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The Hall Technique for Managing Carious Primary Molars

Abstract: The Hall Technique, a method of managing carious primary molars effectively with preformed metal crowns, without the use of local anaesthesia, caries removal or tooth preparation of any kind, is described. The technique is illustrated with a case report. The evidence underpinning the technique is discussed, along with indications and contra-indications for its use, and details of where clinicians can obtain further information on the technique if they are considering using it.

Clinical Relevance: Research evidence has indicated that the Hall Technique is effective in managing dental caries in primary molar teeth when used by General Dental Practitioners, and is preferred by them, their child patients and the children's parents to conventional restorative methods for these teeth.

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Dental caries in children continues to be a significant health problem in the UK.[1] A restorative option for managing caries in the primary dentition, which has been in use since the late 1940s,[2,3] is the preformed metal crown (PMC). The PMC has been recommended by specialists as the restoration of choice for managing primary molars with caries affecting two or more surfaces,[4] yet they do not form part of routine treatment provision in the UK,[5-8] making up only 0.4% of all restorations provided for children in Scotland in 2001/2.[9] However, during an audit of child dental care in the North Eastern Region of Scotland, led by the Children's Department at Dundee Dental Hospital and School, it was noted that, while 74 of the 75 general dental practitioners (GDPs) involved in the audit were not using PMCs, one GDP (Dr Norna Hall) was using them, and this appeared to be routinely. Dr Hall had originally practised in a part of Scotland with relatively low levels of dental caries, and where parents had high expectations of dental care for their children. Here, her management of carious primary molars had regularly included using PMCs, fitted conventionally following complete caries removal with local anaesthetic (LA). Moving to a region in the Scottish Highlands with much higher levels of dental caries in the population, and where dental expectations for children were still relatively low, Dr Hall found herself having gradually to adapt her technique to suit the demand for treatment

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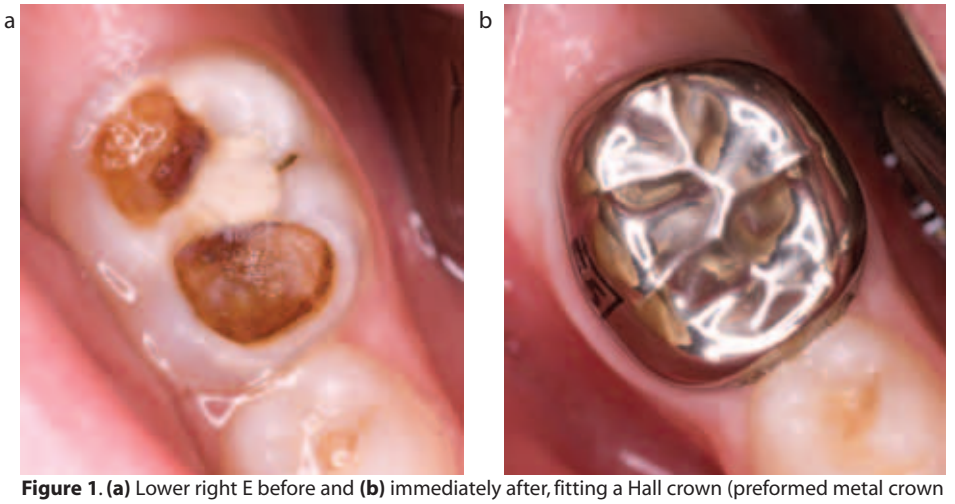

Figure 1. **(a)** Lower right E before and **(b)** immediately after, fitting a Hall crown (preformed metal crown cemented without local anaesthesia, caries removal or tooth preparation (Hall Technique)).

Figure 2. (a) Lower left D, with **(b)** bitewing radiograph showing distal caries.

that was quick, and did not involve LA. Dr Hall began by simplifying her crown preparation technique, and eventually found that fitting PMCs without any caries removal, tooth preparation or LA (Figure 1) gave outcomes similar to those achieved fitting them conventionally. In addition, her patients found the technique comfortable and acceptable.

This method of fitting PMCs (the Hall Technique, with PMCs which have been fitted this way being referred to as Hall crowns) is novel in two ways:

- It involves no LA, no caries removal and no preparation of the tooth of any kind, as the PMC is simply filled with cement and pushed on to the tooth; and
- Decayed tooth tissue is not removed, but sealed into the tooth by the PMC, thus isolating it from the rest of the oral environment.

