Practices and Perceptions of Vital Pulp Therapy in Immature Permanent Teeth

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Introduction

Pulp therapy serves as a cornerstone of treatment in the field of pediatric dentistry, most notably in managing traumatic or carious injuries to immature permanent teeth. The ultimate goal of vital pulp therapy (VPT) in this dentition subset is to preserve the health and function of the pulp tissue in teeth that have yet to complete root development and reach full dental maturity. Over the past several years, there has been mounting interest in investigating the efficacy of vital pulp therapy for immature permanent teeth, as well as studying the techniques and materials used.

When pulp vitality is lost, root formation may be interrupted, leading to incomplete development, thin dentinal walls, and increased risk of fracture. As such, treatment strategies geared toward preserving pulp vitality, such as indirect pulp treatment, direct pulp cap, Cvek pulpotomies, partial pulpotomies, and full pulpotomies without further endodontic treatment have gained traction. If proven successful, these treatments can facilitate complete root development with the goal of preventing further endodontic treatment or extraction. This, in turn, leads to the maintenance of this tooth in the child's dentition for longer periods of time.

Despite the growing body of evidence on vital pulp therapy, clinical success has been varied across platforms, with factors such as the nature and severity of the injury or caries lesion, the materials used, the techniques employed, and patient age and compliance playing significant roles. Although there are references in place to guide pediatric dentists through clinical recommendations for performing vital pulp therapy in immature permanent teeth, the AAPD encourages further research for more predictability in techniques implementing biologically-compatible materials and consistency in treatment outcomes.

Objectives

The goals of this research were three-fold: to understand the techniques and materials most commonly utilized by pediatric dentists performing VPT, to evaluate practitioner comfort levels in rendering VPT on immature permanent teeth, and to identify the main challenges confronting providers looking to perform this treatment.

Study Design & Methods

This research was comprised of a cross-sectional study design. A 16-question survey was sent out via email to active members of the American Academy of Pediatric Dentistry (AAPD), and answers were collected via the Survey Monkey electronic platform. The following demographic data was gathered: age, gender, years since completion of residency training, AAPD regional district, and clinical practice setting. Survey questions ranged from materials and techniques utilized for VPT, reasons for referral, barriers to providing care, provider comfort levels, formal training for VPT, and belief in treatment viability.

Results

A total of 346 U.S. and Canadian pediatric dentists and residents completed this survey. Respondents hailed from all AAPD regional districts. The largest clinical practice setting from the surveyed population was private practice (64%), followed by academia (29%), corporate/DSO (10%), community/FQHC (7%) and 2% non-traditional settings including ambulatory surgery centers, reservation health services, and the military.

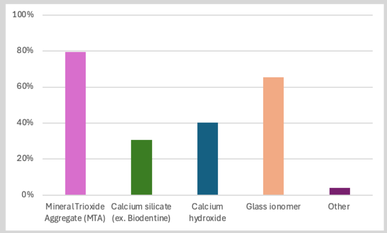

Figure 1: Materials utilized by pediatric dentists performing VPT

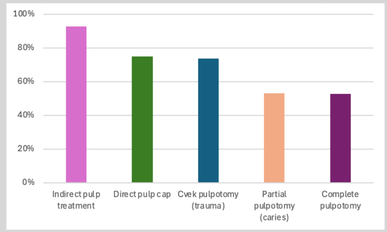

Figure 2: Techniques utilized by pediatric dentists performing VPT

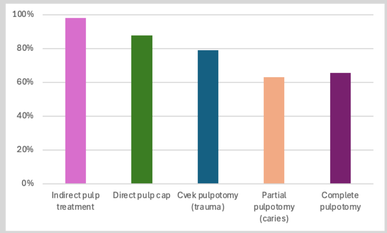

Figure 3: Provider comfort levels in performing VPT

This data demonstrates that indirect pulp treatment is the most popular option for VPT, especially considering how it is the least invasive in nature and likely the most familiar across training levels. The drop in usage for partial and complete pulpotomies may be due to the high success of IPT or reflect hesitancy with more involved procedures and uncertainty with diagnosis/protocols.

