

# Vital Pulpotomy with Fragment Reattachment After Trauma: A Case Report

Borhade G, Kardes E, Mohan M | Rutgers School of Dental Medicine, Newark, NJ



## Background

- Traumatic dental injuries (TDI) affect ~25% of children, with complicated crown fractures accounting for ~5% of all TDI in permanent dentitions
- Ellis Class III fractures expose the dental pulp, necessitating vital pulp therapy to preserve pulp tissue and prevent premature pulp necrosis.
- In immature permanent teeth, maintaining pulp vitality is essential for Apexogenesis — the continued physiologic root development that provides long-term structural integrity
- AAPD guidelines endorse vital pulp therapy (partial or full coronal pulpotomy) as the standard of care for traumatically exposed, vital immature permanent incisors

## Objectives

- To describe the clinical decision-making process and outcome of vital pulpotomy with fragment reattachment in an immature permanent incisor following traumatic crown fracture
- To highlight management when partial (Cvek) pulpotomy is contraindicated due to inability to achieve hemostasis

## Abstract

- A healthy 9-year-old female presented two days after sustaining an Ellis Class III fracture of a maxillary central incisor, with the fractured fragment stored in milk. Persistent pulpal bleeding precluded partial pulpotomy.
- A full coronal pulpotomy was performed under nitrous oxide sedation and local anesthesia, followed by placement of mineral trioxide aggregate and fragment reattachment using adhesive techniques.
- Follow-up evaluations showed the tooth remained asymptomatic with normal periapical tissues, continued root development, and progressive apical closure, consistent with successful apexogenesis.

## Case Presentation

### Patient:

- Healthy 9-year-old female; ASA Class I; no relevant medical history

### Trauma History:

- Presented 2 days post-trauma; fell at school striking maxillary central incisor on hard surface
- Fractured fragment retrieved and stored in milk — optimal interim storage medium

### Classification:

- Ellis Class III (complicated crown fracture) of maxillary right central incisor (#8)

### Clinical Findings:

- Vital pulp exposure with persistent hemorrhage on clinical probing
- Tooth tender to palpation; negative percussion sensitivity
- Positive response to cold pulp sensibility test

### Diagnosis:

- Normal apical tissues with irreversible pulpitis of coronal pulp; immature root with open apex

