Conservative Management of Infra-orbital Space Infection Secondary to Type III B Dens Invaginatus: A Case Report

Raja Raghu, Gauba Krishan, Ashima Goyal, Aditi Kapur, Sanjeev K Singh, Manoj A Jaiswal

Abstract

Aim and objective: We aim to emphasize the conservative management of infraorbital abscess secondary to Dens Invaginatus Type IIIB.

Background: Dens Invaginatus (DI) is a developmental anomaly related to the morphological characteristic of the teeth. It occurs due to the invagination of developing enamel organs in the dental papilla before the complete calcification of the tooth.

Case description: We report a case of 13-year-old child reported with swelling on the right side of the face. Radiographic examination revealed the altered tooth morphology and complex root canal anatomy with periapical abscess associated with the permanent right maxillary canine. Debridement and obturation were done by lateral compaction technique with no surgical intervention for the treatment of infraorbital space infection.

Conclusion: The proper three-dimensional evaluation of DI helps in identifying the root canal morphology and aids in efficient treatment planning. The obturation with Mineral Trioxide Aggregate is a suitable method for treating DI especially in the case of immature teeth. The accurate diagnosis and proper treatment can prevent an unnecessary surgical intervention and has shown a favorable prognosis in the long term.

Clinical significance: Nonsurgical management of odontogenic infections should be the preferred line of treatment, wherever feasible, because of the invasive nature of its surgical alternative. This becomes even more relevant when the patient involved belongs to the pediatric age group which would make a surgical treatment plan all the more challenging. Keywords: Dens invaginatus, Infraorbital space, Canine space, Permanent maxillary canine, cone-beam computed tomography.

Keywords: Abscess, Case report, DI, Dens Invaginatus, Space infection, Tooth anomalies.

Background

Dens Invaginatus (DI) is a morphological dental anomaly which occurs due to the early invagination of the outer enamel organ into the dental papilla before the completion of calcification.1 Some dental anomalies associated with DI include macrodontia, microodontia, supernumerary tooth, and taurodontism.2 Clinically the affected tooth has unusual morphology (barrel shaped form) with a bucco-lingual dimension that’s greater than usual.3 Oehlers et al.4 classified DI into three types (Type I, II, and III) based on the degree of invagination and communication with the periodontal membrane. Type I has been reported to have the greatest incidence of about 79% and Type III the lowest of about 5%.4–6 The most commonly involved teeth are the permanent maxillary lateral incisors with 43% of the reported cases occurring in these teeth.7 However, incidence of only 1.5% has been reported in permanent maxillary canine.8 The canine space (infraorbital space) is a relatively uncommon site for odontogenic infections, occurring only if the infection crosses the labial cortex above the origin of levator labii superioris muscle. Most of the cases reported were treated surgically by incision and drainage through the labial vestibule.9 This case report explains the conservative management of canine space infection in a young patient that occurred secondary to an infected Type III B DI in the right permanent maxillary canine.

Case Description

A 13-year-old male child reported to our Out Patient Department with the chief complaint of swelling on the right side of the face for the preceding 1 week. On extraoral examination, a diffuse swelling was evident on the right side of the face which was tender, erythematous, and compressible which involved the infraorbital margin, cheek, lower eyelid, and ala of nose on the right side with no restriction of mouth opening (Fig. 1).

Intraorally, the swelling appeared to involve the labial surface of the gingiva surrounding the permanent maxillary right canine causing obliteration of the upper labial vestibule in that region. The associated canine had an unaltered crown morphologically compared to the contralateral canine apart from the presence of a pit on the labial surface of the right canine (Fig. 2A). An intraoral periapical radiographic of the affected area revealed a peri-apical radiolucency associated with the permanent maxillary right canine. The root canal morphology appeared altered giving the appearance of a bulbous root with two canals (Fig. 2B). The morphology could not be visualized accurately through the two-dimensional representation of an intraoral periapical radiograph of the affected area revealed a peri-apical radiolucency associated with the permanent maxillary right canine. The root canal morphology appeared altered giving the appearance of a bulbous root with two canals (Fig. 2B).

