough knowledge of normal anatomy of the root canal system as well as its possible aberrancies is imperative for the success of endodontic therapy. The challenge lies not only in diagnosing these abnormal conditions properly but also in complete debridement and three dimensional sealing of the same. This article reports the non surgical retreatment of Type III dens invaginatus in maxillary left lateral incisor with persistent periapical radiolucency, using 3.5X magnifying loupes, Portland cement and fiber post.

**Key words:** Type III Dens invaginatus, 3.5X magnifying loupes, Portland cement

**Introduction**

Anatomic variations of the root canal system are a commonly occurring phenomenon. Dens invaginatus is one such variation. It results from the invagination of the enamel organ into the dental papilla before calcification has occurred\(^1\). Although the etiology of its occurrence remains controversial, various hypothesis have been suggested such as focal growth retardation \(^2\), growth pressure of the dental arch \(^3\), localized external pressure in certain areas of the tooth bud \(^4\), infection and trauma\(^5\). However, none has been proven or widely accepted. Its prevalence ranges from 0.04% - 10% \(^6\) with maxillary permanent lateral incisors being most commonly affected.\(^7\)

The most popular and commonly used classification of invaginated teeth is that proposed by Oehlers in 1957.\(^8\)(Fig. 1)

Clinically, the crown of an affected tooth may appear normal or may shown changes in its size and shape such as greater buccolingual diameter, peg shaped or barrel shaped teeth or a talon cusp.\(^9\)

In majority of cases the “dens in dente” appears to represent simply as an accentuation of the lingual pit, which usually goes unnoticed.\(^10\) Inability to maintain proper hygiene around such area, demands early diagnosis and treatment of such variations.

Range of treatment options suggested extends from sealing of the accentuated lingual pit, conventional root canal treatment, combined root canal- surgical treatment, intentional replantation to extraction.\(^11\) However intentional replantation and extraction are last resort. Surgical approach should also be second option due to inability to completely clean the entire canal, difficulties in achieving proper apical seal & issues of patient comfort. Successful nonsurgical root canal treatment of type II and type III invaginatus is practically impossible without removal of dens.

The following case report presents a nonsurgical retreatment of type III dens invaginatus in maxillary left lateral incisor with persistent apical radiolucency.
Case report
A female patient aged 16yrs came to Department of Conservative Dentistry and Endodontics of Govt. Dental College & Hospital, Ahmedabad with chief complain of pain and pus discharge in relation with upper anterior teeth since 3 months. She gave history of surgery in the same region before 1 year. Her medical and familial history was non contributory. On clinical examination, all her teeth were of normal shape and size. Intraoral sinus was noted in buccal vestibule of upper anterior teeth. Lingual surface of 22 was restored with GIC indicating some previous treatment in relation with that tooth. However, tooth no. 22 was neither decayed nor discoloured. But it was tender to vertical percussion and upon palpation of the buccal mucosa. The tooth exhibited grade 1 mobility. Except for tooth no. 22, teeth 11, 21 &23 gave normal response to electric pulp testing and thermal testing (hot stimulus by application of heated gutta-percha). Periodontal probing was within normal limits for all the teeth. On radiographic examination, tooth no. 22 showed unusual root anatomy, with previous root canal treatment, root end filling and apical radiolucency of about 10mm.(Fig. 3) Diagnosis of type III invaginatus in relation with tooth no. 22 with persistent apical periodontitis was established and non surgical retreatment of 22 was planned.