Results

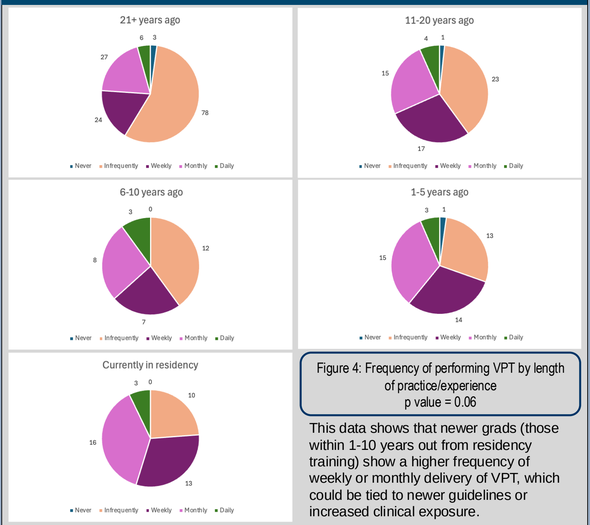

Figure 4: Frequency of performing VPT by length of practice/experience
p value = 0.06

This data shows that newer grads (those within 1-10 years out from residency training) show a higher frequency of weekly or monthly delivery of VPT, which could be tied to newer guidelines or increased clinical exposure.

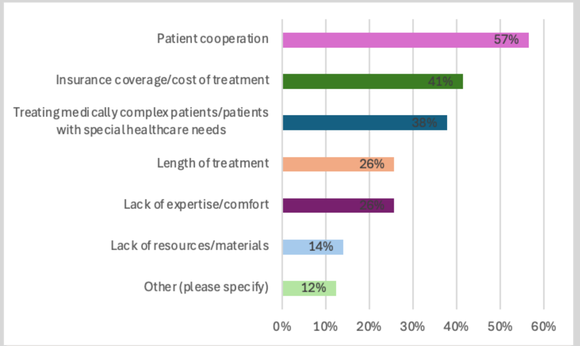

Figure 5: Barriers in performing or offering to perform VPT for immature permanent teeth

Responses in the "other" category included: predictability of long-term prognosis, lack of parental understanding in recommendation for VPT, need for arrangement of sedation, lack of schedule flexibility, and greater belief in complete endodontic treatment. Conversely, many respondents stated they faced no barriers, with one respondent stating that he/she has been rendering treatment for over 20 years with significant success.

Discussion

The Pearson Chi-Squared test via Monte Carlo simulation with resampling was utilized to ascertain any association between participant characteristics and the practices and perceptions of VPT in clinical settings. In all analyzed values, statistical significance is claimed at a computed p-value ≤ 0.05.

The collected data showcases that VPT is performed infrequently by participants (43%, 95% CI: 38%, 49%), despite the majority believing it to be an effective long-term solution (91%, 95% CI: 87%, 94%). This demonstrates that there may be knowledge or confidence gaps, most notably with more invasive vital pulp therapy treatment modalities, despite support from clinical practice guidelines. This could indicate an opportunity for further training with case selection tips and outcome expectations. Of note, the gap between MTA and calcium silicate usage may reflect training emphasis, market penetration, and material cost. Clinicians continuing to rely on calcium hydroxide may benefit from updated training demonstrating how newer materials yield better clinical outcomes.

A majority of participants were interested in further training regarding VPT. The last included survey question was an open-ended response inquiring about additional resources or support that would help improve the practice of VPT for immature permanent teeth. Participants included the following ideas: clinical demonstrations and videos, interactive courses, updates on techniques and success rates, examples of good case selection, and proper reimbursement. In future years, the development of more robust clinical training programs as well as incorporation of further CE courses and study materials could aid in more widespread use and confidence in these techniques.

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