Bilateral dens invaginatus in the mandibular premolars – Diagnosis and treatment

Nupur Kharangate, Nigel R. Figueiredo[1], Marina Fernandes, Rajan Lambor

Abstract

Dens invaginatus (DI) is a developmental anomaly that results from an infolding of the dental papilla during tooth development and simulates the appearance of a tooth within another tooth. It shows a wide spectrum of variations in morphology and usually affects the maxillary lateral incisors. This study presents an unusual case of an Oehlers' Type I DI involving the bilateral mandibular first and second premolars, which presented as an incidental radiographic finding in the first premolars and was associated with a periapical lesion in the second premolars which was successfully treated using nonsurgical endodontics.

Keywords: Dens invaginatus, endodontic treatment, mandibular premolars, periapical lesion

Introduction

Dens invaginatus (DI) is a developmental anomaly that results in a deepening or invagination of the enamel organ into the dental papilla prior to calcification of the dental tissues. This type of malformation was first described by Ploquet in 1794 in a whale's tooth.[1] DI was first described as a "tooth within a tooth" by Salter in 1855 while Socrates in 1856 reported the first case of DI in a human tooth.[2] Commonly, this anomaly occurs in the permanent maxillary lateral incisors followed by the maxillary central incisors, premolars, canines, and less often in the molars.[3] The occurrence of bilateral DI is not uncommon. The etiology of this anomaly is controversial and remains unclear; however, most authors conclude that DI results from an infolding of the papilla during tooth development.[3] Radiographically, DI presents as a radiopaque invagination, equal in density to enamel, which extends from the cingulum into the root canal.[4]

Oehlers' classification categorizes invaginations into three classes as determined by how far they extend radiographically from the crown into the root:[5]

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Type I: An enamel-lined minor form occurs within the crown of the tooth and does not extend beyond the cementoenamel junction. This type is the most commonly occurring variant.

Type II: An enamel-lined form that invades the root as a blind sac and may communicate with the dental pulp.

Type IIIa: The invagination extends through the root and communicates laterally with the periodontal ligament space through a pseudo-foramen. There is usually no communication with the pulp, which lies compressed within the root.

Type IIIb: The invagination extends through the root and communicates with the periodontal ligament at the apical foramen. There is usually no communication with the pulp.

The invagination allows entry of irritants into an area that is separated from the pulpal tissue by only a thin layer of enamel and dentin and is a predisposing factor for the development of dental caries. In some cases, the enamel-lining may be incomplete, and channels may exist between the invagination and the pulp, allowing bacteria and their products to gain access to the pulp. Therefore, pulp necrosis often occurs at an early stage, usually within a few years of eruption, and sometimes even before root-end closure.[1,6]

This article describes a rare case report of bilateral DI in the mandibular second premolars that were treated nonsurgically.

Case Report

A 25-year-old male patient reported to the Department of Conservative Dentistry and Endodontics of our institution with a chief complaint of bilateral swellings in relation to the lower right and left posterior teeth since the last 2 months. The patient gave a history of an occasional dull aching pain in relation to the swellings. There was no relevant medical history. Clinical examination revealed draining sinuses in relation to noncarious 35 and 45 [Figure 1]. Both the teeth were tender to percussion and failed to respond to thermal and electrical pulp testing. Radiographic examination of both 35 and 45 revealed an Oehlers' Type I DI, with incomplete root-end formation and a periapical radiolucent lesion. Incidentally, an Oehlers' Type I DI was also noted in relation to 34 and 44 [Figures 2 and 3]. However, both 34 and 44 were nontender and showed a positive response to pulp testing. To obtain a detailed understanding of the root canal morphology and evaluate the type of invagination, a spiral computed tomography (CT) scan was done with a multi-detector CT scanner (16 slices/s), as per the recommendations given by Christoph *et al*.[7] to reduce the radiation dosage (collimation: 1 mm; pitch: 2; tube voltage, 80 kV; tube current, 40 mA). Axial images were transmitted to a commercially available dental program (Denta scan, Advantage Windows; General Electric, Buc, France) to reformat panoramic and cross-sectional images in all three planes [Figures 4-6].

