Archives of Current Research International

Volume 25, Issue 9, Page 397-403, 2025; Article no.ACRI.143962
ISSN: 2454-7077

Combined Periodontal, Endodontic and Restorative Management of a Pediatric Maxillary Crown-Root Fracture

Samuel Chillavert Dias Pascoal [a*], Elvia Maria Sousa Campos [a], Adriana Kelly de Sousa Santiago Barbosa [a], Iracema Matos de Melo [a], Lidiane Costa de Souza [a] and Celiane Mary Carneiro Tapety [a]

[a] Federal University of Ceará - Sobral Campus, Conselheiro José Júlio St, Sobral, Ceará - Brazil.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: https://doi.org/10.9734/acri/2025/v25i91506

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://pr.sdiarticle5.com/review-history/143962

Case Report

Received: 30/06/2025
Published: 15/09/2025

ABSTRACT

Aims: This case study illustrates the successful preservation and functional restoration of a traumatised maxillary central incisor via a multidisciplinary, conservative approach, providing further evidence in favour of integrated treatment strategies for young patients.
Presentation of Case: An 11-year-old female patient presented with a history of dental trauma affecting her upper right central incisor (tooth #11). An intraoral examination revealed a complex crown-root fracture involving the vestibular, palatal, mesial, distal and incisal surfaces, with a subgingival extension that compromised the biological width. The diagnosis was a complicated crown-root fracture with pulpal involvement. Treatment consisted of endodontic therapy and

**Corresponding author: Email: samuelcdpascoal@gmail.com;*

Cite as: *Samuel Chillavert Dias Pascoal, Elvia Maria Sousa Campos, Adriana Kelly de Sousa Santiago Barbosa, Iracema Matos de Melo, Lidiane Costa de Souza, and Celiane Mary Carneiro Tapety. 2025. "Combined Periodontal, Endodontic and Restorative Management of a Pediatric Maxillary Crown-Root Fracture". Archives of Current Research International 25 (9):397–403. https://doi.org/10.9734/acri/2025/v25i91506.*

surgical crown lengthening to re-establish the supracrestal tissue attachment. A definitive restoration was achieved using a glassfiber post and a stratified composite build-up with a silicone guide. Despite the inability to conduct long-term follow-up due to socioeconomic limitations, the immediate outcome was aesthetically and functionally successful.

Discussion: This case study illustrates how a well-planned, interdisciplinary approach can effectively restore severely traumatised anterior teeth in paediatric patients, thereby avoiding extraction and maintaining aesthetics and function. Although, the lack of follow-up due to poor financial status and unavailability of the patient's family presented itself as the main shotcoming of this case.

Conclusion: It emphasises the importance of individualised, conservative strategies and highlights the challenges in ensuring follow-up care for vulnerable populations.

Keywords: Dental trauma; crown-root fracture; pediatric dentistry; multidisciplinary treatment; case report.

1. INTRODUCTION

Dental trauma is a prevalent public health issue, particularly among children and adolescents, with the maxillary central incisors most frequently affected due to their anterior position (Petti, 2018, Molina et al., 2008). Crown-root fractures, though less common than uncomplicated crown fractures, present greater clinical challenges by compromising function, aesthetics, and periodontal attachment (Mokhtari et al., 2019, Sobczak-Zagalska et al., 2024, Corazza et al., 2022). Their severity depends on trauma mechanism, impact intensity, and patient age (Petti, 2018).

Management often requires multidisciplinary intervention combining periodontal, endodontic, and restorative approaches to re-establish function and aesthetics (Levin et al., 2020, Zhou et al., 2022). Treatment may include orthodontic or surgical extrusion, crown lengthening, fragment reattachment, or direct/indirect restorations (Antipovienė et al., 2021, Bourguignon et al., 2020). In children, conservative strategies are essential to preserve natural teeth, ensure proper growth, and minimise psychological impact (Molina et al., 2008, Selvaraj et al., 2024).

Decisions must consider root development, pulp vitality, and long-term survival. While conservative management is preferred, deep subgingival fractures may require invasive endodontic procedures (Krastl et al., 2021, Elfadil et al., 2023, Silva et al., 2024). Thus, integrated treatment is crucial for functional and aesthetic success in paediatric cases.

