

Treatment of Young Permanent Teeth Pulpitis with Formocresol Pulpotomy

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Abstract

Background: Pulpitis arising from large caries in young permanent teeth present special treatment challenges. Conventional endodontic treatment is not possible due to immaturity of the root apices. Studies presenting inexpensive, reliable, interim and long-term treatment options are lacking.

Objective: These case reports present long-term outcomes of permanent teeth young children (6-12 years old) presenting with large carious lesions and treated with formocresol pulpotomies (FCP) and stainless steel crowns (SSC) or amalgam (Am) restorations.

Methods: Symptomatic first permanent molars with pulpitis and/or carious exposures were treated with full-strength formocresol and received pre-crimped, permanent molar stainless steel crowns cemented with a glass ionomer cement as final restorations. Clinical exams were performed every 6 months and radiographic exams were performed every 6-12 months.

Results: The median follow up period was 5 years with a range of 3-7 years. All teeth treated with FCP and SSC/Am remained clinically and radiographically asymptomatic. Pretreatment periapical radiolucencies when present resolved completely. Root development in all cases proceeded normally to completion.

Conclusions: Formocresol pulpotomy with SSC is a viable, inexpensive, interim and possibly long-term treatment option for immature permanent teeth in children, with large carious lesions and pulpitis.

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Keywords: Formocresol, pulpotomy, permanent teeth, endodontics, pulp biology.

Introduction

Primary teeth are important for eating, phonetics, aesthetics and saving space for permanent teeth. Problems in the primary dentition period have negative effects on children and parents.(1) Newly erupted first permanent molars are the teeth most likely to become carious. Children with large carious lesions approaching the pulp often present with pulpitis. Such teeth would normally be managed with complete pulpectomy and conventional root canal treatment. Conventional endodontic treatment is not possible due to immaturity of the root apices. Studies presenting inexpensive, reliable, interim and long-term treatment options are lacking. (2,3)

Thus, the purpose of this case series was to assess the long-term outcomes of permanent teeth in series of 6 young children (6-12 years old) presenting with large carious lesions and treated with pulpotomies (FCP) and stainless steel crowns (SSC) or amalgam (Am) restorations.

Case Reports

Symptomatic first permanent molars with pulpitis and/or carious exposures were treated with coronal pulpotomy up to the level of the root canal orifices under local anaesthesia and rubber dam isolation. The pulp chambers were irrigated with water but no other instrumentation was performed. Hemostasis was achieved by packing a pledget containing full strength formocresol for 4-5 minutes over amputated pulp stumps at the level of root canal orifices. After, the pulp chambers were filled with a mix of zinc oxide-eugenol- containing a trace of formocresol. All teeth were restored with pre-crimped, permanent molar stainless steel crowns cemented with a glass ionomer cement or amalgam restorations if only the occlusal surface was affected. Clinical exams were performed every 6 months and radiographic exams were performed every 6-12 months, depending upon

the initial presentation and post-treatment signs and symptoms.

The first case is that of a 8 yr 8 month old boy who was referred for treatment of multiple primary and permanent carious teeth and who had extreme anxiety about dental treatment. On initial presentation, the child was experiencing acute, continuous pain from deep caries in the mandibular first permanent molars (Fig. 1). Both molars were treated with formocresol pulpotomy and final restorations of pre-crimped stainless steel crowns (Fig. 1). At the last visit follow up 5 years and 7 months after initial treatment, the molars were clinically asymptomatic, the stainless steel crown restorations and were intact with healthy gingival margins. The rarifying osteitis observed at initial presentation had completely resolved, and the root apices had completely closed (Fig. 1).



Fig. 1: Case #1: Top radiographs: Pre-treatment radiographs of the carious mandibular first permanent molars with periapical and periapical radiolucencies. Bottom radiographs: Seven year follow up of both molars treated with formocresol pulpotomy and stainless steel crowns. Note the complete resolution of the radiolucencies, return of the lamina dura and complete root end closures.



Fig. 2: Case #2: Top radiograph: Pre-treatment radiograph of the carious, molar-incisor-hypoplasia affected, mandibular right first permanent molar with periapical and inter-radiolar radiolucency. Bottom radiograph: Three year follow up of the molar treated with formocresol pulpotomy and stainless steel crown. Note the complete resolution of the radiolucencies, return of the lamina dura and complete root end closure.

Discussion

The formocresol pulpotomy procedures used in this case series resulted in immediate relief of symptoms in all children. Moreover, none of the children were prescribed or required antibiotics. The radiographic signs of rarifying osteitis associated with the involved teeth were observed to resolve over 4-8 weeks, with closures of open apices following their natural timetable. Given the emergency nature of the initial treatment, the final restorations were carried out on second appointments. This allowed clinical and radiographic monitoring of the FC pulpotomy treatment and elicited better cooperation from the child having had relief from pain.

Success of the FC pulpotomy can be jeopardized with a poor final restoration. It is our view that a well-adapted stainless steel crown or well-placed occlusal

amalgam restoration have the highest likelihood of success as opposed to composite resin restorations.

Formocresol is one of the most widely accepted treatment of choice among North American pediatric dentists. (4-6) Despite well-documented high rates of success, formocresol use is still questioned on the grounds of potential tissue toxicity, mutagenicity, and carcinogenicity based on studies carried out in vitro. (4-6) However, these experiments were done at concentrations, volumes and routes of administration different from those employed clinically. It is therefore difficult to extrapolate to the human species. (5) In current literature, there is no documented human scientific evidence of any permanent long-term toxic or carcinogenic effect of formocresol pulpotomies in more than hundred years of its clinical use. (7)

Young permanent teeth are difficult to treat with traditional endodontic treatment due to the presentation of open divergent apex. Without a closed root, permanent retention is limited. (8) As such pulpotomy is often undertaken to promote apexogenesis to encourage the development of root and formation of a closed-end apex. (8) Immature permanent teeth respond favorably to vital pulp therapy and its success may be contributed to the rich vascular supply. (8)

As compared to conventional root canal therapy and FC pulpotomy followed by a class I restoration or a SSC offers a much more cost-effective option for lower socio-economic background patient populations where caries rates are high.

Past literature studies have documented 92% success rate of formocresol pulpotomy in permanent dentition after 10 years and evidence of continued apical development in immature permanent molars following treatment. (8)

Why this paper is important for paediatric dentists

- The case series documents the long term success of formocresol pulpotomy treatment in young permanent teeth.
- The series demonstrates the tissue compatibility of formocresol allowing developing teeth to complete root formation, preserving pulp vitality.
- The paper presents a low cost alternative to conventional endodontic and prosthodontic treatment for pulp involved carious permanent teeth in children.

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