

Success rate of pulpotomies using Mineral Trioxide Aggregate (MTA) versus Zinc-oxide Eugenol (ZOE)



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INTRODUCTION

Dental caries is an important and challenging disease that affects the lives of children and adolescents significantly across the world. Multiple factors are responsible for the etiology of caries – elevated levels of cariogenic bacteria such as *S. Mutans*, metabolism of sugars by these cariogenic bacteria leading to tooth demineralization or a condition like enamel hypoplasia. In addition, socioeconomic and educational parameters also influence a family's view toward oral health. If left untreated, caries can potentially produce a life-threatening situation.

Pulp interventions are indicated for extensive tooth decay. Depending on the severity of the disease, three pulp treatment techniques are available: direct pulp capping, pulpotomy and pulpectomy. After treatment, the cavity is filled with a medicament. Materials commonly used include mineral trioxide aggregate (MTA), calcium hydroxide or zinc oxide Eugenol. There have been studies where they studied the different medicaments like formocresol, calcium hydroxide and ferric sulphate.

PURPOSE

The purpose of this investigation is to study the success of the pulpotomies in primary teeth using MTA and Zinc Oxide Eugenol at recall appointments at 6 months, 12 months, 18 months and 24 months- years 2011-2021 and determine which medicament has a better success rate.

METHOD

This is a retrospective study where data collection was completed at Chesapeake Health Care Dental by dental resident Principal Investigator (PI). Electronic health records of patients aged 4-8 years of age that had pulpotomies done with MTA and Zinc oxide Eugenol with SSC as their final restoration between January 1, 2011, and May 31, 2021, were accessed.

Population: Children ages 4-8 years of age with extensive caries involving vital dental pulp in primary teeth.

Intervention: Pulpotomy performed using different materials (MTA and zinc oxide Eugenol)

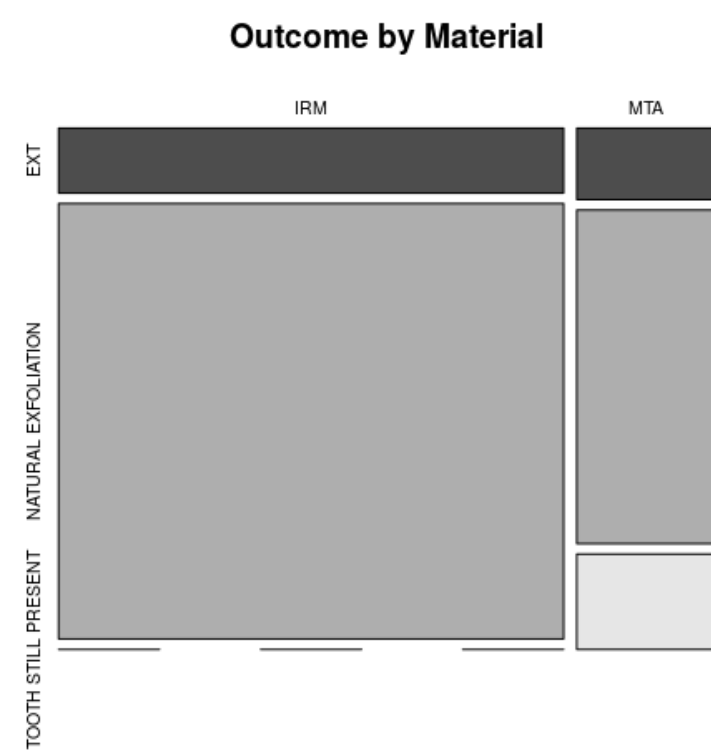
Comparison: Between different materials applied in the same clinical conditions.

Outcome: Success of the therapy at 6 months, 12 months, 18 months and 24 months of follow-up.

RESULTS

Chi square and Fisher's test were used and there is an association between the outcome and the material used.

The p-value of 0.0024 is smaller than our alpha of 0.5



DISCUSSION

This study intended to examine the clinical and radiographic success rates of pulpotomies with MTA, a material with evidence-based success in many endodontic procedures and ZOE. MTA prevents microleakage, is biocompatible, and promotes regeneration of the original tissues when it is placed in contact with the dental pulp or peri radicular tissues. The high success rate of pulpotomy with MTA (97%) is impressive, especially considering the long-term follow-up period.

Pulpotomy failures in primary teeth with caries exposure can be attributed to misdiagnosis of inflammation in the radicular pulp prior to treatment and/or pulp contamination due to microleakage of large multi-surface amalgam rather than stainless steel crowns.

ZOE can cause pulp inflammation, with a risk for subsequent internal resorption. Smith et al claimed that internal resorption is associated with eugenol. When used together with zinc oxide (as in a sub-base following pulpotomy), eugenol comes into direct contact with the vital tissue and causes a moderate to severe inflammatory response, resulting in chronic inflammation and necrosis.

CONCLUSIONS

MTA showed a higher long-term clinical and radiographic success rate than ZOE.

There is an association between the material used and outcome. A post hoc look at the chi square test residuals leads us to believe that the driver of this association is MTA's relationship with the tooth still present. This could be investigated in the future studies.

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