

## INTRODUCTION

Traumatic dental injuries comprise 5% of all injuries for which children and young adults seek treatment. Additionally, 25% of school-aged children experience dental trauma. Of the traumas that affect permanent teeth, crown fractures and luxation injuries are the most common. The case report detailed here describes the management, follow up, and consequent treatment of an adolescent who experienced an uncomplicated enamel-dentin fracture and subsequent root fracture of a permanent maxillary incisor.

## HISTORY OF TRAUMA

- 2017** Initial trauma; snowball fight resulting in enamel-dentin fractures of #8 and 9. Teeth were restored with a guarded prognosis.
- 2018** During a routine radiographic exam, it was found that #8 had a horizontal root fracture and a vertical fracture of the crown and restoration.  
#8 devitalized, becoming necrotic with symptomatic apical periodontitis. Endodontic therapy was initiated and the crown was restored.
- 2019** #8 was restored again after subsequent facial and lingual fractures. Prognosis deemed hopeless.
- 2020** Patient did not attend recommended recall visits.
- 2021** At the patient's dental exam, #8 was non-restorable due to decay and continued structural loss. Given the patient's age and family preferences, bone preservation via root banking was pursued followed by delivery of an esthetic partial.
- 2022** Patient presented for routine dental care. The embedded root was asymptomatic and absent of soft tissue or periapical pathology.

## ROOT BANKING vs DECORONATION

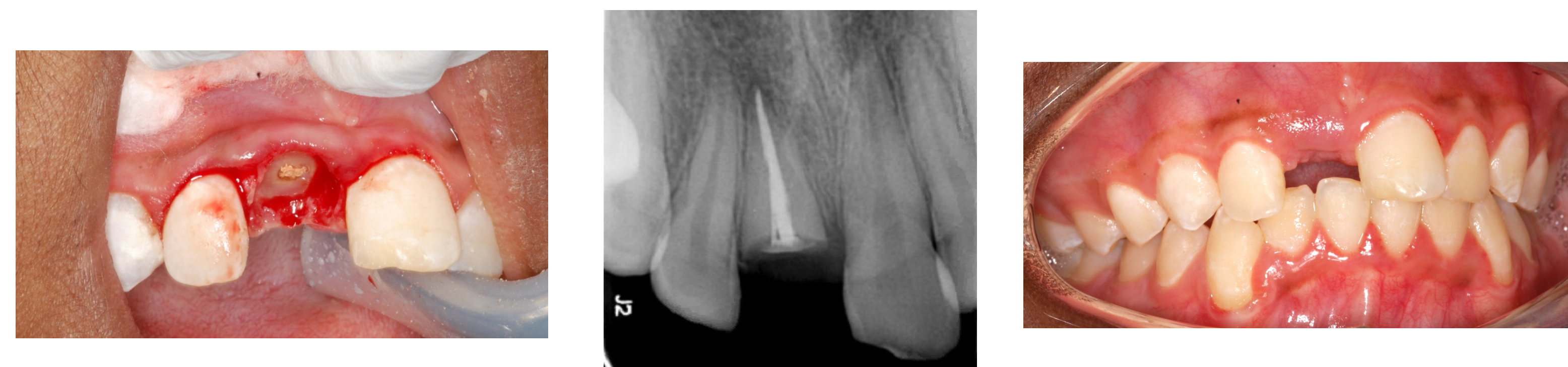
- Injury or caries have allowed PDL to remain viable.
- Root canal is endodontically treated.
- The endodontically treated root is then embedded in the alveolus to preserve bone density/volume.
- In the future, the root can be removed for definitive treatment or when healing is possible.
- Injury has resulted in damaged PDL (ie avulsion) +/- damaged pulp.
- The crown is removed and the root surface is reduced below the bone margin.
- Endodontic files stimulate apical bleeding and the empty root canal fills with blood.
- Bone apposition is induced and new bone resorbs the root.

