

THE HALL TECHNIQUE IN PAEDIATRIC DENTISTRY: A REVIEW OF THE LITERATURE AND AN "ALL HALL" CASE REPORT WITH A-24 MONTH FOLLOW UP

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ABSTRACT

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Aim: This paper highlights a non-invasive treatment option for primary molars, where decay is sealed under preformed stainless steel crowns (SSC).

Summary: Restoring the carious primary molar in children using the "Hall Technique (HT)" is an internationally controversial but evidence-based new treatment modality. It started in the United Kingdom (UK) in 2007 where it is now considered the "Gold Standard" for managing the multi-surface asymptomatic carious primary molar. We review the literature and report a two year follow up of a case treated in Dubai, United Arab Emirates (UAE) where we restored all eight carious primary molars in a 3-year-old child by using the Hall Technique. This approach avoided the need for treatment under local analgesia general anesthesia in this very young child. It is relevant to general dental practitioners, with an interest in children's dentistry in addition to specialists in pediatric dentistry.

Key learning points:

- SSCs placed using the HT are not suitable for all child patients with caries;
- There are selection criteria that should be assessed before considering this technique;
- There should be a clear radiolucent band between the carious lesion and pulp of the tooth intended to be restored with the HT;
- There should be no signs or symptoms of pulpal pathosis;
- All teeth treated with the HT should be followed up clinically and radiographically following the same protocols as conventional treatments.

Keyword: primary molars, stainless steel crowns, caries, Hall technique.

1. Introduction

Primary molar dental caries in childhood is a disease of epidemic proportions that affects all modern societies. Despite a World Health Organization (WHO) pledge in 1981 to render 50% of 5-6-year old children caries free by 2000,¹ many developing countries remained off target to date such as the United Arab Emirates (UAE). A UAE survey showed that less than 84% of 5-year old children were affected by caries² which echoes the dental health status of children in this region.³ By comparison, very low levels of caries have been reported in Europe.^{4,5} In England for example, 88% of three-year olds were free from obvious caries.⁶ The size of decay as a problem in a society is often expressed as "dmft" (decayed, missing and filled teeth) and is well established as the key measure of caries experience in dental epidemiology. The UAE regions dmft index ranged from 3.8 to 6.6² whilst the England

dmft range was a mere 0.48 to 0.9.⁶ This highlights countries/social inequalities where primary tooth dental caries is concerned, especially that not every child has access to a paediatric dentist.

In paediatric dentistry, the carious primary molar is one clinical problem reported to have more than one solution.⁷ These management options have ranged from the classical surgical treatment involving the surgical excision of dental caries (under local analgesia - LA) and restoring the tooth (with restoring it with a composite for example) and ending simply by managing the plaque's biological environment employing minimal interventional techniques.⁸ An example of the latter is the "Hall Technique or HT"^{9,10} which involves encasing the carious lesion by "sealing it" from the oral environment using a stainless steel crown (SSC). The HT has been recommended to manage carious primary molars according to clear selection criteria and was developed in the

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Table 1. Indications and contra-indications of the Hall technique (adopted from Innes et al., 2009).¹¹

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 (pulpal pathosis)
	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
	Patients at risk of infective endocarditis

United Kingdom (UK) as a child friendly treatment approach.¹¹

2. Conventional management of the carious primary molar

It is well known that primary tooth decay management represents a challenge for those who dentally care for children, whether they are general dental practitioners (GDPs) or specialists in paediatric dentistry. For the past five decades, the dental literature in the United States of America (USA) and Europe had advocated treating the deep carious primary molar in using the conventional "drill and fill" philosophy. That is, give LA to the child by injection to anaesthetise the tooth, drill the carious tissue out (often after placing a rubber dam) using a high and slow speed drill, restore the primary tooth with a restorative material (often a preformed stainless steel crown or SSC) after carrying out pulp therapy. Although aesthetic crowns are available for primary teeth (made from Zirconia), they are very expensive and require protracted tooth preparation; thus the SSC remains the crown of choice for the carious primary molar.^{12,13}

3. The Hall technique: "Sealing in" caries

The HT concept⁹ recommended a simple way in managing early enamel and dentinal decay in the primary molar using a SSC; this technique involved no LA, no rubber dam, no drilling and took place in a child friendly play manner. In essence there was no dental caries removal at all from the carious lesion. The technique relied on sealing the carious lesion in situ cutting off its supply of sugary substrate, thus altering the bacterial plaque of the lesion ultimately leading to the arrest of the caries process in the tooth.

