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KEYWORDS

Calcium derivative;
Dental Radiography;
Mineral trioxide
aggregate;
Root resorption;
Volume CT

Dens invaginatus (DI), also known as *dens in dente*, is a developmental anomaly characterized by infolding of enamel and dentin into the pulp cavity, resulting from invagination of the enamel organ into the dental papilla before calcification. This malformation leads to complex canal morphology and an increased risk of pulpal and periapical pathology. According to Oehlers' classification, DI is categorized into three types, with Type IIIb representing the most severe form, in which the invagination extends through the root and exits at the apical foramen, often without direct communication with the main pulp canal.¹ Such cases pose considerable endodontic challenges due to their intricate internal anatomy and the difficulty of achieving complete debridement and hermetic sealing. Advanced imaging techniques like cone-beam computed tomography (CBCT) and microsurgical methods are crucial for accurate diagnosis, effective treatment planning, and positive clinical outcomes in complex cases.

A 33-year-old female presented with a persistent sinus tract and mild discomfort associated with the maxillary right lateral incisor. The tooth and adjacent teeth had previously been restored with full-coverage laminate crowns. The involved tooth exhibited a negative response to vitality testing and a positive percussion response. Tracing of the sinus tract with a gutta-percha cone directed

the path to the apex of the endodontically treated lateral incisor, revealing extensive inflammatory apical root resorption and a large periapical radiolucency (Fig. 1A and B). CBCT examination identified an Oehlers Type IIIb dens invaginatus extending through the root to the apical foramen, associated with a well-defined periapical lesion measuring approximately 7.4×8.5 mm (Fig. 1C–F). The CBCT also revealed that the lingual canal had been previously obturated, whereas the buccal canal was missed during earlier endodontic treatment. Considering the complex root morphology, failure of the prior endodontic therapy, and the patient's preference to preserve the existing esthetic crown, nonsurgical retreatment was deemed impractical, and surgical endodontic management was planned.

Under local anesthesia, an Ochsenbein–Luebke mucoperiosteal flap was reflected to expose the lesion. The periapical lesion was completely enucleated, followed by minimal root-end resection. Ultrasonic retro-preparation created a long oval root-end cavity uniting both canal exits, which was subsequently filled with calcium-enriched mixture (CEM) cement (BioniqueDent, Tehran, Iran) (Fig. 1G). Immediate postoperative radiography confirmed an adequate root-end filling (Fig. 1H). The patient remained asymptomatic during follow-up. At the eight-

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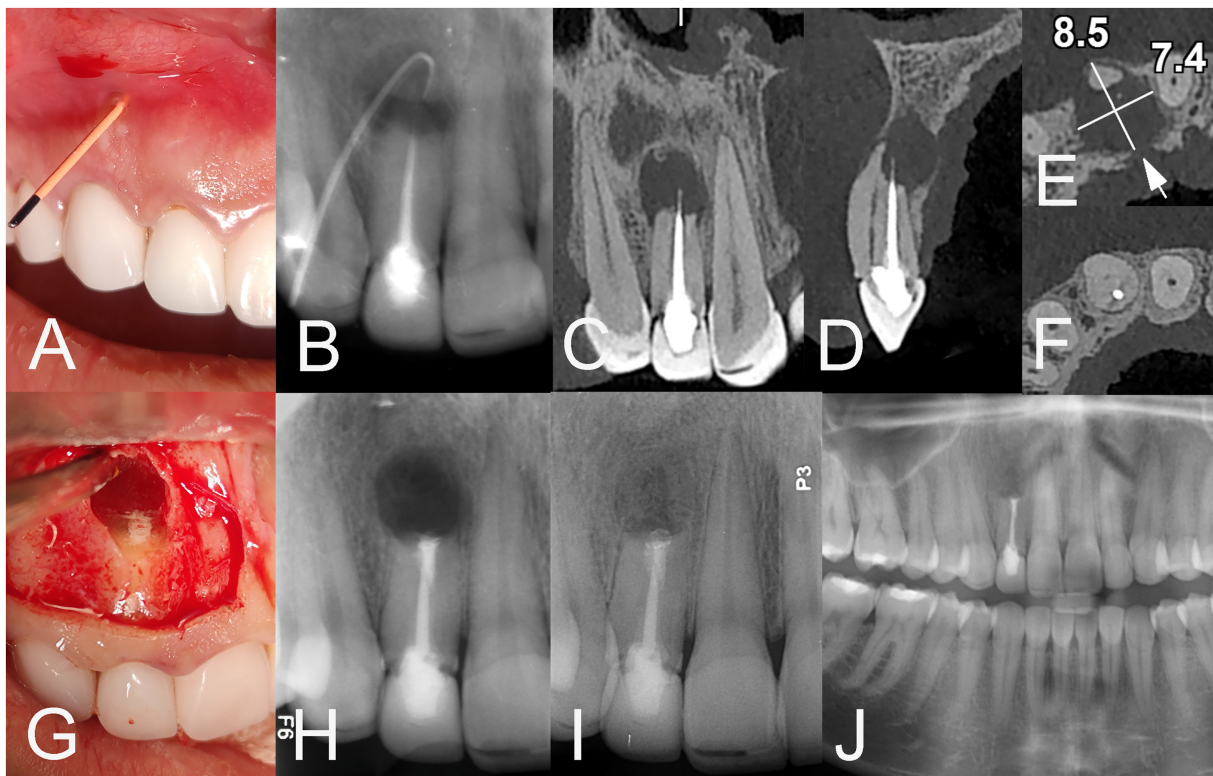


Figure 1 Management of Oehlers Type IIIb dens invaginatus in a 33-year-old female. (A) Preoperative clinical photograph showing sinus tract tracing with a gutta-percha cone. (B) Preoperative periapical radiograph demonstrating tracing of the sinus tract leading to the apex of the maxillary right lateral incisor. (C) Coronal cone-beam computed tomography (CBCT). (D) sagittal CBCT section revealing the invagination extending through the root to the apical foramen, consistent with Type IIIb dens invaginatus. (E and F) Axial CBCT sections confirming the Type IIIb configuration and periapical lesion measuring approximately 7.4 × 8.5 mm. (G) Intraoperative photograph showing the root-end cavity prepared with an ultrasonic retro-tip and filled with calcium-enriched mixture cement; the long oval shape unites the two canal exits into a single retrograde filling. (H) Immediate postoperative periapical radiograph confirming adequate retrograde seal. (I) Eight-month follow-up periapical radiograph demonstrating progressive bone healing and resolution of the periapical radiolucency. (J) Eight-month panoramic radiograph showing nearly complete periapical healing and radiographic success.

month evaluation, periapical (Fig. 1I) and panoramic (Fig. 1J) radiographs demonstrated substantial bone regeneration and nearly complete resolution of the periapical radiolucency, indicating successful healing.

Type IIIb dens invaginatus presents considerable diagnostic and therapeutic challenges due to its independent canal system and apical exit. CBCT is essential for accurately assessing the complexity and extent of the anomaly.² In this case, surgical endodontic treatment was selected mainly because of the patient's preference to preserve the existing esthetic crown. The use of CEM cement provided an effective seal with excellent biocompatibility and osteogenic potential, resulting in favorable periapical healing.^{3–5} Eight-month radiographic follow-up confirmed bone regeneration and nearly complete resolution of symptoms, demonstrating successful management.

Declaration of competing interest

The author has no conflicts of interest relevant to this report.

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None.

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