Management of Traumatic Intrusion with Open Apex : A Multidisciplinary Approach

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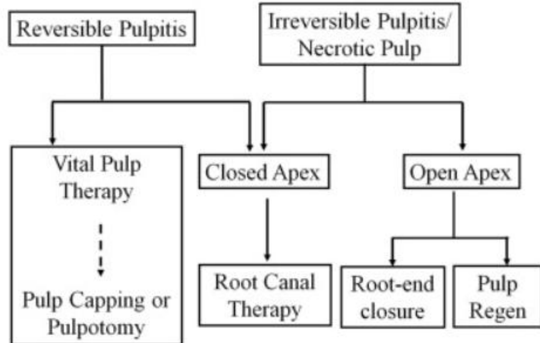
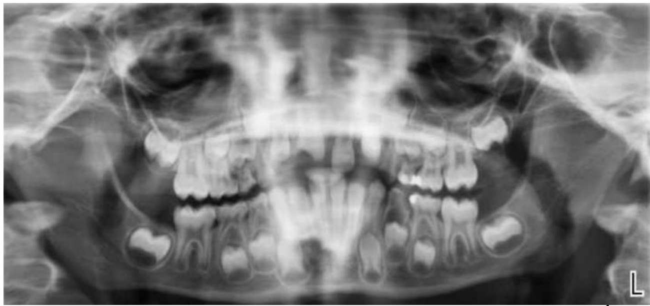
INTRODUCTION

Apexification remains a cornerstone intervention for inducing apical hard tissue barrier formation in immature permanent teeth with necrotic pulps, as evidenced by longitudinal studies reporting success rates exceeding 80-90% in periapical healing. Recent systematic reviews underscore its evolution from traditional calcium hydroxide protocols—plagued by prolonged treatment times and reinfection risks—to single-visit bioceramic approaches using MTA or Biodentine, which demonstrate superior sealing and biocompatibility in randomized controlled trials. AAPD-endorsed research highlights its critical role post-trauma or caries-induced necrosis, where revascularization fails, positioning apexification as a reliable, evidence-based strategy to retain compromised dentition in pediatric patients.

Case selection for treatment of permanent teeth with incomplete root development.
Shabahang, 2013





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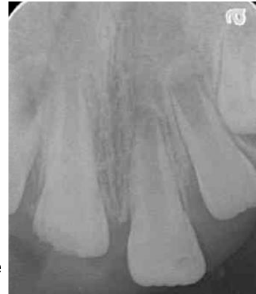

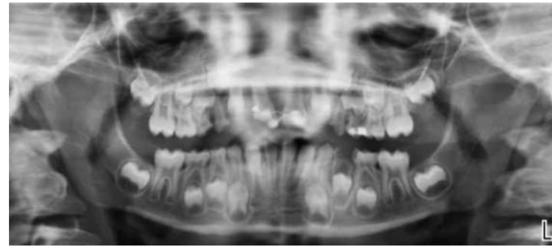

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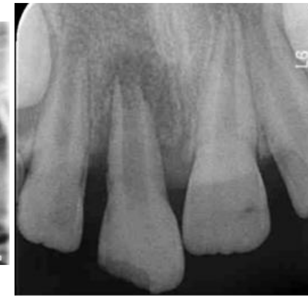

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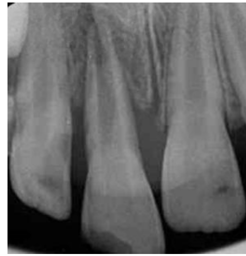

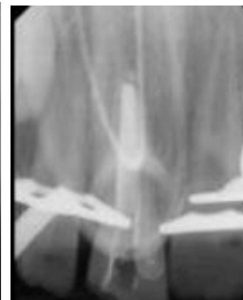

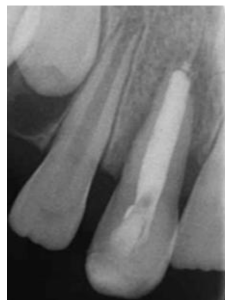

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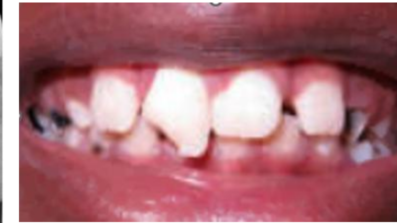
CASE REPORT