3.1. Indications for the HT

SSCs placed using the HT are not suitable for all child patients with caries. There are selection criteria¹¹ that should be assessed before considering this technique. These are summarized in Table 1. The dentist should consider the HT as one of the available clinical methods for treating the carious primary

molar but not as a replacement for conventional methods.

3.2. Clinical Steps of the HT

The HT involves the following simple steps that are usually carried out over a couple of five minute appointments.

A. Hall technique: Appointment One

1) Case selection: It involves diagnosing asymptomatic early enamel and dentine caries in a primary molar; clinically and radiographically (using bitewings usually or a periapical). Bitewings or periapicals (See Fig. 1) may typically show approximal lesions that are not visible clinically but are diagnosed radiographically. There should be a clear radiolucent band between the carious lesion and the pulp of the tooth intended to be restored with the HT. There should be no signs or symptoms of pulpal pathosis; the lesion should be detected prior to the development of symptoms (See Table 1).

2) Fitting orthodontic separators: It involves the placement of two elastic orthodontic separators, mesially and distally, on tooth intended for restoration with a HT (see Fig. 2).



Figure 1. A periapical radiograph showing caries DO to 84. The tooth was asymptomatic and the caries was not visible clinically. Radiographically there is a band of dentine separating the lesion from the pulp. This tooth is suitable for the HT. (Image courtesy of Dr Amal Mahmoud)



Figure 2. The Hall Technique: tooth 84 with orthodontic separators mesially and distally. They are left in situ for 3-5 days.

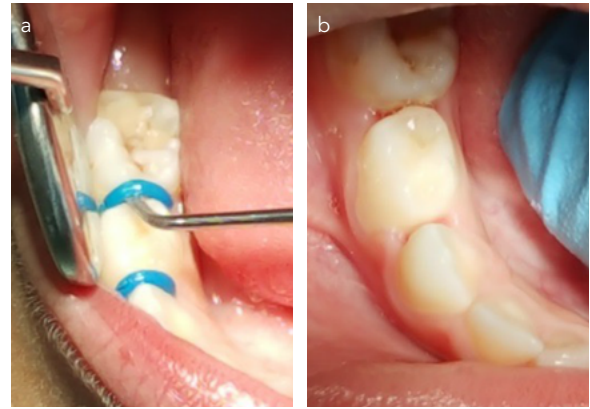


Figure 3. The Hall technique: tooth 84 before (a) and after (b) orthodontic separator removal. Notice the space thus created.



Figure 4. The SSC is tried on tooth 84 using adhesive tape and patient in the supine position.



Figure 5. The patient bites down on the crown using a cotton roll. The patient bites on a cotton wool roll to allow the SSC to "snap" on tooth number 84. A click is occasionally heard.

B. Hall Technique: Appointment 2

1) Removal of separators: 3-7 days after the first appointment, the patient returns for the removal of the orthodontic separators. Space is created mesially and distally that will negate the need for crown preparation (see Figs. 3 a & b).

2) SSC selection and placement: The patient is sat up in the supine position and the operator selects the correct SSC in terms of tooth number and size. After selecting the correct SSC, it is tried passively on the tooth to make sure that it fits with gentle pressure applied to the SSC over the contact points but not completely through. For safety purposes the crown is stuck to the operator's finger (See Fig. 4), while trying out the size, using an adhesive tape/elastoplast.