## PRE-TREATMENT



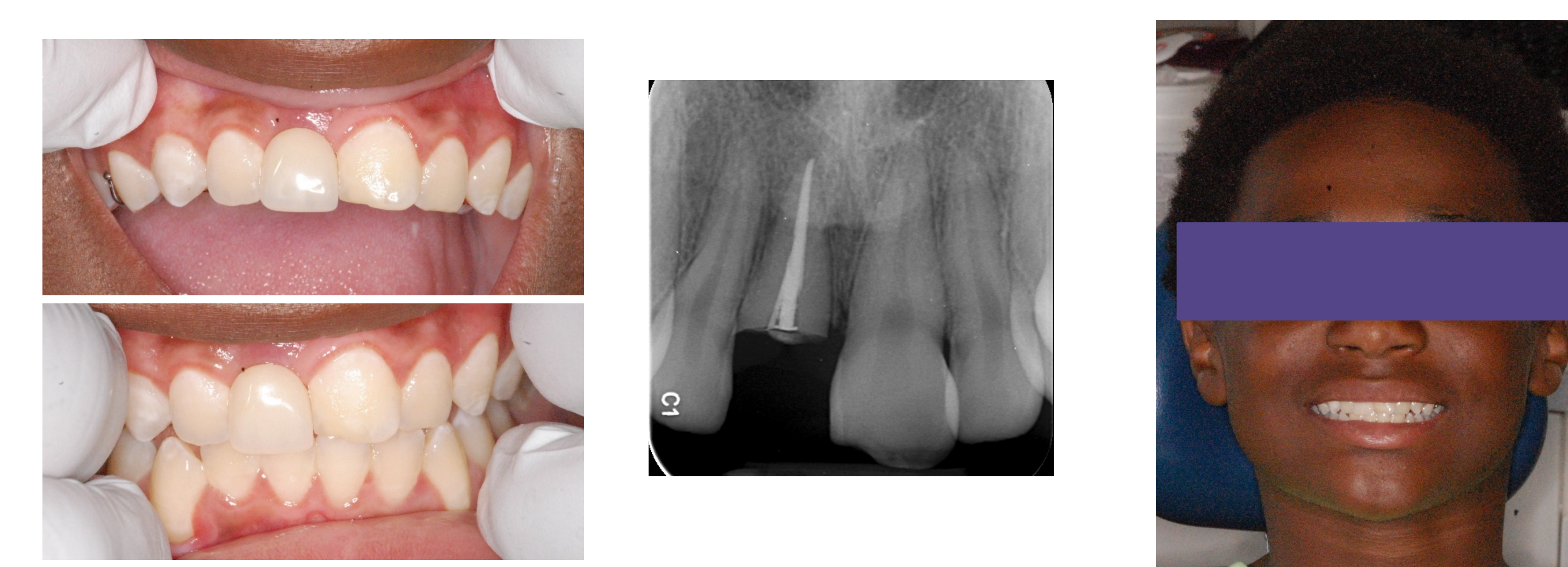
**FIGURE 1:** These images depict the patient as he presented in 2021, 4 years after the initial trauma occurred to #8 and 9. Prior to these images, multiple restorations had been placed to repair #8 and 9 uncomplicated enamel-dentin fractures. #8 was endodontically treated in 2018 after devitalizing from repeated traumas and experiencing root fractures. With the complication of being skeletally immature, the family elected to pursue root banking to address unsatisfactory esthetics and a hopeless prognosis.

## DECORONATION & HEALING



**FIGURE 2:** The **left** image was taken intraoperatively immediately after #8 was decoronated and the coronal part of the root was reduced 2 mm apical to the crest of bone. The **middle** image is an intraoperative radiograph demonstrating the level of root reduction as well as sealing of the root canal. The **right** image is 2 weeks post-operatively, demonstrating the level of gingival healing prior to shade selection and impression for the appliance.

## APPLIANCE DELIVERY & OUTCOMES



**FIGURE 3:** Photos on the **left** and **right** were taken immediately after appliance delivery approximately 4 weeks after root banking. The **middle** image demonstrates radiographic stability 8 months post-operatively.

## ROOT BANKING PROCEDURE

**Root banking:** The coronal aspect of #8 was decoronated and the coronal part of the root was reduced 2 mm apical to the crestal bone. Coronal gutta percha was removed and the root canal was sealed with a resin modified glass ionomer. The endodontically treated root was embedded in the alveolus and the gingiva was reapproximated with sutures.

**Appliance fabrication:** After two weeks of healing, a denture tooth shade was selected and an impression was taken for fabrication of a partial denture.

**Appliance delivery:** On the day of delivery, mild space loss was appreciated but the appliance had adequate retention and satisfactory esthetics. The patient was instructed to use the appliance for esthetic purposes only and avoid mastication or functional challenges.

## DISCUSSION

**Goals of treatment:** The loss of an anterior tooth due to trauma or caries is a challenge to manage in the pediatric population. The need for consistent follow up and reasonable expectations for treatment outcomes are critical to the success of procedures such as root banking. Detailed discussions with this family included the value of preserving alveolar bone as the patient skeletally matures and alternatives if the endodontically treated root were to fail. It was emphasized that future treatment needs may be indicated. The embedded root can be retrieved once the patient is skeletally mature to allow for implant placement, or it can remain in place if other prosthetic options are chosen.

**Anticipated challenges:** Patient selection and compliance are critical to the success and long-term outcomes of root banking. In the case presented here, the primary goal was alveolar ridge preservation in a skeletally immature patient. However, treatment outcomes of this case have a guarded prognosis, as the family experiences barriers to care that have contributed to difficulties with regular appointment attendance, adequate hygiene/retention of dentition and appliance, and an unfavorable history of repeated dental traumas.

## CONCLUSION

Root banking is a reasonable treatment option for retention of alveolar bone in the pediatric population, particularly when a critical tooth, either esthetically or functionally, is non-restorable. Factors that contribute to the success of root banking include long-term and consistent access to care, understanding of future treatment needs and/or complications, and stable systemic health that can support the maintenance of an endodontically treated root.

## REFERENCES

- Bourguignon C, Cohenca N, Lauridsen E, et al. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 1. Fractures and luxations. Dent Traumatol 2020;36(4):314-330. <https://doi.org/10.1111/edt.12578>.
- Dugan, D. J., Getz, J. B., & Epker, B. N. (1981). Root banking to preserve alveolar bone: A review and clinical recommendation. The Journal of the American Dental Association, 103(5), 737-743. <https://doi.org/10.14219/jada.archive.1981.0367>