A clinical diagnosis of pulp necrosis and chronic periapical abscess in relation to 35 and 45 was made. Endodontic therapy was performed under rubber dam isolation. Access cavities were prepared, and the canal negotiated with small size files. The working lengths were established and recorded [Figure 7]. The canal was enlarged, and central hard tissue was removed using H-files and Gates Glidden drills with copious irrigation using 5.2% sodium hypochlorite. Calcium hydroxide dressing was given during the inter-appointment period for 2 weeks. Apical closure was done using mineral trioxide aggregate (MTA), and the teeth were obturated by the thermoplasticized technique using Obtura II (Obtura Spartan Co., Fenton, MO, USA) with vertical compaction using finger pluggers. Then, both the teeth were restored with composite resin access restorations. There was no evidence of any pathology in relation to 34 and 44 and hence no treatment was needed for these teeth.

Postoperative clinical and radiographic examination after 6 months showed satisfactory healing of the draining sinus and periapical lesion in relation to 35 and 45 [Figures 8-10].

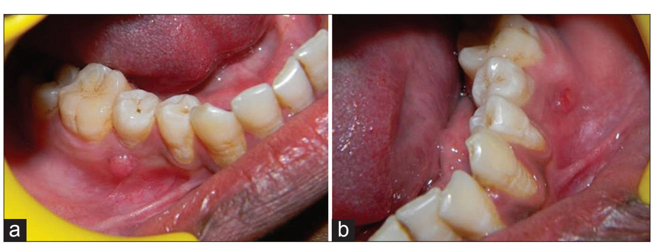

Figure 1: Preoperative intra-oral view showing a draining sinus on the buccal gingiva. (a) Right mandibular second premolar region, (b) left mandibular second premolar region

Discussion

DI is thought to affect usually the permanent maxillary lateral incisors, with the posterior teeth less likely to be affected.[8] While cases of DI in the mandibular teeth have also been reported, only a few cases have been shown to involve the mandibular second premolars.[9] The present case showed bilateral DI in both the first and second mandibular premolars.

According to Hülsmann,[1] if there is no evidence of an entrance to the invagination and no signs of pathosis are visible clinically and radiographically, no treatment is necessary, but strict observation is recommended. In our case, both the mandibular first premolars did not show any clinical or radiographic signs of pathology. Hence, no treatment was carried out for these teeth, and the patient was advised to report regularly for follow-up. Since both the mandibular second premolars were nonvital and showed periapical lesions, they were endodontically treated.

Endodontic treatment of DI constitutes a challenge due to the complicated root canal anatomy of the affected teeth. Nonsurgical endodontic treatment should be attempted first regardless of the size of the periapical lesion. Surgical management is the second option only if the nonsurgical endodontic treatment has failed.[3] The successful management of the present case indicates that the size of the periapical lesion does not influence the treatment procedure to be performed or its outcome.

Diagnostic methods like spiral CT are useful aids in determining the root canal morphology.[10] However, a major concern with the use of a CT scan is its high radiation dosage. In the present case, guidelines proposed by Christoph *et al*.[7] were used, and the effective radiation dosage produced by this method was 0.56 ± 0.06 mGy, which is roughly equivalent to that of a standard panoramic radiograph.

