

## Case Report

# Complex Endodontic Treatment of Dens Invaginatus Type III in Maxillary Lateral Incisor: Reports of Two Cases

Nazneen R<sup>a</sup>, Joshi R<sup>b</sup>, Hasan S<sup>c</sup>, Howlader MMR<sup>d</sup>, Alam MS<sup>e</sup>

### Abstract

*Dens invaginatus is a developmental malformation of teeth, showing a wide spectrum of anatomical variations, resulting from the invagination of a portion of a crown that might be confined to the crown or it may pass the cement-enamel junction and may result in a second apical foramen formation during the stage of odonto-genesis. It is clinically significant due to early development of caries and subsequent necrosis of the pulp. Chronic peri-apical lesions are often associated with these anomalies without clinical symptoms. Clinicians should be mindful of the possibility of dens invaginatus when a patient comes with a tooth having signs of pulpitis without history of trauma, caries and should examine the suspicious tooth as well as the peri-odontium radiographically. Most affected permanent teeth are the maxillary lateral incisors followed by central incisors, canines, premolars and molars. This article describes both surgical and non-surgical endodontic management of dens invaginatus type III with large apical radiolucency in upper left lateral incisor.*

**Key words:** *Dens invaginatus, maxillary lateral incisor, root canal treatment, retrograde filling, mineral trioxide aggregates.*

*(Birdem Med J 2015; 5(2): 111-105.)*

### Introduction

Dens in dente or dens invaginatus is a growth abnormality resulting from the invagination of the mineralized portion of the crown and/or root. There are many theories that attempt to explain the cause of dens invaginatus.<sup>1</sup> However, most authors concur that dens

invaginatus result from an infolding of the papilla during tooth development.<sup>2,3</sup> The incidence of dens invaginatus in the population varies from 0.04% to 10%.<sup>4</sup> The discrepancies may be associated with the different definitions of this dental anatomical deviation.<sup>5</sup> About 42% of all cases are found in the permanent lateral incisors and most of them frequently bilateral (43%).<sup>6</sup> It has also been found in maxillary central incisors, canines<sup>7</sup> and molars<sup>8</sup> and in mandibular incisors.<sup>9-10</sup>

Of the three classifications designed for dens invaginatus<sup>11-13</sup>, clinicians most commonly use the classification one that proposed by Oehlers.<sup>11</sup>

Type I : An enamel-lined invagination within the crown and not extending beyond the cemento-enamel junction (CEJ),

Type II : The enamel invagination into the root, beyond the CEJ, ending as a blind sac,

Type III : The extension of the enamel-lined invagination through the root to form an additional apical or lateral foramen, usually, there is no direct communication with the pulp.

- Dr. Rafia Nazneen, BDS, FCPS, Medical officer, Department of Dental Surgery, BIRDEM General Hospital, Shahbag, Dhaka-1000, Bangladesh.
- Dr. Reema Joshi, BDS, MDS, Assistant Professor, KRIST Medical College, Nepal
- Dr. Sajid Hasan, BDS, FCPS, Medical officer, Department of Dental Surgery, BIRDEM General hospital, Shahbag, Dhaka-1000, Bangladesh.
- Md. Mujibur Rahman Howlader, BDS, DDS, FCPS, MS, Associate Professor, Department of Conservative Dentistry and Endodontics, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka-1000, Bangladesh.
- Prof. Md. Shamsul Alam, BDS, DDS, PhD, Professor, Department of Conservative Dentistry and Endodontics, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka-1000, Bangladesh.

**Address of correspondence:** Dr. Rafia Nazneen, BDS, FCPS, Medical officer, Department of Dental Surgery, BIRDEM General Hospital, Shahbag, Dhaka-1000, Bangladesh.

**Received:** May 22, 2015

**Accepted:** June 30, 2015

An early diagnosis of such malformation is crucial. Due to abnormal anatomical configuration, an invaginated tooth presents technical difficulties in its clinical management<sup>14</sup> as because it is prone to early development of caries and subsequent necrosis of the pulp.

Various techniques for treating dens invaginatus have been reported, including conservative restorative treatment<sup>14</sup> that encouraged sealing the invagination prophylactically with resin<sup>15</sup>, non-surgical root canal treatment<sup>16</sup>, endodontic surgery<sup>17</sup>, intentional replantation<sup>18</sup> and extraction.

Complete debridement of the root canal system is compromised by limited access, consequently, some areas may be completely untouchable when a conventional technique is used. To overcome these limitations, some researchers<sup>19</sup> have suggested that the dens invaginatus be removed under the operating microscope. If non-surgical endodontic therapy fails, a combined approach with apical surgery may be indicated.<sup>20</sup>

#### Case Report-1

A 34-year-old man presented with a history of dull pain and spontaneous discharge from the gum of upper anterior region. The patient gave a history of trauma seven years back. Then six years after that event there developed a painful swelling. Few days later a pus discharging tract was formed that remain intermittently active.