The SSC should be neither too loose nor too tight. The crown should "spring back" from the contact points while trying it on the tooth at this stage. After crown selection, the crown should then be filled with a self-curing glass ionomer cement and positioned over and on the tooth. The operator then digitally presses the crown through the contact points so that the crown flexibly "clicks" on the tooth and fits snugly. The patient is then asked to bite on a cotton wool roll to finish off its correct positioning (see Fig. 5). The excess of the glass ionomer cement is wiped off. The crown should be level with the occlusal plane and blanching of the gingivae will be noticed buccally and lingually indicating an adequate seal (see Fig. 6). The patient may feel a little tightness; however that

and the gingival blanching disappear within an hour if not less. Equated to the tightness of a brand new pair of shoes around feet, it resolves spontaneously after a while. Occasionally the bite may be raised by a millimeter. Multiple SSCs using the HT could be placed in one patient over several appointments without any LA or drilling; however it is possible to place two SSC using the HT in one appointment.¹¹ This is possible in: a) contra-lateral primary molars in the same arch, for example placement of two SSC on upper Es (teeth 55 and 65) or lower Ds (74, 84). b) diagonal teeth in opposing arches, for example, placement of SSCs on tooth 55 and 75, or placement of SSCs on 65 and 85.

C. Hall Technique: Follow-up appointments

All teeth treated with the HT should be followed up clinically and radiographically following the same protocols as conventional treatments.⁹ The tooth should be assessed for pain, sinuses, swelling and radiographically for signs of interradiolar radiolucency or root resorption. The bite usually resolves spontaneously due to dento-alveolar compensation within a week or two (see below).

4. Can the Hall technique be used to restore all Ds and Es in one patient?

Restoring multi surface carious primary molars using conventional SSCs (i.e.; all Ds and Es in one child) after preparing them with a high speed drill has been the standard for many years. However, this is not the



Figure 6. The SSC crown on 84 immediately post fit. Note the slight blanching of the gingiva and opening of the bite.

case when using the HT. The 2015 operating manual of the HT stated that "Hall crowns are not a universal answer to managing all carious primary molars and does not suit every carious primary molar in that child".⁹ As a result, it became acceptable clinical practice, by those who advocate the use of the HT, to avoid restoring all the primary molars in one child using this approach. To elaborate further, restoring all carious Ds and Es in one single child, using the HT was not standard recommendation. The justification had not been clarified by HT advocates but it may have possibly been due to worries about subsequent long term effects on the occlusion. The sequelae of the HT on the occlusion had been studied in the past. It was found that children's occlusion tended to undergo slight opening of the bite (1-2 mm average) which subsided as a result of dento-alveolar compensation¹⁴ or physical intrusion¹⁵ of the crowned tooth. The aforementioned effects were studied when one or two crowns were placed, however, to date, no study had shown the effect of restoring all Ds and Es in one child, on the occlusion. Keeping the above in mind, we report a case during which the HT was utilised to full capacity, contrary to the usual HT clinical doctrine, to restore all eight primary molars in one single child. There were no known complications and the occlusion was deemed satisfactory. This case has been dubbed the "All Hall" case.¹⁶

5. "All Hall" 24-month follow-up case report

The study protocol was reviewed and approved by the Hamdan College Dental Medicine Institutional Ethical Committee at the Mohammed Bin Rashid University of Medicine and Health Sciences (MBRU) in Dubai (UAE) and in accordance with the Helsinki Declaration of 1975, as revised in 2000.

5.1. Case details

A fit and healthy three-year old male child was brought by his father to the Department of Paediatric Dentistry at the Hamdan College Dental Medicine at the Mohammed Bin Rashid University of Medicine and Health Sciences (MBRU) in Dubai (UAE). The father reported that his son had tooth decay but had suffered no discomfort. After clinical and radiographic examination, the patient was diagnosed as having numerous asymptomatic carious primary molar and incisor teeth fitting with the diagnosis of Severe Early Childhood Caries (S-ECC). The patient's eight carious primary molars (55, 54, 64, 65, 75, 74, 84 & 85) were symptom free. Clinical and radiographic signs of pulp pathology were absent. See Figure 7 for pre-operative clinical features and Figure 8 for pre-operative radiographic findings.