The prognosis of nonsurgical endodontic treatment depends on a number of factors like the extent of the invaginated central mass in relation to the pulp space, continuous drainage of fluid from the canal during treatment which

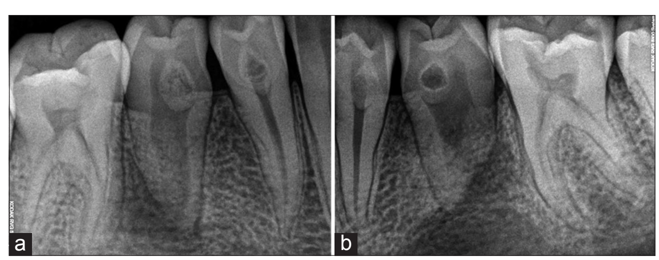

Figure 2: Preoperative intra-oral periapical radiographs. (a) Right mandibular premolars, (b) left mandibular premolars

Figure 3: Panoramic radiograph (preoperative)

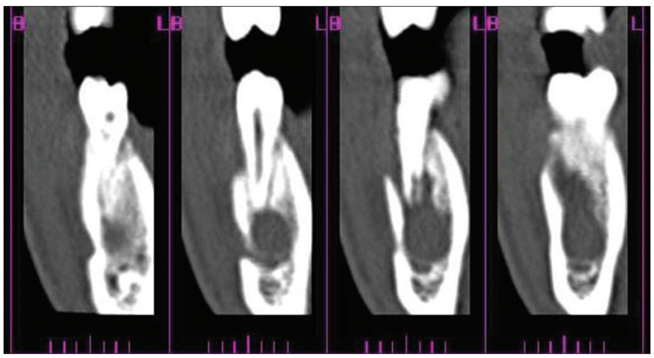

Figure 5: Spiral computed tomography scan (sagittal view) of left mandibular second premolar

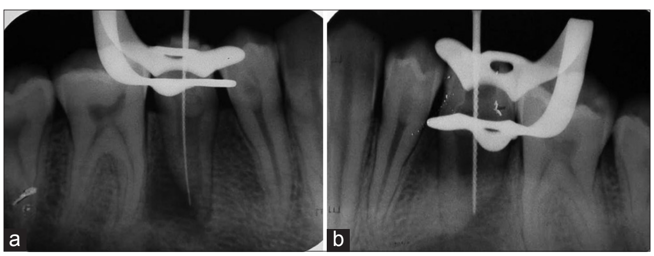

Figure 7: Intra-oral periapical radiographs showing determination of working length. (a) Right mandibular premolars, (b) left mandibular premolars

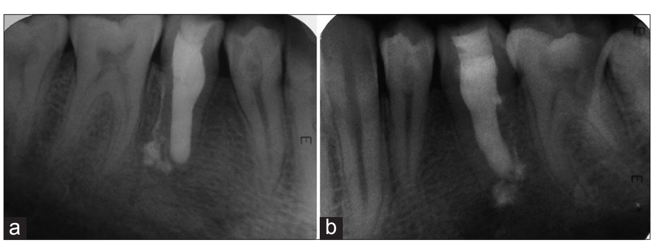

Figure 9: Postoperative intra-oral periapical radiographs showing healing of the periapical lesion. (a) Right mandibular premolars, (b) left mandibular premolars

prevents dryness of the canals, and an open apex which may negate apical seal of the root canal filling.[3]

Mechanical debridement of the canal is difficult in many cases, but the combination of chemo-mechanical instrumentation

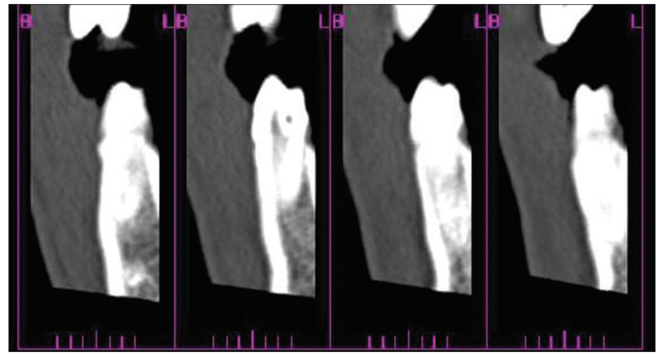

Figure 4: Spiral computed tomography scan (sagittal view) of right mandibular second premolar

