

Summary of: Success rate of calcium hydroxide pulpotomy in primary molars restored with amalgam and stainless steel crowns

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FULL PAPER DETAILS

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Objectives To compare the success rate of calcium hydroxide (Ca(OH)₂) pulpotomies in primary molars restored with a stainless steel crown (SSC) to that of teeth restored with amalgam and to evaluate the role of restoration failure in treatment outcome. **Study design** Pulpotomies were performed in 154 primary molars. Teeth were grouped according to pulpal exposure type as either mechanically or cariously exposed, with cariously exposed teeth further divided according to size of exposure site (pinpoint or larger than pinpoint). Seventy teeth were restored with amalgam and 84 with a SSC. Teeth were followed up for 12 months. **Results** Pulpotomy success rates were 79.9% for teeth restored with a SSC and 60% for those restored with amalgam. The difference between these rates was statistically significant ($p < 0.01$). Restoration failure rates were 14.3% for amalgams and 2.4% for SSCs. The difference between these rates was also statistically significant ($p < 0.01$). Among the 12 failed restorations, treatment was found to be successful in five cases (41.7%) and unsuccessful in seven cases (58.3%). This difference was not statistically significant ($p > 0.05$). **Conclusions** The pulpotomy success rate for teeth restored with a SSC was higher than for those restored with amalgam. Restoration failure did not appear to have an effect on treatment prognosis.

EDITOR'S SUMMARY

A pleasing aspect of this journal's move to providing an increased presence on the internet is its far greater exposure internationally. This has led not only to an impressive rise in numbers of visits and visitors to the website but also greater interest from readers, authors and researchers from around the world. I do not know specifically if this paper, from Turkey, is a result of that process but it certainly does provide some useful observations about practice outside the UK while simultaneously supporting recent research and experience from within the UK, some of which we have published.

As I have written here previously, the questions which surround the restoration of primary teeth, mainly molars, have divided opinion for many years. The great debate on conserving or not continues, with devotees on each side. The use of the preformed (stainless steel) crown has been largely overlooked in the

UK until recently, being confined largely to dental schools, as these authors also note to be the case in Turkey. However, the emergence of the successful Hall technique has begun to change that perception and in its way, this paper adds support to the importance of the inherent anti-microbial sealing effect of that technique.

The healing and reparative differentiation between the relatively clean exposure caused by mechanical means and that created by caries is of particular interest and the authors' future work looks towards investigating this further, which could be of particular predictive value for pulp therapy in this type of tooth.

As so often though, the type of treatment provided depends not only on clinical judgement alone but is also constrained within the resources available of both time and materials. If the systems under which paediatric dental services are provided exclude preformed crowns

then perhaps composite restorations are the next best choice; in turn amalgam may be the least favourable option. What happens if, or when, the use of amalgam is restricted or banned within Europe we will have to wait and see.

By coincidence, the cover image of this issue also highlights stainless steel crowns from a previous BDJ issue.¹

The full paper can be accessed from the BDJ website (www.bdj.co.uk), under 'Research' in the table of contents for Volume 208 issue 9.

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IN BRIEF

- Success rates were found to be higher in teeth restored with stainless steel crowns than in teeth restored with amalgam.
- Amalgam is a suitable alternative to a stainless steel crown only for teeth with mechanically exposed pulp.
- Pulpotomy success rates are higher in teeth with pinpoint carious exposure.
- Under the conditions of this study, restoration failure did not appear to affect treatment prognosis.

COMMENT

This pseudo-randomised study sought to determine the success rate of a vital pulpotomy technique using calcium hydroxide (Ca(OH)₂) in 154 primary molars in relation to a number of clinical variables, including the final restorative option (amalgam or a stainless steel crown).

Over the last decade there has been a large shift in paediatric dentistry practice away from use of non-biologically compatible endodontic materials towards those which facilitate or indeed stimulate pulp regeneration and healing. The use of ferric sulphate and mineral trioxide aggregate are currently the most popular choices amongst UK paediatric dentists, while Ca(OH)₂ is commonly used in Scandinavia, despite its lower success rates. The potential for the primary tooth pulp to recover from injury, given appropriate conditions, is being increasingly recognised. It would appear that the most important requirement for pulp healing is the removal of ongoing bacterial infection, which may stem from marginal leakage around intra-coronal restorations. The British Society of Paediatric Dentistry clinical guidelines thus currently recommend preformed metal crowns (previously known as stainless steel crowns) as the restoration of choice following vital pulpotomy therapy in primary molars.^{1,2} It was therefore reassuring to note that the present study reported a significantly higher success rate for pulpotomised teeth where a stainless steel crown had been placed compared to an amalgam restoration. The clear clinical

message here is that a hermetic seal is paramount to a successful outcome following primary molar pulp therapy.

In terms of restoration longevity, this study also reported that amalgams were almost six times more likely to fail than a crown. The main problems encountered were amalgam fracture or secondary caries. The use of amalgam as a restoration for the carious primary dentition would appear to have little to offer and may be increasingly discounted in favour of preformed metal crowns or adhesive materials. We would certainly concur with the authors' conclusion that a preformed metal crown offers the optimum restoration in primary molars following pulpal injury or inflammation. And with the development of the non-preparation 'Hall technique' for crown placement, it really couldn't be easier!^{3,4}

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AUTHOR QUESTIONS AND ANSWERS**1. Why did you undertake this research?**

Stainless steel crowns have been recommended as the restoration of choice for the long-term success of pulp therapy. However, SSCs are not commonly used in Turkey due to financial constraints. Rather, most practitioners use amalgam to restore endodontically treated teeth, with the use of SSCs limited to university dental clinics. Although the final restoration of pulpotomised teeth is considered to be a contributing factor in pulpotomy failure, the literature contains only a few studies investigating the effects of restoration type on pulpotomy success rates. Therefore, we designed this study to compare the success rates of calcium hydroxide pulpotomies in primary molars restored with SSCs to those restored with amalgam in order to observe the prognosis of pulpotomised teeth with amalgam restorations.

2. What would you like to do next in this area to follow on from this work?

A follow-on study has been planned to observe the rate at which the formation of a dentinal bridge occurs in calcium hydroxide pulpotomies of primary molars with mechanically and cariously exposed pulp restored with amalgam and SSCs, and to discuss whether a dentinal bridge is a necessity for healing. We have also begun a series of studies designed to observe the immune response of primary pulp tissue at different stages of pulpal pathology, some of which have recently been completed.