BULLETIN OF STOMATOLOGY AND MAXILLOFACIAL SURGERY
Volume 21, Issue 9

DOI: 10.58240/1829006X-2025.21.9-19

CASE REPORT

MULTIDISCIPLINARY MANAGEMENT OF AN IMPACTED TOOTH WITH CORONO-RADICULAR DILACERATION: A CASE REPORT

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Received: *Aug 17. 2025;* ***Accepted:****Sep 7, 2025;* ***Published:*** *Sep 20, 2025*

ABSTRACT

Background: Trauma to primary teeth in early childhood can lead to a wide range of developmental disturbances in permanent successors, including corono-radicular dilaceration, a rare condition characterized by a sharp bend in the crown or root. This poses diagnostic and therapeutic challenges and may impact aesthetics and function if not addressed appropriately.

Case presentation: This case report describes the rare occurrence of corono- radicular dilaceration in a 9-year-old girl with an impacted maxillary left central incisor due to trauma at the age of 4years. Initial two-dimensional imaging suggested intrusion, but cone-beam computed tomography (CBCT) confirmed severe corono-radicular dilaceration. A multidisciplinary approach involving surgical exposure using a closed eruption technique and orthodontic traction was employed. The tooth was successfully aligned over two months, followed by composite restoration to correct the crown morphology and improve esthetics .

Conclusions: This case highlights the importance of advanced imaging, timely diagnosis, and an interdisciplinary approach in the management of impacted and dilacerated teeth resulting from childhood trauma. Early intervention not only restored esthetics and function but also improved psychological well-being.

Keywords: Cone-beam computed tomography; Corono-radicular dilaceration; Orthodontic traction; Pediatric dental trauma; Surgical exposure; Tooth impaction

INTRODUCTION

Dental trauma in early childhood, especially to the primary maxillary incisors, can significantly disrupt the development of permanent successors. This disruption is due to the proximity of the developing tooth germs to the apices of the primary teeth. [1] The timing of injury is critical; trauma to primary teeth between 2 to 4 years of age can lead to a wide spectrum of developmental disturbances. [2] Among these disturbances, dilaceration is a particularly challenging condition to diagnose and manage. Dilaceration is defined as an abnormal bend in the crown or root of a tooth.[3] The condition arises due to a physical displacement of the already formed part of the developing tooth germ, followed by continued development along an altered path.

Diagnosing these anomalies can be complex, particularly when standard radiographs are inconclusive. Advanced imaging and timely multidisciplinary intervention are essential. This report presents the management of a child with an impacted maxillary central incisor due to corono-radicular dilaceration resulting from childhood trauma.

CASE ILLUSTRATION

A 9-year-old girl reported to the Department of Pedodontics, with the chief complaint of a missing upper front tooth.The patient was emotionally distressed and reported being bullied at school due to the missing tooth, impacting her self-esteem (Figure 1).

Figure 1. Preoperative intraoral photograph showing missing maxillary left central incisor (tooth 21) and esthetic concern expressed by the patient.

The child was accompanied by her grandparents, who gave a vague history of trauma, recalling that she had hit her face on a door approximately one week earlier, but neither the patient nor the guardians could confirm the exact details of the incident. However, the mother later recalled an avulsion incident at age 4.

On extraoral examination, the patient exhibited no facial asymmetry, bruising, or signs of active infection. Intraoral examination revealed a well-developed maxillary arch with adequate space for eruption, but with the permanent maxillary left central incisor (tooth 21) clinically absent. No soft tissue swelling or abnormal mucosal color was noted in the region of the missing tooth. An intraoral periapical (IOPA) radiograph revealed a foreshortened image of the unerupted tooth 21, suggestive of intrusion (Figure 2).

Figure 2. IOPAR showing a foreshortened image of unerupted 21, suggestive of intrusion.

According to the International Association of Dental Traumatology (IADT) guidelines, the depth of intrusion (>7 mm) warranted intervention via either surgical or orthodontic repositioning.[4] Given the patient's age and available space in the dental arch, surgical exposure of the impacted tooth using the closed eruption technique was planned in conjunction with orthodontic traction to guide the tooth into its correct position. A mucoperiosteal flap was raised in the maxillary anterior region to access the crown of tooth 21. On exposure, unexpectedly, the crown showed palatal inclination with visible crown dilaceration. (Figure 3) Initially, a 0.16 stainless steel (SS) wire was placed.