This report describes the conservative, interdisciplinary management of a complicated crown-root fracture with biological width invasion, combining periodontal, endodontic, and restorative approaches.

2. PRESENTATION OF CASE

This case forms part of a prospective project conducted by the Restorative Dentistry Study Group (GED) at the Federal University of Ceará, approved under protocol 4.750.328. The patient's guardian signed informed consent for clinical management and use of anonymised data and images.

An 11-year-old female presented to the dental clinic after an accidental fall with trauma to the upper right central incisor (#11). She had no relevant medical history and no prior dental trauma. Clinical and radiographic examinations revealed a complicated crown-root fracture involving buccal, palatal, mesial, distal, and incisal surfaces, with subgingival extension compromising the supracrestal tissue attachment (Figs. 1a, 1b). The patient's parents reported that dental trauma had occurred around 21 days before seeking care, which likely contributed to pulpal compromise and the need for endodontic therapy. The tooth had been previously accessed but required complete endodontic therapy. Pulp sensibility testing was conducted whereas the results presented as negative, while clinical and radiographic findings were consistent with pulpal necrosis. Adjacent teeth were unaffected, and there was no pathological mobility or soft tissue injury.

Given the extension of the fracture and the patient's age, an interdisciplinary plan was established over two sessions, combining endodontic, periodontal, and restorative procedures.

Fig. 1. Vestibular (a) and palatal (b) view of fracture in tooth 11 involving the vestibular, palatal, mesial, distal and incisal surfaces