1*Oral Health Sciences Center, PGIMER Satellite Center, Sangrur, Punjab, India
2–6Oral Health Sciences Center, Post Graduate Institute of Medical Education & Research, Chandigarh, India
Corresponding Author: Raja Raghu, Oral Health Sciences Center, PGIMER Satellite Center, Sangrur, Punjab, India, Phone: +91 9791350351, e-mail: raja.ragu.spm@gmail.com
Source of support: Nil
Conflict of interest: None

© The Author(s). 2021 Open Access This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (https://creativecommons.org/licenses/by-nc/4.0/), which permits unrestricted use, distribution, and non-commercial reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The Creative Commons Public Domain Dedication waiver (http://creativecommons.org/publicdomain/zero/1.0/) applies to the data made available in this article, unless otherwise stated.
Conservative Management of Infra-orbital Space Infection

Conservative Management of Infra-orbital Space Infection

Journal of Postgraduate Medicine, Education and Research, Volume 00 Issue 00 (xxxx 2022)

radiograph and thus, a Cone Beam Computed Tomography (CBCT) investigation of the tooth was carried out. The CBCT revealed an invaginated canal on the labial side lined by enamel. Two more canals were discernible on the palatal side, of which the distal canal had a C-shaped appearance in transverse section that connected with the periodontal through an apical foramen and the mesial canal communicated with the main canal at the middle third (Figs. 3A and B). Based on the radiographic assessment, an infraorbital space infection secondary to acute periapical abscess in right permanent maxillary canine associated with Type III B DI was diagnosed and a conservative approach was planned to treat the same.

A rubber dam was placed and an access was established through the labial pit, through which a yellow colored blood stained fluid discharge was evident. The other two canals on the palatal aspect were vital and treated under local anesthesia (Lignocaine with 2% adrenaline) (Fig. 4A). Antibiotic (Amoxicillin and Clavulanic acid combination 45mg/Kg/day) and analgesics (Ibuprofen 10mg/Kg/day) were prescribed to the patient for the consecutive 5 days. Intracanal drainage was established daily for the next 3 days using 15 size K file extended beyond the apical foramen. Fluid from the root canal was aspirated using a syringe with 27-gauge side vented needle and the access cavity was sealed with zinc oxide eugenol cement. At 1-week follow-up, the clinical signs and symptoms were completely resolved. The working length was measured using an apex-locator and confirmed with the radiographic method (Fig. 4B). The bio-mechanical preparation was done by conventional step-back technique using K-files for the invaginated canal and Ni-Ti rotary files (DeNext Pro Gold Protaper Rotary files) in the other two canals. The irrigation

Fig. 1: Infraorbital space infection involving the right side of the face

Fig. 2: (A) Intraoral picture showing the labial pit and swollen gingiva on the permanent right maxillary canine. (B) IOPA shows periapical radiolucency

Fig. 3: CBCT of the involved tooth. (A) Coronal view (B) Three-dimensional image
was done with 12% Ethylene Diamine Tetra-acetic acid followed by 2.5% sodium hypochlorite (NaOCl) and 2% chlorexidine and the final irrigation done with normal saline. A calcium hydroxide dressing was placed in the canals between the appointments. The dressing was changed every 2 weeks and maintained for 2 months. The canal was obturated with gutta percha and AH plus sealer by lateral condensation technique (Figs. 5A and 5B). The canal orifices were sealed with Glass Ionomer Cement and nonvital bleaching was done using 10% hydrogen peroxide and sodium perborate. The patient was recalled after an interval of 2 weeks to change the bleaching agent. After three subsequent appointments, a satisfactory change in the color of the tooth was observed. The access cavity was thereafter disinfected with 5% NaOCl and sealed with composite restoration (Figs. 5C and 5D). The patient was recalled regularly to check the stability of the treatment rendered. At 30 months follow-up, the tooth was asymptomatic with no sign of periapical changes or external resorption (Fig. 6) and no coronal discoloration.