He also had initial caries on 53, 52, 51, 61, 62 & 63. There was no known trauma history. His initial cooperation was categorized as "pre-cooperative". The patient's behavioural scale was assessed to be negative initially but improved dramatically to positive behaviour as treatment progressed. The treatment options for the carious primary molars that were discussed and explored with his father were; prevention only, conventional restorative treatment using LA, the "Hall Technique" with no LA (and restorations of the upper primary incisors) or full mouth rehabilitation under general anaesthesia (GA). The patient's father was keen for his son to receive dental treatment in the dental chair rather than under GA due to many reasons including financial constraints (children's dental GA is not routinely provided by a free public service - available to everyone - in the UAE as it is in the UK for example). After sufficient consideration, the father consented for the HT as the child's cooperation for LA was not forthcoming and he was adamant about avoiding GA.

Table 2. All Hall case: Treatment plan.

1. Preventive care phase
 - Acclimatisation and non - pharmacological behavioural management
 - Oral hygiene instructions (OHIs)
 - Record plaque score at each visit
 - Diet analysis and advice
 - Fluoride application
2. Restorative treatment plan
 - a. Restore the posterior carious teeth with stainless steel crowns using the Hall Technique (HT): 55, 54, 64, 65, 74, 75, 84, 85
 - b. Interim therapeutic restorations (ITR) using Glass Ionomer Cement (GIC) restorations for: 53,52,51,61,62,63
3. Recall and reviews: regular 3 month recalls, radiographs every 6 months and fluoride varnish application 4 times a year (3, 6, 9, 12, 18, 24 months thereafter)
4. Definitive treatment for upper anterior teeth once cooperation allowed.



Figure 7. Shows clinically pre-op, immediate, 9 months and 24 months post-treatment SSCs HT. No clinical pathology related to the SSC was noted on any of the molars (no sinuses or swellings).

5.2. Treatment

A treatment plan was arranged on our postgraduate clinic (See Table 2). An extensive preventive programme was instigated to improve the patient's very poor oral hygiene in addition to diet assessment, analysis and advice.

Over a period of two months and following the HT protocol,⁹ the child had all his eight primary molars fitted with SSCs and cemented with GIC. No LA was used. The molars were fitted with elasticated orthodontic separators in order to create space to prepare the teeth to receive the SSC a week later. Two molars were treated per appointment (see Table 3).

As per the standard Hall manual,⁹ the following principles were adhered to during treatment:

- 1) Compliance with the indications and contra indications and selection criteria⁹ for the HT (See Table 1). Assurance of the absence of any symptoms or signs of pulpal pathosis or sepsis (clinical or radiographic assessments);
- 2) Blue elasticated orthodontic separators were used and left in situ for one week to create interdental spaces where required;
- 3) Two SSCs placed in a single appointment were never:
 - a. In the same arch adjacent to each other (i.e. never in the same quadrant);
 - b. On the same side in opposing arches.
- 4) When two crowns were placed in a single appointment they were diagonally in opposing arches (for example 64 and 84);
- 5) Appointments were at least one to two weeks apart to allow the occlusion to settle. The

appointments were short; no longer than 15-20 minutes.

The SSCs crowns were placed as per the schedule in Table 3. The patient also had simple restorations placed (with no LA) on his upper anterior primary incisors and canines, using simple excavation and GIC with a view to eventually receiving composite strip crowns. Figure 7 shows the mouth immediately after completion of treatment. The bite appeared open and was initially raised by approximately 1-1.5 mm. The patient was followed up six, nine, 12, 15, 18 and 24 months later. Neither he nor his parents had any complaints whatsoever. There were no issues with the occlusion, symptoms or signs of pulpal pathosis or sepsis affecting the molars. The bite had completely recovered (see Fig. 7). The parents' satisfaction in reaching a positive outcome, without resorting to the use of GA, was very high. Post op radiographs (Fig. 8) showed satisfactory crown placement and no recurrent caries. The only noticeable development was that tooth 26 became impacted against the SSC of 65. This was also noted on the other first permanent molars (16, 46, and 26); however, they disengaged spontaneously without intervention. The 26 impaction was corrected within a week by removing the SSC of 65.

