

# Partial Pulpotomy and Immature Permanent Teeth: Dental Management of Trauma in the Developing Dentition

## INTRODUCTION

Following a traumatic incident, evidence based dental treatment can improve dental trauma aftermath. Most commonly, permanent teeth are traumatized from falls, collisions with hard surfaces, motor vehicle accidents, violence, and sports. Before the age of 19 years old, children experience traumatic incidences to the permanent dentition at a rate of approximately 25 percent. In children and young adults, permanent tooth crown fractures and luxations are the most frequently occurring dental injuries. Regarding treatment outcomes, an isolated, singular tooth trauma is expected to have a better outcome than a tooth that has a combination of two or more different injuries concurrently. Regardless of pulpal exposure status, crown fracture injuries are associated with an increased risk for infection and necrosis of the pulp. Treating younger, growing children with permanent tooth trauma poses unique challenges and considerations. Pediatric dentists must consider tooth development, root immaturity, and facial growth.

## CASE REPORT

On Wednesday, July 9, 2025, an 8-year-old male was playing at a park and ran face first into a metal pole. The following day, Thursday, July 10, 2025, the patient arrived to the UH Rainbow Babies and Children's Hospital Smile Suite Pediatric Dental Clinic with his mom. The patient has a past medical history of sickle cell trait, lactose intolerance. Clinical and radiographic exam revealed complicated fractures of #8 and 9, including 2-3mm mesio-palatal fractures below the gingiva. Teeth #8 and 9 were subluxated and non-mobile. No trauma was noted to the remaining dentition. The patient's gingiva was erythematous and lacerated. Radiographs revealed immature tooth apices, fractures, and exposed pulp. Following examination, treatment options were discussed with the family: do nothing, extract #8, 9, or perform Cvek partial pulpotomies #8, 9 followed by resin crown restorations. The family opted for partial pulpotomies, and resin crown restorations. #8 and 9 had guarded to poor prognosis and restorability due to the large subgingival fractures. The family was aware these teeth will need close follow up, and possibly complete root canal therapy, full coverage crowns, or extraction in the future. The family understood the goal of treatment with partial pulpotomies is to preserve the teeth, keeping them alive, and maintain bone. The possibility of a gingivectomy using laser therapy to ensure proper restorability was also discussed.

## CLINICAL AND RADIOGRAPHIC PRESENTATION

Initial Presentation  
7/10/25



Dentin Bridging  
9/16/25



Initial PA  
7/10/25



Restored #9  
10/9/25



Partial Pulpotomy  
7/10/25



Restored #8, 9  
10/9/25



## TREATMENT SUMMARY

### 7/10/25 – Initial Presentation

- Local anesthetic administered via local infiltration, Cvek partial pulpotomies completed on #8 & 9 with Biodentine, flowable composite seal placed

### 9/16/25 – Restorative

- Pt reported #8, 9 as asymptomatic, no pain on percussion or palpation, dentin bridging and closure of the immature apices visualized radiographically, mild PDL widening #8, completed #9 – MIFL composite build up

### 10/9/25 – Restorative

- #8 has erupted more into the mouth and considered restorable, laser gingivectomy not needed, patient asymptomatic, completed #8 – MIDFL composite build up

## DISCUSSION AND CONCLUSION

This trauma case highlights the enormous healing ability of immature teeth compared to mature teeth. During the first patient encounter, the prognosis was not promising due to delayed treatment initiation, subgingival tooth fractures, and pulpal exposure. Following imaging and findings of complicated crown-root fractures of vital permanent teeth with immature apices, it is recommended for Cvek partial pulpotomies to be performed to preserve the pulp, ideally within nine days of the incident. Although rubber dam isolation is the gold standard, in fractures like this case, it may be challenging.

Once partial pulpotomy debridement is completed, the pulp wound should be covered with a medicament. Recommended medicaments include non-setting calcium hydroxide and non-staining calcium silicate cements. MTA and Biodentine, both non-staining calcium silicate cements, display high success rates. Apexogenesis is a histological occurrence of the continued physiologic root development of immature permanent teeth through vital pulp therapy. Successful apexogenesis will result in future closure of the immature apex, as well as dentin bridging. Dentin bridging is a reparative, hard tissue barrier formed by pulp cells in response to pulpal medicaments. Related to this case, root development and tooth eruption was encouraged, maintaining bone levels.

At first presentation, restoring #8 and 9 appeared challenging because of the significant subgingival fractures. Laser therapy to expose more tooth structure was proposed. Fortunately, the teeth naturally erupted throughout the treatment period, allowing for restorative conditions to be achieved. At recall appointments for the patient, #8 and 9 appear stabilized and continue to mature. Timely and proper management of trauma in the developing dentition is an important facet of pediatric dentistry. This case shows that trauma in immature permanent teeth may have better prognoses as compared to mature teeth.

## REFERENCES

- American Academy of Pediatric Dentistry. Policy on prevention of sports-related orofacial injuries. The Reference Manual of Pediatric Dentistry. Chicago, IL: American Academy of Pediatric Dentistry; 2025:130-5
- American Academy of Pediatric Dentistry. Pulp therapy for primary and immature permanent teeth. The Reference Manual of Pediatric Dentistry. Chicago, IL: American Academy of Pediatric Dentistry; 2025:487-96.
- 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>