Access was established from the lingual side of 22 without local anesthesia and previous gutta-percha were removed using H file and xylene. Diagnosis was further confirmed radiographically. On careful enlargement of the access opening using 3.5X magnifying loupes with LED light a continuous narrow C shaped primary canal was noted buccally around the larger invaginated palatal canal separated by the septa running mesiodistally. It can be presented schematically as in (Fig.2). Considering the difficulty in cleaning & shaping of such abnormal root canal system & failure of previous root canal treatment, joining of the two canals by removal of intermediate septa, was decided to achieve thorough cleaning of the canal system. After establishing the working length radiographically.(Fig.4) GG drills were carefully used under magnification and illumination for removal of the intermediate septa. Canals were intermittently irrigated with copious 1% NaOCl solution. After removal of the intermediate septa, circumferential filing was done with H files to smoothen the dentinal walls. Removal of intracanal septum resulted into open apex.(Fig.5) Intracanal medicament of calcium hydroxide mixed with 3% NaOCl was given and the tooth was restored temporarily with Kelzinol. Dressing was repeated weekly until the intraoral sinus was healed and the symptoms disappeared. After 3 weeks extraradicular tissue was checked through canal with paper points to determine if an external matrix of calcium sulphate was necessary against which to compact Portland cement. As there was reasonably firm soft tissue barrier at the apex, apical barrier of about 3mm was then formed with Portland cement using finger pluggers.(Fig.6) Moist cotton pellet was thereafter placed over it to allow it to set. The following day the cotton pellet was removed & the coronal part of the canal was dried. Weekend root structure was then reinforced with fiber post cemented with resin cement.(Fig.7) On six months followup, patient was free of symptoms. The tooth was not sensitive to vertical percussion and palpation of buccal mucosa. Radiograph showed reduction in size of periapical lesion indicating successful treatment.(Fig.8)

Discussion
Difficulties in treating such cases are closely related to the complexity, the type and the extent of invagination. The prevalence of each type of invagination was reported by Ridell with Type I
being the most common (79%) whilst Type II (15%) and III (5%) less frequently observed.\textsuperscript{(12)} Present case was Classified as Oehler’s Type IIIB dens invaginatus resembling last diagram in fig. 2, with persistent apical periodontitis. Because of the complex anatomy of dens invaginatus, conservative endodontic treatment is difficult and usually complicated, especially when large apical lesions exist. Regardless of the size of the periradicular lesion, surgical treatment should be performed only when nonsurgical endodontic treatment has failed, and the size of the periradicular lesion should not dictate the treatment procedure.\textsuperscript{(13)} Thus nonsurgical treatment with removal of intermediate septum was performed. C. Sathorn& P Parashos have also reported similar case of dens invaginatus in which they removed the internal hard tissue with ultrasonic tips.\textsuperscript{(14)} Various studies have proven that the chemical, physical, microbiological and biological properties of Portland cement is similar to MTA, except for the presence of arsenic and absence of bismuth oxide in the former.\textsuperscript{(15,16,17,18,19,20)} However, studies have also shown that the amount of arsenic present in Portland cement is too low to cause any health hazard.\textsuperscript{(21)} Radioopacity of Portland cement is similar to dentin making it possible to use as a apical barrier. Considering the poor economic background of the patient and acceptability for dental use Portland cement was used for apexification. Use of fiber post with resin cement is justified as they forms monoblock thus reinforcing the weakened tooth structure.\textsuperscript{(22)} This case report illustrates that even in a tooth with type III dens invaginatus and persistent apical periodontitis, careful nonsurgical endodontic treatment might result in satisfactory periradicular healing, with the aid of magnification.
FIG. 2 SCHEMATIC REPRESENTATION OF CANALS IN CROSS SECTION OF ROOT

Buccal Side

Primary canal
Intermediate Septa
Invagination

Palatal Side

FIG. 3 PRE OPERATIVE IOPA WITH PREVIOUS ENDODONTIC TREATMENT.

FIG. 4 DETERMINATION OF WORKING LENGTH OF THE PRIMARY CANAL AFTER REMOVAL OF OLD GUTTA PERCHA

FIG. 5 IOPA AFTER MERGING THE INVAGINATUS AND THE MAIN CANAL

FIG. 6 APICAL BARRIER WITH PORTLAND CEMENT
References


