

Nonsurgical management of a patient with multiple dens invaginatus affecting all maxillary incisors

Mostafa Ghandi, Farnaz Ghorbani¹, Davoud Jamshidi²

Departments of Endodontics and ¹Pediatric Dentistry, Student Research Committee, Qazvin University of Medical Sciences, ²Department of Endodontics, Dental Caries Prevention Research Center, Qazvin University of Medical Sciences, Qazvin, Iran

Abstract

This paper discussed a patient with dens invaginatus (DI) in all maxillary incisors that was accompanied by supernumerary tooth and also bifid cingulum, lingual pit, and talon cusp on the other teeth. DI is a rare developmental malformation usually seen in the maxillary lateral incisors of permanent dentition. A healthy 22-year-old Iranian woman was referred for the treatment of carious teeth. Following comprehensive clinical and radiographic examination, that was diagnosed DI affecting all maxillary central and lateral incisors. Left maxillary central incisor was Type I and the other incisors were Type II, according to Oehlers classification. Furthermore, she had supernumerary tooth and Class III malocclusion. All teeth responded to sensibility tests, except right maxillary central incisor that was diagnosed pulp necrosis and asymptomatic apical periodontitis. Conventional root canal therapy was done for the right maxillary central incisor using mineral trioxide aggregate and gutta percha and AH26 sealer by thermoplastic method. After 18 months of follow-up, clinical and radiographical examination revealed periapical healing of the right maxillary central incisor and absence of pulp and periapical pathosis in other incisors. The early recognition of DI, correct diagnosis, and appropriate management of this tooth is essential to ensure favorable treatment outcome.

Keywords: Cone beam computed tomography, dens invaginatus, follow-up, maxillary incisors, root canal therapy

Address for correspondence: Dr. Davoud Jamshidi, Department of Endodontics, Dental Caries Prevention Research Center, Qazvin University of Medical Sciences, Bahonar Blvd., Qazvin, Iran.

E-mail: davoud.jamshidi@gmail.com


Submission: 08-08-21 **Revision:** 11-09-21 **Acceptance:** 04-10-21 **Web Publication:** 08-01-22

INTRODUCTION

Dens in dent, known as dens invaginatus (DI), telescopic tooth, and deluted compound odontoma, is a developmental malformation involving deciduous and permanent teeth characterized by a deep depression in the crown or root which covered with enamel. The prevalence of this anomaly in different populations ranges between 0.04% and 10%.^[1,2] There is no consensus on the cause of this

anomaly. However, factors such as stimulation of enamel proliferation into the dental papilla, growth retardation of a group of cells relative to the surrounding cells with normal growth, and the impact of external forces on the tooth bud have been mentioned.^[3]

Various classifications have been proposed for this anomaly, the most common being the Oehlers classification, which

| Access this article online | |
|---|---------------------------------|
| Quick Response Code: | Website: www.saudiendodj.com |
|  | DOI: 10.4103/sej.sej_172_21 |

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Ghandi M, Ghorbani F, Jamshidi D. Nonsurgical management of a patient with multiple dens invaginatus affecting all maxillary incisors. Saudi Endod J 2022;12:138-42.

includes three groups. Type 1 is an enamel depression that leads to a blind cavity within the crown. Type 2 is an enamel depression that extends apically and passes through the cemento-enamel junction but does not involve the periapical tissues. It may or may not communicate with the dental pulp. Type 3 is a form which leads to the formation of a secondary foramen that terminates in the area of the periodontal ligament and usually has no connection with the dental pulp.^[4] The pulp space of these teeth is smaller and some enamel such as opacities can be seen in different sizes or shapes in the root.^[5]

The most common involved teeth in this anomaly are maxillary lateral incisors. However, the involvement of maxillary central incisors, canines, premolars, and molars has been reported. Unilateral occurrence is more common; however, bilateral form has also been reported.^[6]

Combinations of DI and other anatomical variations, such as germination, fusion, talon cusp, peg lateralis, macrodontia or microdontia, taurodontism, and dens evaginatus and association with hypodontia, dentinogenesis imperfecta, ameloblastoma, odontome, and supernumerary teeth have been reported.^[7,8]

Several treatments have been proposed for these teeth, depending on their anatomical complexity. Treatment options include preventive tooth sealing, root canal treatment, endodontic surgery, tooth replantation, and tooth extraction.^[9] This report presents a patient affecting DI in all maxillary incisors, having supernumerary tooth and Class III malocclusion that needs endodontic management.