## Pre-operative pictures

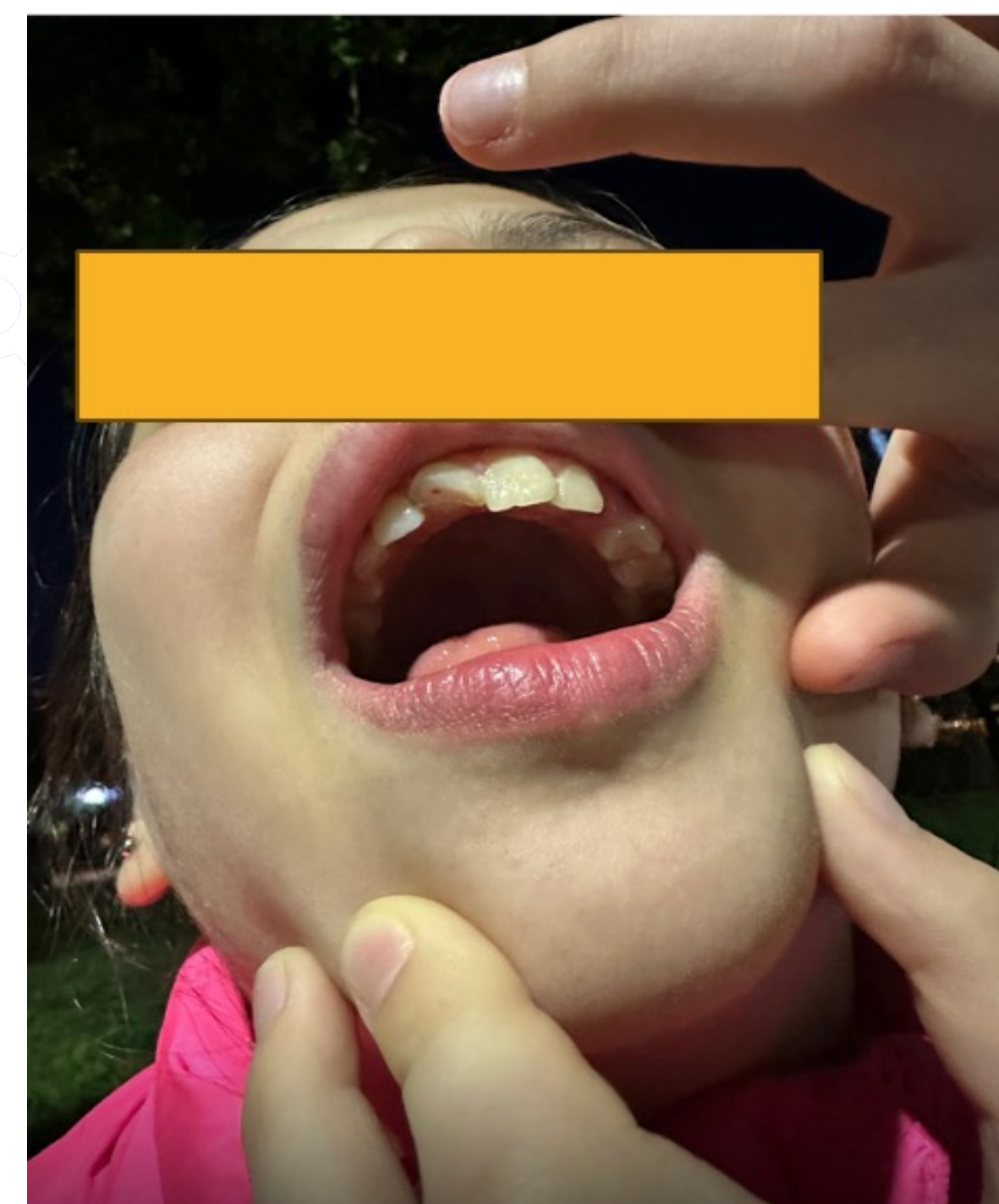


Fig 1. Preoperative photograph taken few hours after trauma.