**DISCUSSION**

DI is a common dental anomaly with a prevalence ranging between 0.3 and 10%. The maxillary lateral incisors are the most commonly involved (38.5–75%) teeth and among them 0.25–26.1% of individuals reported were symptomatic. The prevalence of DI among Indians is as low as 2.4%. The treatment approach for this malformation depends upon the complexity of involvement and the pulpal status. Teeth which exhibit only an invagination with no pulpal involvement are treated by prophylactic sealing while teeth in which the invagination extends below the Cemento-enamel junction (CEJ) with pulp pathology are treated by endodontic interventions. In this case, the patient reported with right side infraorbital space infection with pain in the affected region. According to previously reported literature, an important sign to detect DI is abnormal tooth morphology like a deep pit on the lingual or occlusal surface, pronounced cingulum or talon cusp on the palatal/lingual surface. However in this case, only a deep pit on the labial surface was evident which has not been reported in the previous cases and DI was just an incidental finding on the periapical radiograph. A CBCT was recorded for a three-dimensional examination of the root canal morphology. As described by various authors, CBCT helps in detailed examination of the root canal anatomy, extent of periapical radiolucency, internal or external root resorption and thus aids in treatment planning. In this case, three different canals could be identified, one on the labial and the other two on the palatal surface, with a periapical radiolucency which was larger than what was evident on the periapical radiograph. An invaginated canal located on the labial aspect was found to be communicating with the main canal at the middle third. De Smith et al. histologically investigated the invaginated human permanent maxillary incisors and found that the invagination appeared as bottles with the narrow necks toward the incisal edge. The enamel formed a continuous layer between the inner connective tissue and dentin of the invagination. Only

![Fig. 4: (A) Access opened on labial and palatal surface. (B) Working length X-ray](image)

![Fig. 5: (A) Obturated tooth showing discolored crown. (B) IOPA–post obturation. (C) Post bleaching photograph (lateral view). (D) Post bleaching (occlusal view)](image)
Conservative Management of Infra-orbital Space Infection

In this case, we performed invaginated canal, combined surgical and endodontic treatment, or modalities are nonsurgical endodontic treatment of the infected canine space infection with DI has not been described in the previous reports to the best of our knowledge.

In this case, pus was drained conservatively through the access opening and the other two canals on the palatal side. The canal on the mesial side merged at the middle third of the main canal and had a separate apical opening on the palatal side. Therefore, it was not feasible to remove the invagination completely which could have possibly caused a weakening of the tooth structure and subsequently led to failure of the treatment. Therefore, only hand instrumentation was done for the invaginated canal and the other two canals were prepared by NiTi-rotary files. This was concurrent with the report by Dembinskaite A et al. who mentioned that the use of rotary instruments in the invaginated part is not recommended because of uncertain shape and the surface lined by enamel might result in instrument fracture. The root canal system was irrigated with 2.5% NaOCl and 17% Ethylene Diamine Tetra-acetic acid which have an antibacterial effect and prevented the formation of endodontic biofilm. calcium hydroxide used as an intracanal medicament in this case helps in repair of the periapical tissue due to change in pH of the root dentin. Furthermore, it acts as an antibacterial agent and stimulates the mineralized tissue deposition. Various authors recommended the use of Mineral Trioxide Aggregate in obturating DI especially in teeth with open apices as a retrograde filling material due to its high biocompatibility, excellent sealing, and ability to stimulate apexitification. In this case, the tooth had a closed apex and got the apical tug-back with the gutta percha master cone, so it was obturated with lateral condensation technique to facilitate a proper seal of all the irregularities of DI as reported by various other authors also. At the 30 months follow-up, there was complete healing of the periapical area without any sign of extrinsic resorption. This case report highlights the successful management of infraorbital space infection associated with Type III B DI treated nonsurgically.

**Conclusion**

DI is a dental anomaly of developmental origin commonly involving permanent maxillary lateral incisors followed by permanent maxillary canine and premolars with several morphological types. The proper three dimensional evaluation of DI helps in identifying the root canal morphology and aids in efficient treatment planning. The obturation with Mineral Trioxide Aggregate is a suitable method for treating DI especially in case of immature teeth. The accurate diagnosis and proper treatment can prevent an unnecessary surgical intervention and has shown favorable prognosis in the long-term.

**Clinical Significance**

DI of permanent canine is an uncommonly encountered anomaly, specially as the focus for an odontogenic space infection. It is thus, important for the treating clinician to be aware of the clinical and radiographical signs of the anomaly to be able to diagnose and treat the condition optimally.

Nonsurgical management of odontogenic infections should be the preferred line of treatment, wherever feasible, because of the invasive nature of its surgical alternative. This becomes even more relevant when the patient involved belongs to the pediatric age group which would make a surgical treatment plan all the more challenging.

**Orcid**

Raja Raghu

http://orcid.org/0000-0002-1751-4134
Conservative Management of Infra-orbital Space Infection

REFERENCES