CASE REPORT

This report was given approval by the Ethics Committee, Faculty of Dentistry, Qazvin University of Medical Sciences (IR.QUMS.REC.1400.190).

A 22-year-old Iranian woman was referred to Qazvin University of Medical Sciences for the treatment of carious teeth before orthodontic treatment. Patient's chief complaint was orthodontic malocclusion. Her medical and dental history was unremarkable and her facial appearance was normal. Family history did not reveal any evidence for hereditary dental anomalies. Clinical examination showed malocclusion Class III, a supernumerary tooth in the posterior right maxillary arch and bifid cingulum on the right maxillary lateral incisor (#12) and left maxillary central incisor (#21), lingual pit on the right maxillary central incisor (#11) and talon cusp on the left maxillary

lateral incisor (#22) on the palatal surface of anterior teeth [Figure 1a and b]. All teeth except the tooth #11 responded to pulp sensibility tests within normal limits. No periodontal packet and bleeding on probing could be seen [Table 1]. Radiographic examination revealed enamel depressions in all maxillary central and lateral incisors and periapical radiolucency around the tooth #11 [Figure 1c]. Cone-beam computed tomography (CBCT) demonstrated the dens invagination anomaly in all maxillary incisors, extension of periapical radiolucency of tooth #11, and a supernumerary tooth in the posterior right maxillary arch [Figure 1d-f].

According to Oehlers classification, all maxillary incisors were classified Type II DI, except the tooth #21 which was classified as Type I. The pulp of tooth #11 was necrosis and had asymptomatic apical periodontitis with open apex. The treatment plan and prognosis and permission to publish this case report were explained to the patient, and informed consent was taken. Conservative endodontic treatment was performed for the tooth #11, and all anterior teeth were followed up for 18 months. After local anesthesia with 2% lidocaine and 1:80000 epinephrine (Darou Pakhsh/Iran), the tooth was isolated with a rubber dam [Figure 2a] and a conservative access cavity was prepared with a diamond cylindrical bur (Teeskavan/Iran). The working length was established with apex locator (Root ZX Morita/Tokyo, Japan) and confirmed radiographically [Figure 2b]. Circumferential filling was done with hand K file (Mani, Japan) up to #70 and root canal was irrigated with 5.25% sodium hypochlorite (NaOCl) (Golrang/Iran). Finally, creamy calcium hydroxide (Golchai/Iran) was placed into the canal as intracanal medicament by Lentulo (Dentsply/USA) and access cavity was sealed with Cavit (Golchai/Iran). After 2 weeks, at the second session, filling and irrigation with NaOCl were repeated. Smear layer was removed with 17% ethylene diamine tetraacetic acid. Canal dried with paper point and then apical plug with mineral trioxide aggregate (MTA) (Angelus/Brazil) were placed by MTA carrier (Medic-Kart/India) and the plugger [Figure 2c]. After 15 min, MTA setting was verified by hand K file #45. The remaining coronal part of root canal was obturated with gutta percha (Meta/South Korea) and

Table 1: Results of the diagnostic test

| Tooth number | Cold | Heat | Electrical pulp tester | Percussion | Palpation | Mobility |
|--------------|-------|-------|------------------------|------------|-----------|----------|
| 12 | N (+) | N (+) | Response | + | + | WNL |
| 11 | 0 | 0 | 0 | + | + | WNL |
| 21 | N (+) | N (+) | Response | + | + | WNL |
| 22 | N (+) | N (+) | Response | + | + | WNL |