Following discussion with Dr Hall and a review of her own audit data, a pilot trial was carried out by the authors, involving four GDPs and four specialists

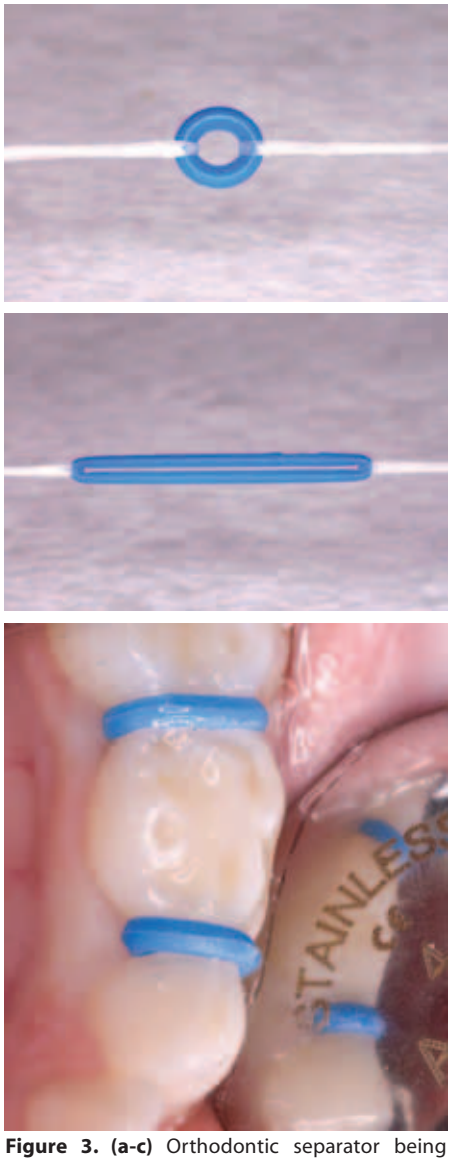

Figure 3. (a-c) Orthodontic separator being stretched between two pieces of floss, then placed between the contact points of lower left D.

from Secondary Care, which found the technique to be acceptable to the dentists and their patients.[10] Subsequently, a retrospective analysis of Dr Hall's practice records,[11] and a two-year randomized control trial set in general dental practice,[12] have shown the Hall Technique to be effective and acceptable to dentists and their patients for managing dental caries in primary molar teeth.

Case report

The following case illustrates the use of the Hall Technique for managing the carious lower first primary molar of a four-year-old boy.

Figure 4. Lower left D immediately after removal of separators, which have been in place for five days.

The patient presented for his first dental examination accompanied by his mother . He was fit and well, and reported no problems with his teeth. He was brushing only once daily, and was using toothpaste with a low concentration of fluoride (500 ppmF). Clinical examination, including radiography, indicated several carious lesions in his primary dentition. Initially, treatment concentrated on prevention, which included brushing instruction, and advice based on the SIGN 83 guideline:[13]

- 1000 ppmF toothpaste;
- Twice daily;
- Spitting out, not rinsing after brushing;
- Brushing supervised by parent;
- Fluoride varnish application; and
- Diet advice.

Description of the technique

As it was likely that at least one of the patient's primary molars would require pulp therapy, it was decided to acclimatize him to treatment by placing a Hall crown on the lower left D, which had a non-cavitated Class II lesion distally (Figure 2). All aspects of the proposed treatment were discussed with the patient and his mother, and consent obtained. As it was likely that the 4-year-old patient was

Figure 5. Size 5 PMC being tried for size over the lower left D. The patient is sitting upright as an aid to airway protection. The correct size of crown will not impinge on the teeth on either side, and a slight 'spring back' will be felt when the PMC is gently pushed up to (but not through) the contact points.

Figure 6. The PMC has been filled with a luting glass ionomer cement and placed firmly over the tooth. The extruded cement is quickly wiped away (as children find the taste very unpleasant), before the child is encouraged to complete the seating of the crown by biting down hard on to it (often with a cotton wool roll to even the pressure).

Figure 7. The crown fully seated, with the cement set. The child is asked to keep biting on the crown for two minutes, until the cement is set, to prevent 'spring back' of the PMC from the fully seated position.