The long term treatment plan was the following:

- 1) Continue follow-up at 3 months intervals of all Es and Ds clinically;
- 2) Close monitoring of tooth 51 for any sign of infection. Pulpectomy or extract if symptoms;
- 3) Bitewing radiographs every 6 months to monitor all Es and Ds. Interval to increase if caries risk status changed;

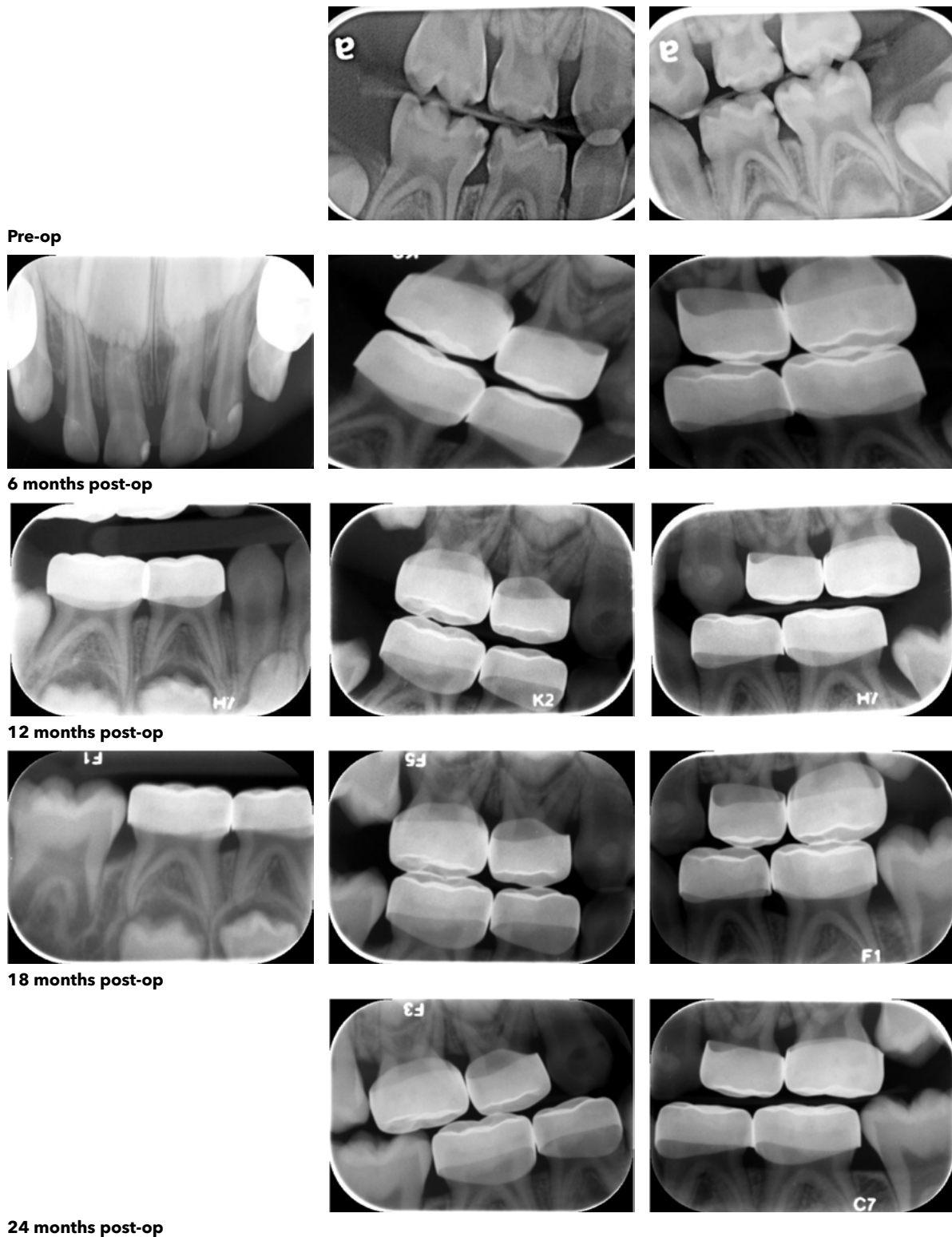


Figure 8. Shows pre-op bitewing radiographs showing caries in all Ds and Es. Also shown are bitewings taken 6 months, 12 and 18 months post-op Hall technique. They show fully seated HT SSCs with no secondary caries and no pathology and normally erupting 6s. A periapical of 84 was taken at 12 months and 18 months as it had the deepest pre-op carious lesion. Note the absence of periapical pathology and normal eruption of 46. At 24 months the bitewings show no change except that tooth 26 is engaged against 65 SSC. It was treated as an ectopic eruption of 26.

- 4) Restore remaining upper anterior teeth with composite strip crowns once cooperation allows;
- 5) Reinforce preventive measures (oral hygiene, diet), professional topical fluoride varnish application 4 times/year.

5.3. Case Discussion

This report showcased treatment that may be

of interest to GDPs and specialists in paediatric dentistry alike. It highlighted simple non-invasive treatment that eliminated the need for treatment under LA and avoided a dental GA in a very young child. A situation many occur in practice on a daily basis. This case had been a great challenge due to important factors which were involved: the patient's

Table 3. Sequence of appointments.

Appointment 1	Assessment, radiographs, explain treatment options, OHI, diet sheet, orthodontic separator 64 (as parents opted for HT)
Appointment 2 (one week later) 2 SSCs placed	Diet advice, remove separator 64. Place and cemented SSC using HT on 64 and 84 (spaced already), place new separators on 55 and 75
Appointment 3 (one week later) 2 SSCs placed	OHI reinforced, remove separators, cement SSC HT on 55 and 75
Appointment 4 (one week later)	Place new separators on 65 and 85
Appointment 5 (one week later) 2 SSCs placed	Remove separators and cement SSCs HT on 65 and 85