N: Normal, WNL: Within normal limit, 0: No response, +: Mild response, ++: Moderate response, +++: Severe response

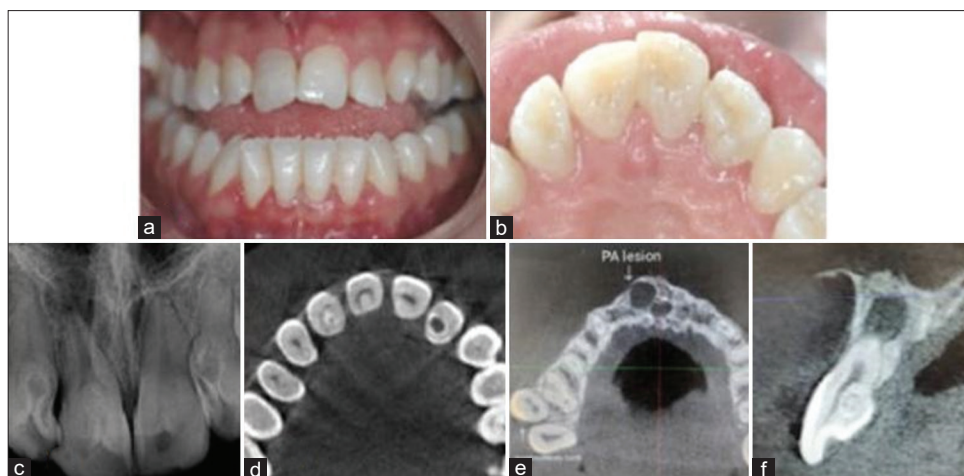


Figure 1: (a) Clinical view of dentition showing anterior open bite and Class III malocclusion; (b) intraoral photograph showing dens invaginatus in the permanent maxillary incisors; (c) intraoral radiograph showing dens invaginatus in the permanent maxillary incisors and periapical radiolucency in relation to the tooth #11; (d) axial view of cone-beam computed tomography; (e) extension of periapical radiolucency; (f) cross-sectional view of cone-beam computed tomography tooth #11

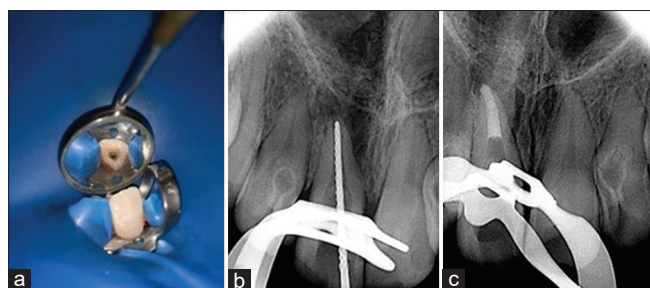


Figure 2: (a) Access cavity; (b) working length determination radiograph; (c) Apical mineral trioxide aggregate plug placement

sealer AH26 (Dentsply/USA) by thermoplastic method. Therefore, that sealer applied by lentulospiral (Dentsply/USA) and BeeFill (VDW/Germany) was set at 160°C and melted gutta percha was injected. The access cavity was sealed with glass ionomer cement (GC/Japan), and then, the patient was referred for restorative treatment. After 18 months, the tooth showed the healing process and it was functional; the patient reported no symptoms except slight sensitivity to cold of tooth #12 that according to clinical and radiographical examination was referred for restorative treatment [Figure 3a-d].

DISCUSSION

Dental anomalies can lead to cosmetic and periodontal problems. Dens in dent is one of these anomalies, named by Socrates in 1956.^[10] Very few cases were published with four or more than four DI in a patient. In the current case report, the patient had multiple anomalies including DI in all maxillary incisors, supernumerary tooth, Class III malocclusion, bifid cingulum, lingual pit, and talon cusp on teeth.