Clinical examination revealed that there was an intraoral sinus tract directed from buccal to the maxillary left lateral incisor. The mesio-distal diameter of the crown of the lateral incisor was larger than normal. The tooth was tender to percussion and non-mobile. Periodontal probing affirmed normal attachment, with no reading greater than 3 mm. The maxillary left lateral and central incisor did not respond to vitality testing, through the adjacent right central incisor and left canine respond within normal limits. The color of the teeth did not differ from that of the adjacent teeth.

Radiographic [Fig.-1] examination revealed evidence of large radiolucency apical to the maxillary left lateral incisor involving the central incisor. The anatomy of the maxillary left lateral incisor was consistent with a type-III dens invaginatus.



**Fig.-1:** Initial intra-oral peri-apical radiograph (case 1)

A clinical diagnosis was established as dens invaginatus type-III, necrotic pulp and chronic apical abscess with intraoral sinus tract. As the patient was unable to give follow up repeatedly the treatment plan was root canal treatment of both central and lateral incisor followed by endodontic surgery with retrograde filling with mineral trioxide aggregates (MTA).

At the first visit the pulp chamber of upper left lateral incisor was opened and the invagination orifice located with endodontic explorer. A radiograph [Fig.-2] with files in the root canals was obtained and working length were established and recorded. The canal system was debrided thoroughly and prepared by engine ProTaper



**Fig.-2:** Working length measuring x-ray (case 1)

technique. Copious irrigation with 5.25% sodium hypochlorite and glyde as a lubricant was used throughout the procedure. Then calcium hydroxide was used as an intra-canal dressing.

At the second visit the root canals were obturated with proper GP and Zn-oxide eugenol paste, x-ray was taken [Fig.-3] and root canal treatment was done on left central incisor [Fig.-4].



**Fig.-3:** Intra-oral peri-apical radiograph after obturation of upper left lateral incisor (case 1)



**Fig.-4:** Intra-oral peri-apical radiograph after obturation of upper left central incisor (case 1)

After one week endodontic surgery was performed and retrograde filling with MTA [Fig.-5] was given. The peri-apical area was thoroughly curatted. Then the flap was replaced and sutured. One week after the suture was removed. There was no sinus tract and the patient was asymptomatic and advised for follow up after 3,6, and 12 months.



**Fig.-5:** X-ray after endodontic surgery and retrograde filling (case 1)

#### Case Report-2

A 58-year old man came with a dull pain at a left upper incisor for around 1 year and had bad taste at upper left quadrant. The patient had endodontic therapy on left maxillary central and lateral incisors few years back. He had non-contributory medical history. Clinical examination revealed a sinus, buccal to the maxillary lateral incisor and discoloration of the crown. The left maxillary lateral incisor [Fig.-6] had mesiodistally wider



**Fig.-6:** Clinical photograph of mesiodistally wider upper left lateral incisor (case 2)

crown comparison to the right lateral incisor. Periapical probing affirmed normal attachment, with no reading greater than three millimeters. The maxillary left lateral incisor was restored with Silver-amalgam filling palatally and the tooth maxillary left central incisor had crown restoration damaged. The maxillary left lateral incisor was sensitive to percussion and had no response to heat and cold. A peri-apical radiograph of left maxillary lateral incisor [Fig.-7] demonstrated a complex pulp cavity with a vertical radiopac shadow that extends from pulp chamber to middle third the root and poorly obturated single canal. There was also marked radiolucency at the periapical area. It was a chronic peri-apical peri-odontitis with dens invaginatus type-III.

Treatment started with removal of the previously restored silver amalgam filling. Obturated canal was found, liquid xylene soaked in cotton ball was placed on the chamber for a minute. Gutta-percha (GP) was removed by H-file. After removal of GP and proper access cavity preparation was done. The main canal [Fig.-8] was contained within a central cylindrical mass of hard tissue. Accessed a second area mesial to the main canal, another fine canal was found. Canal preparation was done in conventional method. Working length measuring x-ray [Fig.-9] was taken.

Copious irrigation with 5.25% sodium hypochlorite solution was used throughout the procedure.

After drying the root canals slurry of calcium hydroxide (Endocalpaste, Insta Chemical Ltd.) was placed in both canals as an intra-canal medication and temporary filling placed. One week later, the patient returned without symptoms of pain and tenderness but the presence of sinus tract. Same procedure repeated in second visit.



**Fig.-7:** Initial intraoral peri-apical radiograph (case 2)



**Fig.-8:** Clinical photograph after locating the main canal (case 2)



**Fig.-9:** Working length measuring x-ray (case 2)

Owing to a limitation in the patient's schedule, patient was asked to come after one month and both the canals were obturated by lateral condensation of GP and zinc oxide-eugenol sealer. A postoperative radiograph [Fig.-10] was taken. Final restoration was given with GI filling and the patient was advised for follow up visit.



**Fig.-10:** X-ray after root canal obturation (case 2)



## Discussion

Aberrant development of the dental lamina often results to form odontomas.<sup>1-3</sup> It ranges from a slight malformation such as an exaggerated or accentuated cingulum or extra roots or cusps on otherwise normal teeth. In the past, complex classifications to such developmental anomalies included: dilated, invaginated, geminated.