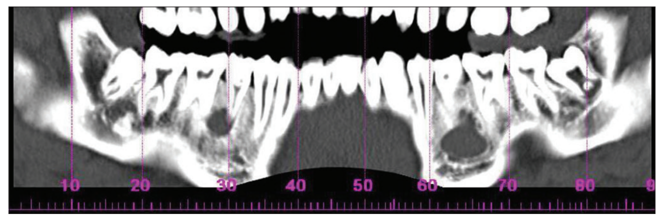

Figure 6: Spiral computed tomography scan (reformatted panoramic view)

Figure 8: Postoperative intra-oral view showing healing of lesion. (a) Right mandibular second premolar region, (b) left mandibular second premolar region

Figure 10: Panoramic radiograph (postoperative)

and the use of calcium hydroxide may be sufficient without resorting to surgery. Calcium hydroxide has been commonly used as inter-appointment intra-canal medicament.[11] It has also been used to control exudation in the canal.[12] In our case, we successfully used long-term calcium hydroxide treatment to achieve disinfection. The use of MTA as an apical seal for immature roots allows the immediate rehabilitation of the crown, thus increasing the resistance to fracture and enhancing the esthetic result.[2]

The present case showed the occurrence of Type I DI in relation to 35 and 45 with periapical lesions, which was successfully treated nonsurgically. This case illustrates that even in cases with bilateral DI, open apices and an associated periapical lesion, use of nonsurgical endodontic treatment can result in satisfactory peri-radicular healing.

Conclusion

Although DI is a relatively common anomaly, it may be easily overlooked due to the absence of any significant clinical signs. This is unfortunate as the presence of an invagination is thought to increase the risk of dental caries, pulpal involvement, and periodontal inflammation. Also, the variable nature of the invagination can often mean that any required endodontic treatment may be complicated. Careful radiographic examination and knowledge of the variations in morphology of the internal anatomy of teeth are thus necessary for a successful treatment outcome.

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References

1. Hülsmann M. Dens invaginatus: Aetiology, classification, prevalence, diagnosis, and treatment considerations. Int Endod J 1997;30:79-90.
2. Silberman A, Cohenca N, Simon JH. Anatomical redesign for the treatment of dens invaginatus type III with open apexes: A literature review and case presentation. J Am Dent Assoc 2006;137:180-5.
3. Ranjini MA, Kaiwar A, Meena N, Kumari RA, Shetty A, Naveen DN, *et al*. Non-surgical endodontic treatment of type II dens invaginatus. J Conserv Dent 2009;12:73-6.
4. Zengin AZ, Sumer AP, Celenk P. Double dens invaginatus: Report of three cases. Eur J Dent 2009;3:67-70.
5. Oehlers FA. Dens invaginatus (dilated composite odontome). I. Variations of the invagination process and associated anterior crown forms. Oral Surg Oral Med Oral Pathol 1957;10:1204-18.
6. Rabinowitch BZ. Dens in dente: Primary tooth; report of a case. Oral Surg Oral Med Oral Pathol 1952;5:1312-4.
7. Christoph GD, Engel WG, Britta R, Hermann KP, Oestmann JW. Must radiation dose for CT of the maxilla and mandible be higher than that for conventional panoramic radiography? Am Soc Neuroradiol 1996;96:1758-60.
8. Conklin WW. Bilateral dens invaginatus in the mandibular incisor region. Oral Surg Oral Med Oral Pathol 1978;45:905-8.
9. Karaca I, Toller MO. Multiple bilateral dens in dente involving all the premolars. Case report. Aust Dent J 1992;37:449-52.
10. Reddy YP, Karpagavinayagam K, Subbarao CV. Management of dens invaginatus diagnosed by spiral computed tomography: A case report. J Endod 2008;34:1138-42.
11. Bystrom A, Claesson R, Sundqvist G. The antibacterial effect of camphorated paramonochlorophenol, camphorated phenol and calcium hydroxide in the treatment of infected root canals. Endod Dent Traumatol 1985;1:170-5.
12. Heithersay GS. Calcium hydroxide in the treatment of pulpless teeth with associated pathology. J Br Endod Soc 1975;8:74-93.

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