A CBCT scan was ordered to determine exact root canal anatomy in subjected tooth, extension of periapical lesion, and location of supernumerary tooth. Studies have been shown the benefits of CBCT in management of complex cases.^[11]

Nonsurgical endodontic treatment is the first line of treatment for such teeth and has excellent long-term results compared to surgical treatment due to disinfection of the entire root canal system. However, periapical surgery, as second option, is only indicated in immature teeth with failed nonsurgical root canal treatment.^[12] One of the challenges of endodontic treatment of open apex teeth is achieving the root canal apical barrier. One-step apexification can be done in one session with MTA and other calcium silicate-based materials such as biodentine.^[6,13] In this case, nonsurgical root canal treatment was performed for the right maxillary central incisor (#11) with open apex; similar to previous studies, MTA was used to establish an apical seal.^[14-16]

In complex anatomy, irrigation with NaOCl and calcium hydroxide medicament can improve canal disinfection and debridement. Obturation of this tooth due to its complexity is a clinical challenge. Different obturation materials such as Biodentine, MTA, and gutta percha with different sealers have been used. However, none of them consider as ideal filling material.^[17-19]

In the present case, MTA-Angelus was used for one-step apexification due to elimination of calcium sulfate from the composition; it provides a short setting of 15 min.^[20,21]



Figure 3: Postoperative periapical radiographs showing healing of the periapical lesion in tooth #11. (a) Preoperative radiograph; (b) postoperative radiograph; (c) 6-month radiographic follow-up; (d) 18-month radiographic follow-up

To prevent overfilling, some other case reports also described one-step apexification in management of open-apex DI using calcium silicate-based cements.^[15,18]

A similar case was presented by Conklin.^[22] The common denominator of the two studies is simultaneous occurrence of bilateral DI and supernumerary teeth. The presence of DI and supernumerary tooth was also mentioned in another study.^[23] Some previous studies have reported the patient with multiple DI in maxillary teeth. In the study of Purani and Purani,^[24] DI was observed in four maxillary incisors and talon cusp in the canine teeth. The co-occurrence of this anomaly was similar to the present study. Furthermore, in the study of Chung *et al.*,^[7] in addition to DI in maxillary incisors, maxillary canine also was affected and root canal calcification was observed in mandibular teeth. According to the Uslu *et al.*, there is a high prevalence of dental anomalies in orthodontic patients and the prevalence of DI is 5% in these patients.^[25]

The present case demonstrated a successful clinical and radiographic outcome for the treatment approach. After 18-month follow-up, periapical lesion was healed and other incisors had no pathosis. From the patient's point of view, this treatment was successful due to tooth retention, the absence of symptoms, and esthetic appearance.

In the current case report, a tooth with DI Type I and asymptomatic apical periodontitis with open apex was treated with MTA plug and gutta percha and was successful. This was the strength of this case.

Genetic assessment was not possible due to ethics and financial matters, and it may be considered a limitation of this study. Future studies using genetic testing are suggested to better assess the pattern of this anomaly.

DI combined with developmental abnormality such as pits can cause early necrosis of the pulp and may interfere with the maturation of the apical foramen. When abnormal