Figure 8. Excess cement has been removed, and the contact points flossed through. The slight increase in occlusal vertical dimension will be accommodated within alveolar growth.

apprehensive about treatment, to ease the fitting of a Hall crown, orthodontic separators were placed using dental floss, and left in place for five days (Figure 3). Following removal of the separators (Figure 4), a size of PMC was selected which covered the occlusal table of the tooth, but was still tight enough to give a feeling of 'spring back' when seated up to, but not through, the contact points (Figure 5). The PMC was then filled with a glass ionomer luting cement, and pressed firmly over the tooth until fully seated (Figure 6). Excess cement was quickly removed, then the patient was asked to bite down on to the crown to seat it fully and encouraged to keep biting on the PMC for two minutes to allow the cement to set (Figure 7). Finally, any remaining set cement was removed (Figure 8), the contacts flossed through, and the patient discharged, with the advice that any feeling of the PMC being 'high in the bite' would resolve within a day or two (Figure 9).

Discussion

This technique allowed a young child, who had no previous experience of restorative treatment, to have his carious primary molar managed effectively, with no distress and with very low risk of treatment-induced anxiety. The Hall Technique can be viewed as biological, rather than surgical, in its approach to the management of dental caries. The premise of this biological approach is that the carious process is driven by the plaque biofilm on the surface of the lesion.[14] The plaque biofilm has to exist within a very specific environment to be actively cariogenic, as evidenced by the clinical observation that, despite plaque being ubiquitous around the dentition, and sugar being plentiful in

a

b

Figure 9. (a) The patient, and **(b)** crown, immediately after placement.

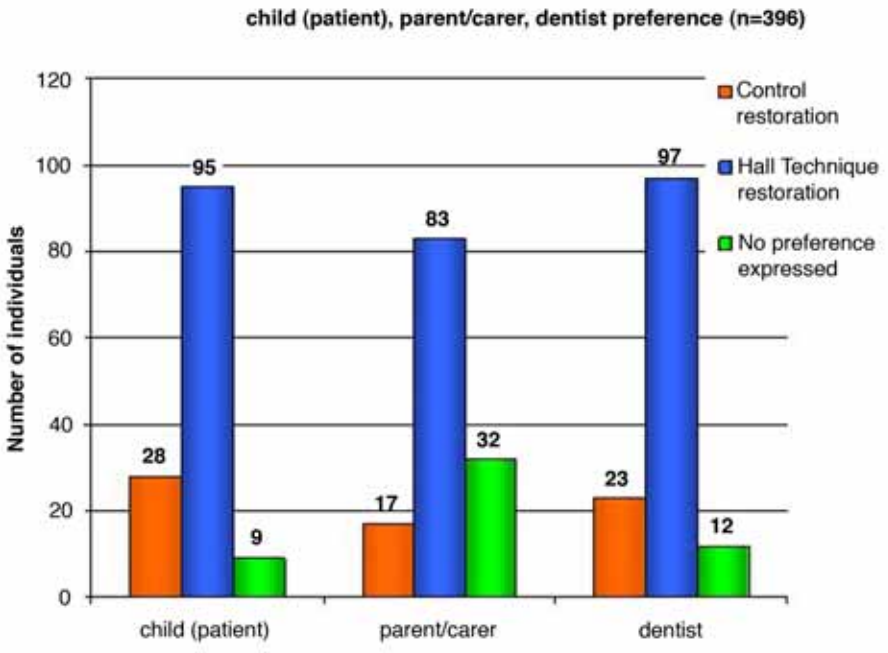

Figure 10. Patients (n=132) had matched pairs of primary molars; one was restored conventionally, the other with a Hall crown. Graph displays patient/ carer/ dentist treatment preference, assessed by questioning after completion of treatment.