Dens in dente or dens invaginatus are uncommon tooth anomaly which range in severity from superficial in which only the crown is affected to deep in which both crown and the roots are involved. The presumed aetiology of this phenomenon has been related either to focal growth retardation or focal growth stimulation, or to localized internal pressure in certain areas of the tooth bud.

Clinicians should be aware of the incidence and methods for treating dens invaginatus. Failure to locate, debride and obturate complex root canal spaces will lead to failure in some cases.

The successful management of a dens invaginatus depends mainly on the ability to gain access to and disinfect the root canal system in light of its complex and variable presentation and unpredictable morphology. Moreover, the root canal filling also can become a challenge, considering the restricted access and the irregular shape of the root canal system.

In the first case, the etiology of peri-radicular pathosis is due to trauma. MTA is used as a retrograde filling material because it seals all of the pathways of communication between the root and the peri-radicular tissue.

In the second case, the etiology of the peri-apical pathosis was due to the infected root canals. However, it is not known how long the root canals had been infected prior to the patient developing symptoms. Mechanical debridement of the root canal was difficult, but the combination of chemo-mechanical instrumentation and the use of calcium hydroxide were sufficient without resorting to surgery.

The use of a warm GP technique will help to obturate the root canal system, as it was possible to compact the softened material into the major irregularities within the root canal system.

## Conclusion

Using the fundamental concept regarding the etiology of endodontic infections and current instrumentation techniques, an alternative approach for the treatment of tooth with complex anatomy has been presented. Future developments in instrumentation and disinfecting medicaments may provide alternatives to the technique described.

## References

1. Rotstein I, Stabholz A, Heling I, Friedman S. Clinical considerations in the treatment of dens invaginatus. *Endod Dent Traumatol* 1987; 3: 249-54.
2. Hulsmann M. Dens invaginatus: aetiology, classification, prevalence diagnosis and treatment considerations. *Int Endod J* 1997; 30: 79-90.
3. Ikeda H, Yoshioka T, Suda H. Importance of clinical examination and diagnosis: a case of dens invaginatus. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1995; 79: 88-91.
4. Ulmanky M, Hermel J. Double dens in dente in a single tooth. *Oral Surg Oral Med Oral Pathol* 1964; 17: 92-97.
5. Tagger M. Non-surgical endodontic therapy of tooth invaginations. *Oral Surg Oral Med Oral Pathol* 1977; 43: 124-29.
6. Bimstein E, Shteyer A. Dilated type of dens invaginatus in the permanent dentition. *ASDC J Dent Child* 1976; 43: 410-13.
7. Neto MDS, Zuccolotto WG, Saquy PC, Grandini SA, Ptcora JD. Treatment of dens invaginatus in a maxillary canine. *Braz Dent J* 1991; 2: 147-50.
8. Costa WF, Neto MDS, Pecora JD. Upper molar dens in dente. *Braz Dent J* 1990; 1: 45-49.
9. Cole GM, Taintor JF, James GA. Endodontic therapy of dilated dens invaginatus. *J Endod* 1978; 4: 89-90.
10. Wells DW, Meyer RD. Vital root canal treatment of a dens in dente. *J Endod* 1993; 19: 616-17.
11. Oehlers FA. Dens invaginatus, part I: variations of the invagination process and association with anterior crown forms. *Oral Surg Oral Med Oral Pathol* 1957; 10: 1204-18.
12. Hallett GE. The incidence, nature and clinical significance of palatal invagination in the maxillary incisor teeth. *Proc Royal Soc Med* 1953; 46: 491-99.
13. Schulze C. Developmental abnormalities of the teeth and the jaws. In: Gorlin RJ, Goldman HM, eds. *Thoma's oral pathology*. St.Louis: Mosby, 1970; 96-183.
14. De Sousa SM, Bramante CM. Dens invaginatus: treatment choices. *Endodontics and Dental Traumatology* 1998; 14: 152-58.
15. Rotstein I, Stabholz A, Heling I, Friedman S. Clinical considerations in the treatment of dens invaginatus. *Endod Dent Traumatol* 1987; 3: 249-54.
16. Hosey MT, Bedi R. Multiple dens invaginatus in two brothers. *Endodontics and Dental Traumatology* 1996; 12: 44-47.
17. Bolanos OR, Martell B, Morse DR. A unique approach to the treatment of a tooth with dens invaginatus. *Journal of Endodontics* 1998; 14: 315.
18. Lindner C, Messer HH, Tyas MJ. A complex treatment of dens invaginatus. *Endodontics and Dental Traumatology* 1995; 11: 153-55.
19. Girsch WJ, McClammy TV. Microscopic removal of dens invaginatus. *J Endod* 2002; 28: 336-39.
20. Ortiz P, Weisleder R, de Justus YV. Combined therapy in the treatment of dens invaginatus: case report. *J Endod* 2004; 30: 672-74.