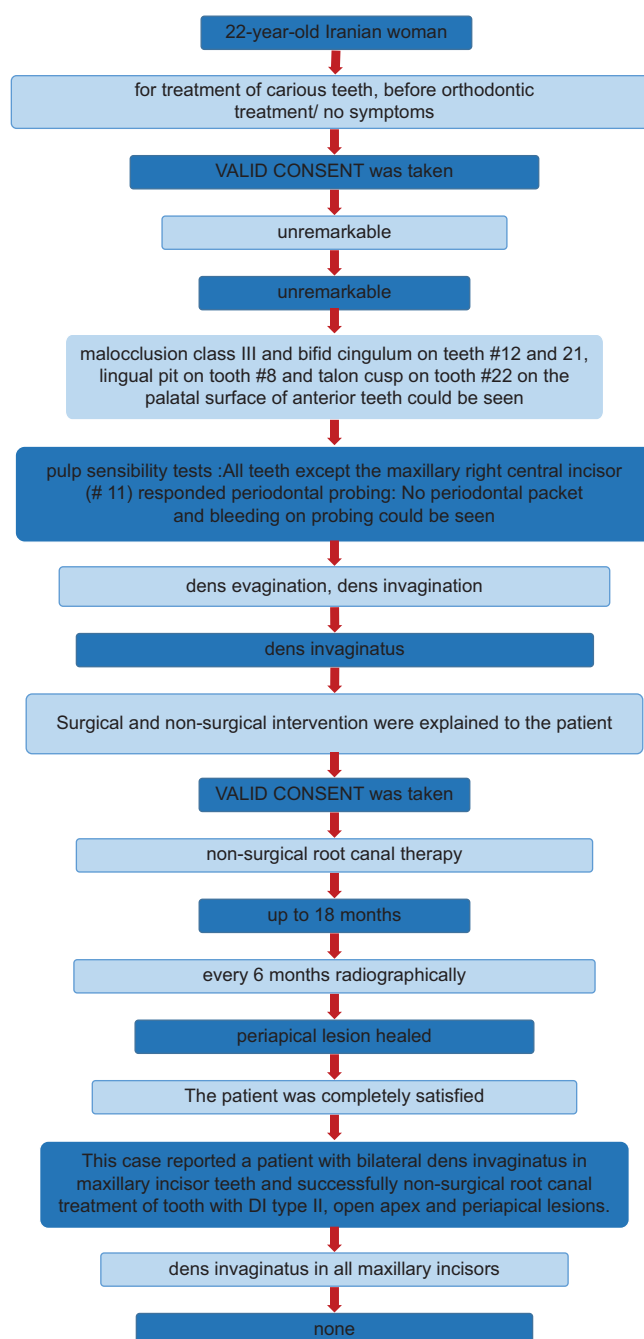


Figure 4: PRICE 2020 flowchart

grooves and pits are seen on the anterior teeth, the patient should have a radiographic examination for the possibility of DI anomaly. Teeth affected by this anomaly are prone to decay in these pits; then, early detection of this anomaly and therefore prevention of caries in these pits are very important and can prevent dental pulp problems and complicate endodontic treatments. This case report was prepared according to the PRICE 2020 Guidelines [Figure 4].^[26]