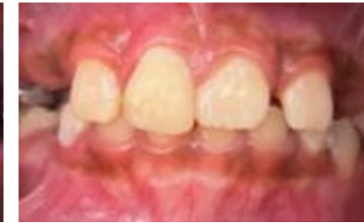
In October 2024, the patient sustained a sports-related facial injury after running into a pole, resulting in intrusion and chipping of tooth #8 with associated pain in the maxillary anterior region. He was evaluated by a pediatric dentist and subsequently by OMFS in the emergency department, where #8 was found to be severely intruded to the level of the gingival margin with an Ellis Class II fracture, no pulp exposure, no soft tissue trauma, and no mobility of #8 or #9. Because the tooth was immature with an open apex, spontaneous reeruption was initially recommended and surgical repositioning/splinting was deferred. Over the next two weeks, OMFS recommended extrusion of #8, and after discussion of anesthesia options and associated risks, surgical extrusion was completed under IV sedation three weeks after the trauma. The patient missed follow-up for one year. At the 1-year visit, tooth #8 was noted to be extruded approximately 5–6 mm, resulting in traumatic occlusion. Due to the patient's anxiety and the time-sensitive nature of the guarded prognosis, he was referred to the operating room under general anesthesia for a combined Pediatric/Endo case as soon as possible.

TREATMENT

Treatment was completed in the operating room under general anesthesia in a multidisciplinary setting with Endodontics Department and Pediatric Dentistry. After discussion with the Endodontics team, apexification with Biodentine was recommended with a guarded prognosis. Local anesthesia was administered with 0.75 carpule of 2% lidocaine with 1:100,000 epinephrine, and treatment was performed using a split-dam technique with Opal Dam and 00 retainers. Access was prepared, working length was determined radiographically because the apex locator was unreliable due to the open apex, and the canal was instrumented to a size 90, 0.02 K-file. The canal was irrigated copiously with NaOCl, EDTA, and final NaOCl, then an apical plug was placed with BC putty and BC sealer, with intermittent intraoperative radiographs used to confirm apical seal. The canal was filled and condensed with BC putty, BC liner was placed over the material, the chamber was rinsed. Restored by the peditric dentists. Care was then continued by pediatric residents.

Before & After





DISCUSSION

Apexification remains a reliable treatment option for immature permanent teeth with necrotic pulps and open apices when the goal is to create an apical barrier for obturation and periapical healing. Although revascularization is the preferred approach in immature teeth because it can support continued root development and thickening of canal walls, it is not always feasible, especially when patient cooperation or clinical circumstances limit treatment predictability. In this case, the patient could not tolerate multiple dental appointments, which made a single-visit approach more appropriate.

Biodentine has gained interest as an apical barrier material because of its favorable handling, rapid setting time, and bioactive properties compared with MTA. Its biologic value is supported by Laurent, Camps, and About, who demonstrated that Biodentine induces TGF-β1 release from human pulp cells and promotes early dental pulp mineralization. Han and Okiji further showed that Biodentine forms a calcium- and silicon-rich interfacial layer with dentin and supports biomineralization at the material–dentin interface. These properties may help reinforce thin dentinal walls in immature teeth while providing an effective seal.

Clinically, Biodentine has been reported as a successful alternative to MTA in apexification case reports and comparative studies, including the case report by Dahiya and Singhal, which described successful single-visit apexification with a Biodentine apical plug. In the present case, Biodentine was selected because of its shorter setting time, biocompatibility, and ability to support apical closure, and the three-month follow-up showed periapical healing and successful barrier formation. Although the evidence is promising, current literature is still limited to relatively small clinical studies and case reports, so further long-term research is needed to confirm its durability in immature necrotic teeth.

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