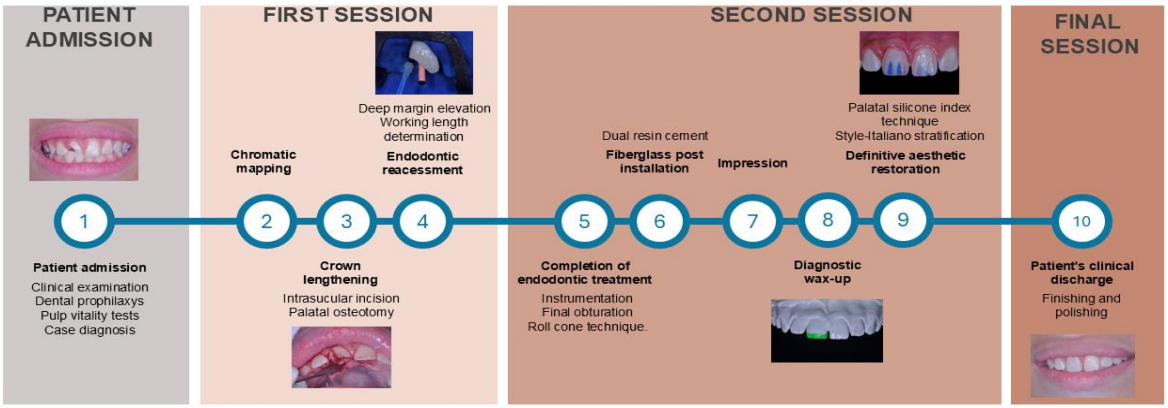

Fig. 2. Case timeline

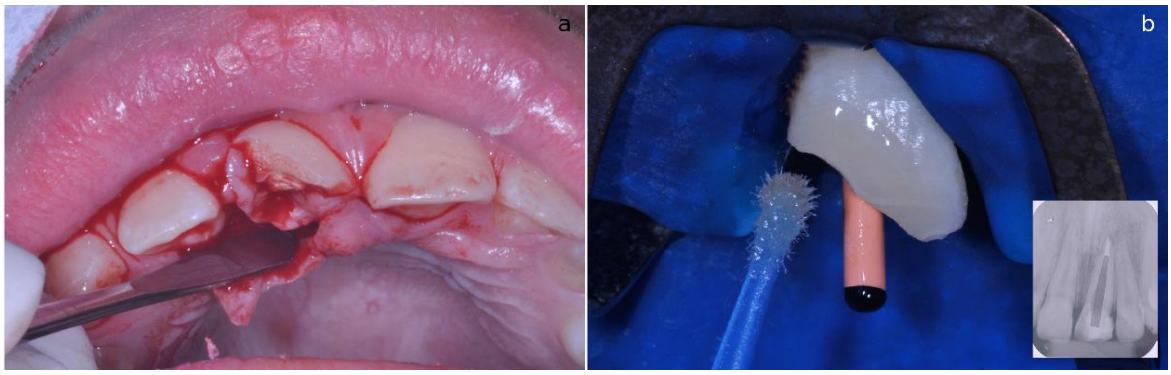

Fig. 3. Periodontal surgical procedure to increase the clinical crown, with detachment of gingival tissue using a simple Molt detacher (a). under absolute isolation, with a vaselined gutta-percha cone positioned inside the canal, to begin the reconstruction of the cervical portion (b)

During the first session, local anaesthesia was administered, and endodontic access and pulpectomy were performed. Surgical crown lengthening followed to allow isolation and restorative planning. A sulcular incision and flap elevation exposed the fracture margin, and osteotomy was performed on the palatal surface to re-establish the biological width (Fig. 3a). Once periodontal space was restored, deep cervical margin elevation (DCME) was carried out to relocate the margin to a more favourable position (Fig. 3b), enabling rubber dam isolation. Endodontic treatment was then completed with mechanical instrumentation, sodium

hypochlorite/EDTA irrigation, and obturation using the roll-cone technique with sealer 26, chosen due to the wide apical foramen.

In the second session, shade selection was confirmed, and the post space was prepared, leaving a 4 mm apical seal. A glass fiber post was cemented with dual-cure resin cement, providing reinforcement without compromising the root structure. For coronal reconstruction, a diagnostic wax-up was performed, and a silicone index was fabricated to guide the restoration. Incremental layering of composite resin reproduced the palatal wall, dentin mamelons, and enamel stratification, ensuring natural integration with adjacent teeth (Fig. 4).

Final finishing and polishing were performed using sequential abrasives, rubbers, and polishing paste. Occlusal adjustment was carried out to achieve proper force distribution and prevent interferences. The restoration provided satisfactory function and aesthetics, and the patient and guardian were instructed on the importance of follow-up visits for monitoring and maintenance (Figs. 5a-f).

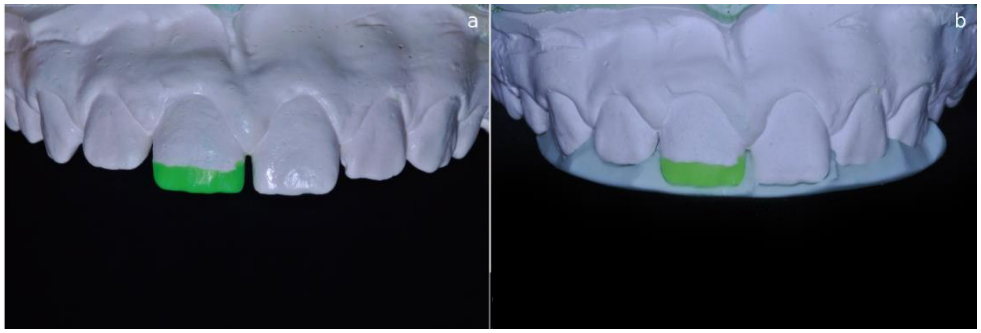

Fig. 4. Plaster model with waxing of tooth 11 and silicone guide to perform the wall technique

Fig. 5. Demarcation of transitional line angles (a), reflective and deflective zones (b). Measurements of width and length using a dry point compass (c-d). Initial (e) and final (f) photograph of the case, after finishing and polishing

3. DISCUSSION AND CONCLUSION

Crown-root fractures in paediatric patients are challenging due to subgingival extension and involvement of multiple tissues. According to IADT guidelines, preserving biological width, considering root development, and meeting aesthetic demands are essential (Antipovienė et al., 2021, Krastl et al., 2021). Early multidisciplinary care helps prevent periodontal breakdown and functional or psychological sequelae (Mokhtari et al., 2019, Zhou et al., 2022,).