CONCLUSION

DI can increase the likelihood of pulp involvement due to infiltration of bacteria through pit, so early detection of this anomaly is important. This case report demonstrated a successful nonsurgical management of asymptomatic apical periodontitis in an open apex maxillary central incisor with DI.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Jung M. Endodontic treatment of dens invaginatus type III with three root canals and open apical foramen. *Int Endod J* 2004;37:205-13.
- Sedano HO, Ocampo-Acosta F, Naranjo-Corona RI, Torres-Arellano ME. Multiple dens invaginatus, mulberry molar and conical teeth. Case report and genetic considerations. *Med Oral Patol Oral Cir Bucal* 2009;14:E69-72.
- Alani A, Bishop K. Dens invaginatus. Part 1: Classification, prevalence and aetiology. *Int Endod J* 2007;40:146-55.
- Oehlers F. Dens invaginatus (dilated composite odontome): I. Variations of the invagination process and associated anterior crown forms. *Oral Surg Oral Med Oral Pathol Oral Radiol* 1957;10:1204-18.
- Soares J, Santos S, Silveira F, Nunes E. Calcium hydroxide barrier over the apical root-end of a type III dens invaginatus after endodontic and surgical treatment. *Int Endod J* 2007;40:146-55.
- Ali A, Saraf P, Patil J. Endodontic management of type IIIB dens invaginatus: An unusual case report. *Saudi Endod J* 2018;8:144.
- Chung SH, Hwang YJ, You SY, Hwang YH, Oh S. A case report of multiple bilateral dens invaginatus in maxillary anteriors. *Restor Dent Endod* 2019;44:e39.
- Subramaniam A, Kamtane S, Desai R, Thakre G. Dens in dente of maxillary third molar. *J Oral Maxillofac Pathol* 2008;12:88.
- Chen YH, Tseng CC, Harn WM. Dens invaginatus: Review of formation and morphology with 2 case reports. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1998;86:347-52.
- Hülsmann M. Dens invaginatus: Aetiology, classification, prevalence, diagnosis, and treatment considerations. *Int Endod J* 1997;30:79-90.
- Patel S, Brown J, Pimentel T, Kelly R, Abella F, Durack C. Cone beam computed tomography in endodontics – A review of the literature. *Int Endod J* 2019;52:1138-52.
- Meghana S, Thejokrishna P. Type III dens invaginatus with an associated cyst: A case report and literature review. *Int J Paediatr Dent* 2011;4:139.
- Bolbolian M, Ghorbani F, Ghandi M, Ghashami M, Ranjbar Omid B, Mirzadeh M. A comparative investigation of the microleakage of biodentine and mineral trioxide aggregate as coronal barrier in nonvital bleaching. *J Maz Univ Med Sci* 2020;30:80-9.
- Brooks JK, Ribera MJ. Successful nonsurgical endodontic outcome of a severely affected permanent maxillary canine with dens invaginatus Oehlers type 3. *J Endod* 2014;40:1702-7.
- Agrawal PK, Wankhade J, Warhadpande M. A rare case of type III dens invaginatus in a mandibular second premolar and its nonsurgical endodontic management by using cone-beam computed tomography: A case report. *J Endod* 2016;42:669-72.
- Srivastava R, Verma PK, Tripathi V, Tripathi P, Singh AR. Management of Oehlers type II dens in dente with open apex and alveolar bone defect. *J Clin Diagn Res* 2016;10:j05-6.
- Moazami F, Sobhnamayan F, Malekzadeh P, Naseri M. Nonsurgical treatment of unusual dens invaginatus with MTA based filler in immature maxillary lateral incisor: A case report. *Iran Endod J* 2021;16:60-4.
- Goel S, Nawal RR, Talwar S. Management of dens invaginatus type II associated with immature apex and large periradicular lesion using platelet-rich fibrin and biodentine. *J Endod* 2017;43:1750-5.
- Zhang P, Wei X. Combined therapy for a rare case of type III dens invaginatus in a mandibular central incisor with a periapical lesion: A case report. *J Endod* 2017;43:1378-82.
- Bortoluzzi EA, Broon NJ, Bramante CM, Garcia RB, de Moraes IG, Bernardineli N. Sealing ability of MTA and radiopaque Portland cement with or without calcium chloride for root-end filling. *J Endod* 2006;32:897-900.
- Hansen SW, Marshall JG, Sedgley CM. Comparison of intracanal endosequence root repair material and ProRoot MTA to induce pH changes in simulated root resorption defects over 4 weeks in matched pairs of human teeth. *J Endod* 2011;37:502-6.
- Conklin WW. Double bilateral dens invaginatus in the maxillary incisor region. *Oral Surg Oral Med Oral Pathol* 1975;39:949-52.
- Jimenez-Rubio A, Segura J, Jimenez-Planas A, Llamas R. Multiple dens invaginatus affecting maxillary lateral incisors and a supernumerary tooth. *Dent Traumatol* 1997;13:196-8.
- Purani JM, Purani HJ. A rare presentation of multiple dens invaginatus in maxillary dentition. *BMJ Case Rep* 2014;2014:bcr-2013-200389.
- Uslu O, Akcam MO, Evirgen S, Cebeci I. Prevalence of dental anomalies in various malocclusions. *Am J Orthod Dentofacial Orthop* 2009;135:328-35.
- Nagendrababu V, Chong B, McCabe P, Shah P, Priya E, Jayaraman J, et al. PRICE 2020 guidelines for reporting case reports in endodontics: A consensus-based development. *Int Endod J* 2020;53:619-26.