Figure 3. Surgical exposure of the the crown of 21 showing palatal inclination with visible crown dilaceration.

Orthodontic traction was initiated using light orthodontic force with a stainless steel ligature wire tied to the main archwire. (Figure 4) The flap was repositioned and sutured back, ensuring the esthetic and functional benefits of a closed eruption.

Figure 4. Orthodontic traction initiated using 0.16 stainless steel (SS) wire

Subsequently, to further evaluate root morphology, a cone-beam computed tomography (CBCT) scan was conducted. CBCT imaging provided a clear 3D view of the unerupted tooth, confirming corono-radicular dilaceration with palatal inclination of the crown and an abrupt curvature between the crown and root (Figure 5); findings that were not clearly visible in conventional radiography. These features confirmed a diagnosis of impacted and dilacerated permanent maxillary left central incisor, a rare developmental disturbance resulting from early trauma.

Figure 5. CBCT image revealing corono-radicular dilaceration with abnormal angulation of crown and root of tooth 21.

At the two-week follow-up, the impacted tooth had responded to the orthodontic traction and had descended sufficiently to engage with the arch wire. The tooth continued to erupt gradually over the next two months and was eventually aligned into the correct position within the dental arch (Figure 6).

Figure 6. Intraoral view after two months of orthodontic traction showing aligned 21 in the dental arch.

Once ideal positioning was achieved, composite restoration was performed to correct the dilaceration (Figure 7). The patient was advised periodic recall visits for pulp vitality testing and radiographic monitoring, given the risk of late complications such as pulp necrosis, root resorption, or canal obliteration associated with corono-radicular dilaceration. At subsequent reviews, the tooth remained stable, with no signs of mobility, infection, or discoloration.

Figure 7. Post-treatment image after composite restoration correcting the crown morphology of 21.

DISCUSSION

Traumatic injuries to primary teeth, especially during early childhood, can result in significant and sometimes irreversible consequences on developing permanent successors due to their close anatomical relationship.[1] Avulsion and intrusion of primary tooth could cause more serious sequel in successor tooth. The maxillary central incisors are particularly vulnerable, as they are situated just above the apices of the primary incisors and are undergoing active odontogenesis during this age.[5] According to previous studies, 3-9% of all sequels after traumatic injuries are crown dilacerations.[6] Corono-radicular dilaceration, though rare, presents a unique challenge as it involves a combined deviation of both the crown and the root, making diagnosis and treatment considerably more complex. This case of a 9-year-old girl presenting with a missing maxillary central incisor (tooth 21) illustrates the challenges and clinical decision-making involved in diagnosing and managing trauma-induced dental anomalies in a growing child.

Etiology and Age Considerations

The age at which dental trauma occurs significantly influences the type and severity of its impact on developing permanent teeth. In this case, trauma was

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sustained at around 4 years of age, a critical period when the permanent maxillary central incisor is still developing. The corono-radicular dilaceration observed is likely a direct result of trauma during this vulnerable stage of odontogenesis.[7] Dilaceration refers to an abrupt deviation in the long axis of the tooth, caused by displacement of the already calcified portion of the developing germ, while the remaining non-calcified part continues growing at an abnormal angle.[7]

Between 2 and 3 years of age, the permanent tooth germ lies palatally above the apex of the primary incisor. Trauma during this time typically results in crown dilaceration. However, if trauma occurs at 4–5 years, when the crown is fully formed and lies closer to the resorbing root of the primary tooth, the force is likely transferred to Hertwig's epithelial root sheath.[8,9] This leads to rotation of the crown-root complex, while the root continues to develop along its original path, causing root dilaceration.[10] These observations align with existing literature, which shows that trauma between 2 and 4 years of age can result in anomalies such as dilaceration, enamel hypoplasia, or ectopic eruption of permanent incisors.[5]

Diagnostic Complexity and Imaging

Initial intraoral periapical (IOPA) radiography revealed a foreshortened image of 21, which was suggestive of an intrusion.[11] However, the two-dimensional limitations of IOPA imaging could not fully delineate the extent or direction of the displacement or the presence of dilaceration. This limitation of the initial imaging with IOPA underscores the diagnostic value of CBCT in confirming both crown and root dilaceration. CBCT offers comprehensive three-dimensional visualization, allowing accurate assessment of the orientation and spatial position of the impacted tooth. Wankhade et al.,[6] and Bletsa et al.,[7] has emphasized the indispensable role of CBCT in accurately diagnosing complex root morphology and guiding treatment planning in such anomalies. In this patient, CBCT imaging revealed a stark difference between the two maxillary central incisors. (Figure 8).