In this case, crown lengthening enabled exposure of the fracture margin and adequate isolation, while endodontic therapy provided a sound foundation for restoration (Radwanski et al., 2022). A 4 mm apical gutta-percha plug ensured sealing, and a glass fiber post offered reinforcement with dentin-like elasticity, reducing fracture risk (Rao et al., 2017, Fráter et al., 2020, Samiei et al., 2014). Additionally, the Callahan-Johnston roll-cone obturation technique was chosen to address the challenge of the wide apical foramen, allowing for better adaptation and sealing since thin dentinal walls exceed the incidence of root fractures in teeth after apexification (Mohammadi, 2020, Yu and Zhu, 2021, Rech et al., 2022).

In pediatric patients, careful management of the periodontal tissues is particularly important due to the dynamic nature of gingival contours and the risk of future soft tissue changes. Children in developmental stages, additional factors—such as their physical and psychological development, time, and financial costs—add complexity to the treatment of complex crown-root fractures in anterior teeth, making prognosis less favorable (Petti, 2018, Sobczak-Zagalska et al., 2024). Restorative procedures balanced biological preservation with aesthetic needs. Incremental stratification achieved optical integration and controlled polymerisation shrinkage (Mohammadi, 2020, Rech et al., 2022). Reducing chair time and employing preoperative planning improved predictability and patient cooperation.

A limitation was the absence of long-term follow-up due to socioeconomic barriers, preventing assessment of periodontal stability and restoration longevity (Di et al., 2024). Despite this, the immediate outcome demonstrated that coordinated endodontic, periodontal, and restorative management can effectively preserve severely traumatised anterior teeth in children. Also, although crown-lengthening surgery can provide immediate access for restorative procedures, its indication in pediatric patients must be weighed carefully due to ongoing dental and periodontal development. It has been recommended that orthodontic extrusion as a preferable alternative, as it preserves the periodontal ligament attachment and may provide more favorable long-term periodontal conditions (Molina et al., 2008, Antipovienė et al., 2021). In the present case, however, the surgical approach was selected because of the subgingival extension of the fracture, the urgent need to restore function and aesthetics, and the limited feasibility of orthodontic traction given the clinical and socioeconomic context.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

During the preparation of this work the author(s) used ChatGPT 5o (Open AI) in order to review text fluency and language, spelling, and grammar errors. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

CONSENT

As per international standards, parental written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

Antipovienė, A., Narbutaitė, J., & Virtanen, J. I. (2021). Traumatic dental injuries, treatment and complications in children and adolescents: A register-based study. *European Journal of Dentistry*.

Bourguignon, C., Cohenca, N., Lauridsen, E., Flores, M. T., O'Connell, A. C., Day, P. F., et al. (2020). International Association of Dental Traumatology guidelines for the management of traumatic dental injuries:

1. Fractures and luxations. *Dental Traumatology, 36*(4), 314–330. https://doi.org/10.1111/edt.12578

Corazza, P. H., Di Domênico, M. B., Facenda, J. C., Merlo, E. G., Borba, M., & Ozcan, M. (2022). Fiberglass versus cast metal posts: A practical review based on mechanical properties. *Brazilian Dental Science, 25*(4).

Di, T., Zhang, X., Yu, H., Yang, Y., Wang, L., & Chen, Y. (2024). Multidisciplinary treatment approach for complex crown-root fractures in child with periodontal health as the guiding principle: A case report with 8-year follow-up. *BMC Oral Health, 24*(1), 1491.

Elfadil, S., Nassar, H. I., Elbeshbeishy, R. A., & Annamma, L. M. (2023). Esthetic rehabilitation of pediatric patients using direct bonding technique—A case series report. *Children, 10*(3), 546.

Fráter, M., Lassila, L., Braunitzer, G., Vallittu, P. K., & Garoushi, S. (2020). Fracture resistance and marginal gap formation of post-core restorations: Influence of different fiber-reinforced composites. *Clinical Oral Investigations, 24*, 265–276.