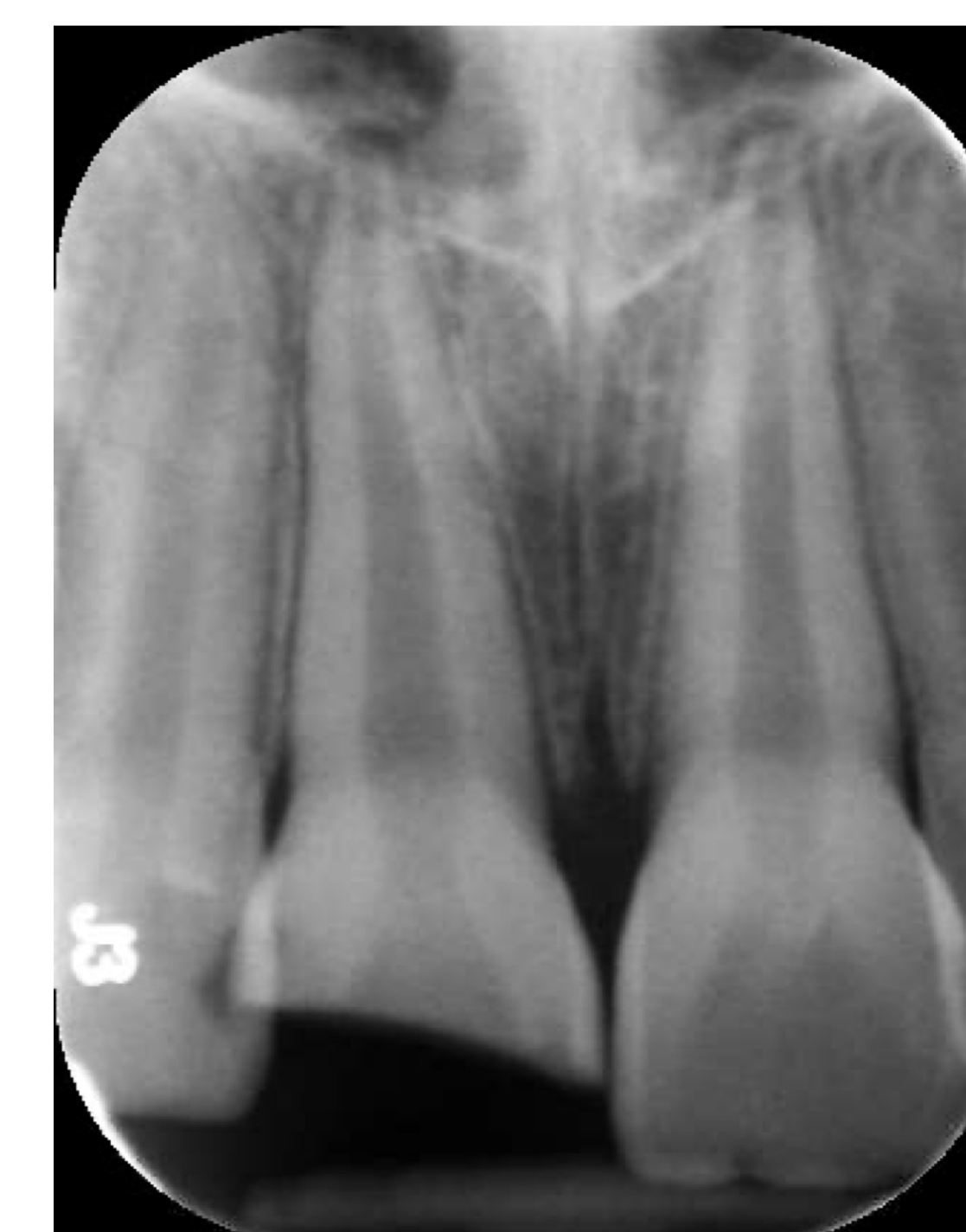


Fig 2: Periapical radiograph taken on emergency visit

## Treatment

**Pre-operative:** Diagnostic radiograph (periapical) confirmed open apex and normal periapical tissues

**Sedation & Anesthesia:** Nitrous oxide/oxygen inhalation sedation administered; local anesthesia achieved with 2% lidocaine 1:100,000 epinephrine

**Pulp Assessment:** Upon access, persistent hemorrhage from pulp exposure site — uncontrolled after 10-min application of sterile cotton pellet saturated with sodium hypochlorite

- Hemorrhage precluded partial (Cvek) pulpotomy; full coronal pulpotomy indicated per AAPD protocol

**Full Coronal Pulpotomy:** Entire coronal pulp removed to the level of the canal orifice using a sterile round bur at slow speed. Hemostasis achieved at radicular pulp with moist cotton pellet pressure

**MTA Placement:** Mineral trioxide aggregate (MTA) applied directly over radicular pulp stumps; verified by digital radiograph

**Restoration:** Calcium silicate liner placed over MTA; fractured fragment re-hydrated in saline and reattached using 4th-generation adhesive system + flowable composite resin



Fig 3: Periapical radiograph taken 1 week post op

## Results / follow-up



Fig 4: Periapical radiograph taken 5 months post op



Fig 5: Photograph taken 5 months post op

### 1-Week Follow-up:

- Tooth asymptomatic; no spontaneous pain or swelling
- Reattached fragment intact; satisfactory occlusal relationship
- No signs of periapical pathology on clinical examination

### 5-Month Follow-up:

- Tooth remained clinically and radiographically asymptomatic at all visits
- Periapical radiograph: continued root elongation and progressive apical closure — consistent with successful apexogenesis
- Normal periapical tissue architecture; no periapical radiolucency
- Fragment reattachment intact with no marginal discoloration or secondary fracture

### Overall Outcome:

- Pulp vitality preserved; root formation progressing physiologically
- No clinical or radiographic signs of pulp necrosis, internal resorption, or restorative failure

## Discussion

- Persistent hemorrhage after a 10-minute hemostatic attempt suggested inflammation beyond the superficial coronal pulp, exceeding the indication for Cvek (partial) pulpotomy.
- Cvek pulpotomy (removal of 2–3 mm of inflamed pulp) is recommended for recent pulp exposures with controlled bleeding. Full coronal pulpotomy extends to the canal orifice and is indicated when inflammation may extend deeper within the coronal pulp.
- Hemostasis is the primary intraoperative decision point; persistent bleeding indicates deeper pulpal inflammation requiring more extensive pulp removal. Mineral trioxide aggregate (MTA) provides excellent biocompatibility, sealing ability, and promotes hard-tissue bridge formation. Calcium silicate cements demonstrate high success rates for vital pulp therapy in immature permanent teeth.
- Fragment reattachment preserves natural tooth structure, color, and surface texture while providing immediate esthetic and functional restoration. Storage of the fragment in milk maintains hydration and facilitates successful bonding.

## References

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