Retrospective Examination of Clinical Outcomes in Primary Pulp Therapy

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Introduction

A pulpotomy is carried out in a primary tooth when decay removal leads to the pulp being exposed in a tooth with a healthy pulp or reversible pulpitis, or following a traumatic pulp exposure, provided there are no signs of infection or abnormal resorption on the radiograph.

For *vital* primary teeth with deep caries lesions that result in pulp exposure during carious dentin removal, **Ferric sulfate** (**FS**), has been one of the most popular pulpotomy medicament (and *secondary* hemostatic agent) used for several decades, with its hemostatic action via agglutination of surface proteins. With conditional recommendations from the AAPD, there is room for alternatives.

One option can be found amongst imidazoline derivatives such as nasal spray containing 0.05% oxymetazoline (**NS-OXY**), an alpha-adrenergic agonist. NS-OXY is safe as an over-the-counter nasal agent to treat nasal congestion and is also commonly used in medical surgical and anesthesia procedures as an effective topical hemostatic agent. Differences in FS and NS-OXY can be noted in their mechanism of action of hemostasis as well as their pH (2.55 for ViscoStat™ and 5.81 for NS-OXY). Commercially available oxymetazoline also has antimicrobial activity through its antimicrobial preservatives, benzalkonium chloride.

Purpose

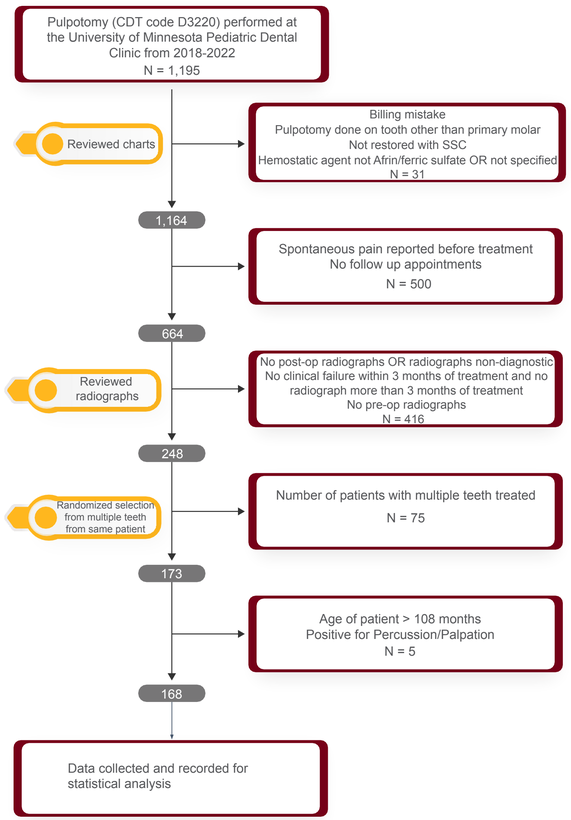
The purpose of this retrospective study was to investigate the clinical outcome of primary pulp therapy using FS or NS-OXY as the hemostatic agent.

Method

After IRB review, pulpotomy treatment (CDT code D3220) performed at the UM Pediatric Dental Clinic from 2018-2022 were reviewed.

Clinical data were recorded by reviewing the clinical notes. Clinical survival was recorded as success if the treated tooth was free of clinical symptoms (no pathological mobility, no pain, no sign of infection), failure if the treated tooth is symptomatic on the recall date, and acute failure if the treated tooth became symptomatic and was treated on an emergency visit.

A total of 168 cases were included for data analysis and used clinical failure as the primary outcome. The Restricted Mean Survival Time (RMST) to 30 months was utilized to compare survival curves between FS and NS-OXY medications.



Results

There was no statistical significant difference in the age between the hemostatic agents(W = 0.281, P=.597, F = 1.546, P=.215).

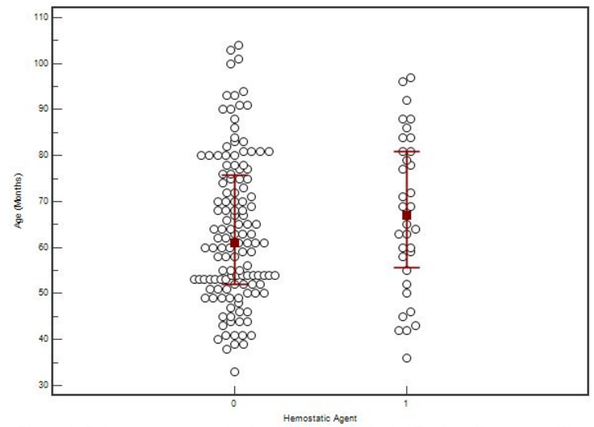


Figure 1. Column scatter graph of age distribution in the Ferric sulfate group (0) and the NS-OXY group (1).

No covariates were retained in the Cox proportional model.

The restricted mean survival time (RMST) was as it does not rely on proportional events between groups.

The RMST up to 30 months was 28.29 months for cases treated with FS (SE: 0.47, 95% CI: [27.37-29.21]) and 27.48 months (SE: 1.24, 95% CI: [25.02-29.87]) for cases treated with NS-OXY P=.52).

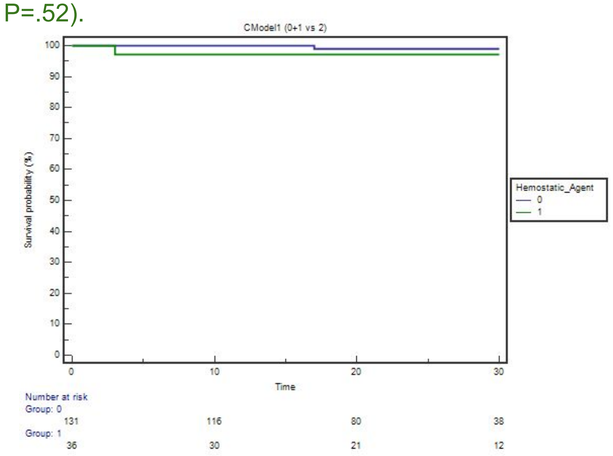


Figure 2. Survival curve of Ferric sulfate was blue (0), of NS-OXY was green (1).

Discussion

The mean survival time for the FS group was 47.49 months (SE: 1.47, 95% CI: [44.60-50.37]) and 42.88 months (SE: 2.93, 95% CI: [37.14-48.62]) for the NS-OXY group. However, when the analysis is restricted to 30 months, the difference between the two groups was 0.84 months.

The RMST was used instead of Cox proportional model as no covariates (age, behavior, gender, hemostatic agent (FS vs NS-OXY), location (clinic vs OR), capping material (IRM vs MTA), tooth) were retained. However, it may be valuable to note only 11 cases used MTA as the capping material exclusively with NS-OXY and that this could be a potential confounder despite the findings from the Cox proportional model.

Conclusion

This showed similar and high RMST between FS and NS-OXY that were used as secondary hemostatic agents in primary pulpotomies. More work is needed in the future to assess the efficacy and safety profile of NS-OXY.

References

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