Krastl, G., Weiger, R., Filippi, A., Van Waes, H., Ebeleseder, K., Ree, M., et al. (2021). Endodontic management of traumatized permanent teeth: A comprehensive review. *International Endodontic Journal, 54*(8), 1221–1245. https://doi.org/10.1111/iej.13508

Levin, L., Day, P. F., Hicks, L., O'Connell, A., Fouad, A. F., & Bourguignon, C. (2020). International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: General introduction. *Dental Traumatology*. https://doi.org/10.1111/edt.12574

Mohammadi, Z. (2020). Strategies to manage permanent non-vital teeth with open apices: A clinical update. *International Dental Journal, 61*(1), 25–30.

Mokhtari, S., Hajian, S., & Sanati, I. (2019). Complicated crown-root fracture management using the 180-degree rotation method. *International Journal of Clinical Pediatric Dentistry, 12*, 247–250. https://doi.org/10.5005/jp-journals-10005-1625

Molina, J. R., Vann, W. F. Jr., McIntyre, J. D., Trope, M., & Lee, J. Y. (2008). Root fractures in children and adolescents: Diagnostic considerations. *Dental Traumatology, 24*(5), 503–509.

Petti, S., Glendor, U., & Andersson, L. (2018). World traumatic dental injury prevalence and incidence, a meta-analysis—One billion living people have had traumatic dental injuries. *Dental Traumatology, 34*, 71–86.

Radwanski, M., Caporossi, C., Lukomska-Szymanska, M., Luzi, A., & Sauro, S. (2022). Complicated crown fracture of permanent incisors: A conservative treatment case report and a narrative review. *Bioengineering (Basel), 9*(9), 481. https://doi.org/10.3390/bioengineering9090481

Rao, B. S., Bandekar, S., Kshirsagar, S., & Naman, S. (2017). Endocrown—A unique way of retention: Case report. *Journal of Advances in Medicine and Medical Research, 22*(3), 1–5. https://doi.org/10.9734/JAMMR/2017/32747

Rech, A., Olberttz, M., Paiva, D. J., Ribeiro, A. N., Gimenez, T., & Imparato, J. C. (2022). Aesthetic-functional rehabilitation of deciduous anterior teeth without removal of carious tissue: Series of clinical cases. *RGO—Revista Gaúcha de Odontologia, 70*, e20220059.

Samiei, M., Aghazade, M., Farhadi, F., Shahveghar, N., Torab, A., & Pakdel, S. M. V. (2014). Sealing efficacy of single-cone obturation technique with MTA and CEM cement: An in vitro bacterial leakage study. *Journal of Dental Research, Dental Clinics, Dental Prospects, 8*(2), 77–83.

Selvaraj, N., Mamat, N., & Taib, H. (2024). Navigating crown-root fracture complexities in an adolescent. *Cureus, 16*(10), e71406.

Silva, F. M., Aguiar, P. H. S., Assis, H. C., Lopes-Olhê, F. C., Mazzi-Chaves, J. F., Silva, R. G., et al. (2024). Evaluation of the bonding strength of conventional, anatomized, adjustable, and CAD/CAM milled fiberglass posts in weakened endodontically treated roots. *Brazilian Dental Journal, 35*, e246103.

Sobczak-Zagalska, H., Ogonowska-Paul, D., Bartmański, M., & Adamska, P. (2024). Management of complex root fractures in young patients—Case series and a literature review. *Journal of Clinical Medicine, 13*, 6753.

Yu, H., & Zhu, H. (2021). The management of a complicated crown-root fracture incorporating modified crown-lengthening

surgery. *British Dental Journal, 230*(4), 217–222.

Zhou, Z. L., Gao, L., Sun, S. K., Li, H. S., Zhang, C. D., Kou, W. W., et al. (2022). Spontaneous healing of complicated crown-root fractures in children: Two case reports. *World Journal of Clinical Cases, 10*(18), 6298–6306. PMID: 35949815; PMCID: PMC9254207. https://doi.org/10.12998/wjcc.v10.i18.6298

Peer-review history:
The peer review history for this paper can be accessed here:
https://pr.sdiarticle5.com/review-history/143962