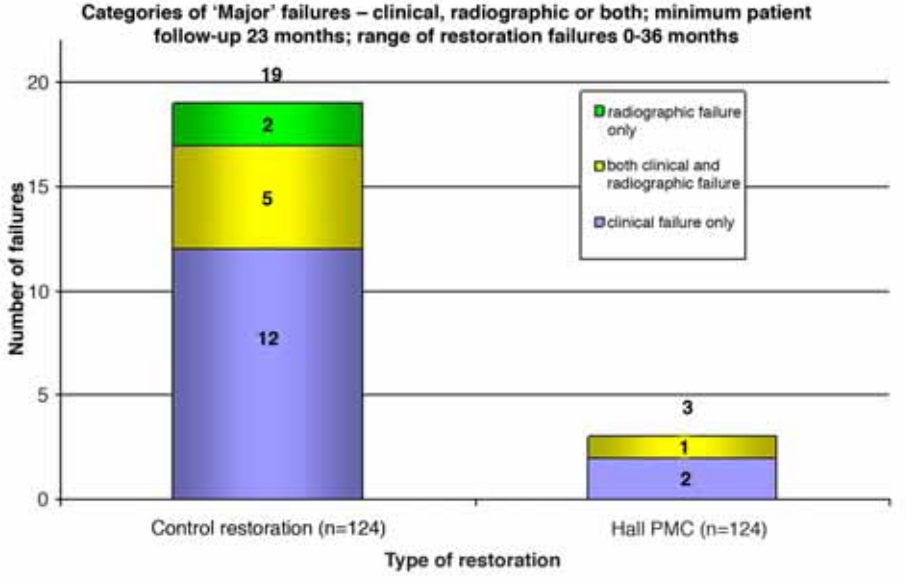

Figure 11. Graph shows 'Major' failures (signs or symptoms of irreversible pulpal disease) for control restorations and Hall PMCs noted clinically, radiographically or both, after a minimum follow-up period of 23 months (n=124).

most diets, the vast majority of dental caries begins at only two, very specific, locations; the base of fissures, and just below the contact points. This means that the carious process is vulnerable; disrupt the favourable environment encouraging a cariogenic biofilm (for example, by sealing it from the oral environment) and, in response, the plaque biofilm composition will alter to a less cariogenic flora.[15,16] Biologically altering the biofilm through changing the environment (as opposed to surgical excision of the biofilm along with associated carious tooth tissue) can be sufficient to slow, or even arrest, progression of the lesion, allowing the pulpo-dentinal complex time to respond with reactionary dentine, and thereby help protect the pulp. The biological approach exploits the fact that primary teeth exfoliate, and makes risk-reduction of pain/sepsis rather than restoration of aesthetics or function, the treatment priority. More importantly, it offers clinicians the opportunity to provide less invasive treatments for young patients (in this case through the use of the Hall Technique) and reduce the risk of treatment-induced anxiety.

Preformed metal crowns, when placed conventionally, are considered an effective restoration.[4,17,18] Although a recent Cochrane review found no randomized control trials comparing PMCs to other restorations, it reported that lower levels of evidence all supported the superiority of the PMC in terms of restoration longevity.[18] Despite this evidence, PMCs do not appear to be popular with GDPs in the UK. An investigation into the views of 93 GDPs[8] found that only 3% used PMCs routinely and 82% would never use them. Amongst the barriers to the use of PMCs reported by the dentists were perceived difficulties with children's ability to accept invasive treatment. Although little work has been carried out on children's perceptions of dental treatment, it is known that children can find the use of LA and rotary instruments difficult to accept.[19-21]

The Hall Technique avoids many of the barriers described by GDPs to using PMCs, and a two-year randomized clinical trial set in general dental practice in the UK has shown the technique to be more acceptable to children, parents and GDPs (Figure 10), and more effective in preventing pain and sepsis (Figure 11), than conventional restorative techniques.[12] Some indications and contra-indications for the Hall Technique are shown in Table 1, and a fully illustrated manual on using the Hall Technique can be downloaded from; **http://www.scottishdental.org/resources/HallTechnique.htm**

The Hall Technique will not suit every child, every carious molar in that child or every dentist. In addition, provision of the Hall Technique without a comprehensive and motivational prevention programme

is unlikely to achieve what most clinicians would agree as the management aim for a carious primary dentition; that it exfoliates with the minimum risk of pain or sepsis. The evidence is that the Hall Technique can be an effective addition to the clinician's range of treatment options for the carious primary molar.

Acknowledgements

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Indications include:	■ Class I lesion, non-cavitated, if patient unable to accept fissure sealant, or conventional restoration ■ Class I lesion, cavitated, if patient unable to accept partial caries removal technique, or conventional restoration ■ Class II lesions, cavitated or non-cavitated
Contra-indications include:	■ Teeth with signs or symptoms of irreversible pulpitis, or dental sepsis ■ Teeth with clinical or radiographic signs of pulpal exposure, or periradicular pathology ■ Teeth with crowns so broken down with caries, they would normally be considered as unrestorable with conventional techniques

Table 1. Indications and contra-indications for using the Hall Technique for managing primary molars with carious lesions assessed as at risk of causing pain/sepsis before exfoliation.