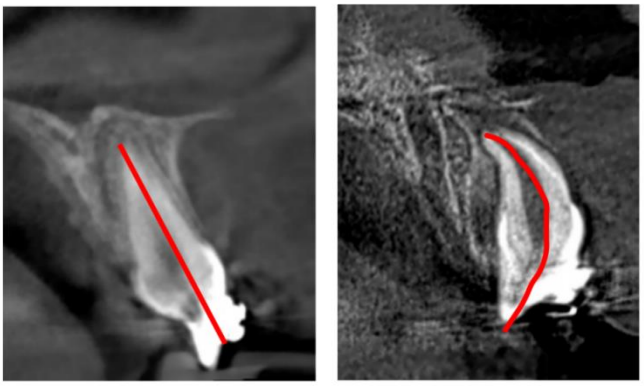

Figure 8. CBCT images revealing a stark difference between the two maxillary central incisors with clear dilaceration in left maxillary incisor (figure 8 a,b)

The right incisor had a normal crown-root alignment, while the left incisor showed clear corono-radicular dilaceration with a sharp angulation between the crown and root, indicating disruption of the calcification axis during development. This abnormal angulation can complicate orthodontic traction, endodontic treatment, and esthetic rehabilitation. Additionally, crown misalignment and enamel defects may negatively affect overall esthetic outcomes.[8]

Multidisciplinary Treatment Approach

Management of dilacerated and impacted anterior teeth presents both esthetic and functional challenges and requires a multidisciplinary approach that balances surgical exposure, orthodontic traction, and, if necessary, restorative correction . **A** closed eruption technique was chosen to optimize esthetic outcomes by maintaining soft tissue contours and ensuring a natural emergence profile. This was consistent with best practices reported by Xiang Ru SHI et al., who found improved periodontal and esthetic outcomes using the technique. [12]

The mucoperiosteal flap was elevated to expose the palatally inclined crown, and orthodontic traction was applied. Orthodontic traction with light continuous force using a 0.16 stainless steel (SS) archwire and ligature tie-back allowed gradual repositioning and minimizing damage to periodontal structures.Such techniques are supported by evidence as the preferred method for impacted anterior teeth with favorable prognosis. Gurunathan et al. underscore the need for gentle orthodontic forces when treating teeth with post-traumatic sequelae.[11]

Restorative and Esthetic Considerations

After successful alignment, composite resin build-up was performed to restore the natural crown form distorted by dilaceration. Beyond functional rehabilitation, this step was vital in addressing the psycho-social distress the child experienced. Children at this developmental stage are highly conscious of peer perception and facial appearance. Timely dental intervention played a key role in improving the patient's emotional well-being and self-confidence.[13]

Prognosis and Long-Term Considerations

Although the immediate outcome was favorable, long-term monitoring **i**s essential due to the risk of complications inherent to dilacerated teeth. In cases of coronoradicular dilaceration additional complications

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such as pulp canal obliteration, pulp necrosis, or even root resorption over time.[14] Additionally, defective enamel at the dilacerated crown site may allow microbial ingress, leading to sub-clinical infection and inflammation even in the absence of caries.[15] Therefore, routine follow-ups involving clinical examination, vitality testing, and periodic radiographs are recommended throughout adolescence to detect and manage late complications early.

This case is unique due to the rare presentation of combined crown and root dilaceration with deep palatal displacement, diagnosed accurately by advanced imaging and clinical suspicion. The case also exemplifies how trauma history, though initially unclear, can become crucial once the clinical and radiographic signs are integrated.

CONCLUSION

Early childhood trauma can have long-lasting effects on permanent tooth development. This case highlights the significance of timely diagnosis using CBCT and the effectiveness of a multidisciplinary treatment approach. With coordinated care, even severely dilacerated and impacted teeth can be successfully managed to achieve favorable functional and esthetic outcomes.

DECLARATION

Acknowledgments

I sincerely thank the clinical team, and my institution for their valuable guidance and support throughout this

case report. I am also grateful to the patient and her family for their cooperation.

Declaration

The patient provided written informed consent for participation and publication of this case report

Conflict of interest

The authors declare no Conflict of interest

Funding

No external funding was received.

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