

Success of Vital Pulp Therapy in Immature Permanent First Molars

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Background

- Dental caries** is the most prevalent and preventable chronic disease among children and adults.¹
- Due to the **early presence of the first permanent molars (FPM)**, they are more susceptible to developing caries during the early eruption phases, which can quickly progress into deep carious lesions.¹
- Vital pulp therapies**, including **pulpotomy**, offer the potential adequate management of deep caries for further root maturation, resolution of symptoms, and restoration of form and function (**Image 1**).¹⁻⁹
- Research is needed to inform about outcomes and factors associated with success of FPM pulpotomy.

Objectives/Hypothesis

Objectives: To assess the success rate of vital pulpotomy treatment in FPM and to identify the factors associated with treatment outcomes.

Hypothesis:

- Immature FPM have a higher success rate with vital pulp therapy compared to mature teeth.
- Delivering the definitive restoration within 6 months of pulp therapy improves the success rate of treatment for FPM.

Materials & Methods

- Study Type:** Retrospective Chart Review [Jan 1, 2016 – Mar 1, 2023] using EHR system axiUm®
- Inclusion:** Patients aged 5-16 years; vital pulpotomy treatment on ≥ 1 FPM at the UIC COD
- Data collected on **patient demographics, status of tooth treated, treatment received, and follow up**
- 25-item questionnaire; analyzed via R® Version 4.3.2

Results

- A total of 254 patients met the inclusion criteria. The mean age was 8.6 years (SD = 1.7), with 58% White-Hispanic, 20% Black, and 7% Asian
- 156/254 returned for F/U visits. Out of those 156, successful treatment was observed in 104 FPM and failure in 52 teeth.
- Root development was assessed using the Cvek classification: 44% having complete root development, 53% having incomplete, and 3% were unable to assess radiographically (**Figure 2**).
- Pulp therapy types included Cvek (1%), partial pulpotomy (16%), and full pulpotomy (83%), (**Figure 1**).
- Most treated teeth (77%) were restored with glass ionomer (GI) on the day of treatment.
- Approximately 54% of the treated molars received a definitive restoration, with 23.9% of them done on the day of treatment.
- Two-thirds of the patients were cooperative and treated under nitrous oxide.
- A **strong** association was observed with success in teeth treated that received a final restoration ($p < 0.001$).
- A **moderate** marginal association was observed in treatment success based on the restorative material used on the day of the pulpotomy treatment for those who received stainless steel crowns (SSC) and composite restorations ($p = 0.057$), (**Table 1**).
- No correlation was detected between the success rate of pulp therapy and root development ($p = 1.00$).

Image 1 – Steps of Pulpotomy Treatment

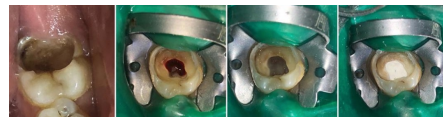


Image from: Eid et al., 2022¹⁰

IRB and/or ACC Protocol #: STUDY2023-0452

Figure 1 – Pulpotomy Treatment (n=156)

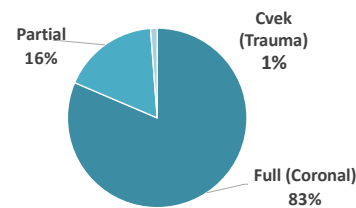


Figure 2— Root Development Status (n=156)

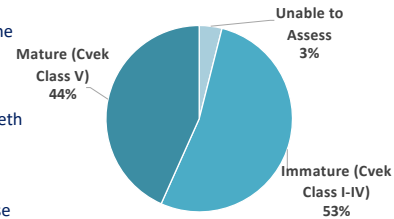


Table 1 – Pulpotomy Success Based on Restoration

Restoration	Failure (n=52)	Success (n=104)
Glass Ionomer	37.5%	62.5%
Composite	13.3%	86.7%
Stainless Steel Crown	9.1%	90.9%

Conclusions

- The results suggest that the success of FPM pulpotomy treatment is **independent of stage of root development**.
- FPM treated with pulpotomy are **more successful long-term when restored** with SSC or composite restoration on the same day of treatment.
- For clinical consideration, restoring pulpotomy-treated teeth with a **definitive restoration at the same visit** may be beneficial.
- Further studies are needed to examine long-term success factors.

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