Appointment 6 (one week later)	Place separators, 54 and 74 Coincidentally 51 noted to be discoloured, no known history of trauma. X-ray taken. Opted to manage this tooth conservatively although pulpectomy or extraction of 51 not ruled out
Appointment 5 (One week later) 2 SSCs placed	Reinforce OH. Placed SSCs HT on 54 and 74. Restore Upper anterior teeth using GIC restorations as interim restorations
Appointment 6 (One week later)	Check occlusion. Reinforce OHI and polish upper anterior teeth
Recall 3 months	No complaints. Check occlusion and OH
Recall 6 months later	All Es and Ds SSCs in situ. No symptoms. Bitewings taken. No clinical or radiographic signs of pathology. Occlusion had settled (No open bite). Good gingival health
Recall 9, 12, 15, 18 months later	No complaints. OH excellent. Occlusion normal. Good gingival health. Radiographs taken. Fluoride. Consider if cooperation improves, anterior strip crowns with composite (in addition to pulp therapy for 51)
Review at 24 months	No complaints. Bitewings taken show no pathology. 26 noted to be impacted against 65 SSC. Dissimpacted 26 by removing SCC. 26 erupted. Replaced SSC 65

young age, anxiety, the number of molars involved, pre-cooperation, the limited financial capacity of the parents to afford general anaesthesia. However, the parents' dedication to attend to multiple appointments, motivation and great support to their child made it successful. Modelling techniques had worked successfully to reduce the patient's dental anxiety, where he observed and learned appropriate behaviour from his parents and sister. Separation anxiety is very common at this age and having the parent or his sister around was helpful. He had a high risk dental caries status, so his primary molars were treated using SSCs, although other options such as complete caries removal and composite restorations, partial caries removal or even non restorative caries treatment (NRCT) were possible.⁷ The patient was a good candidate for the HT, as his molars were carious, asymptomatic, had no signs of irreversible pulpitis

or sepsis, no clinical or radiographic signs of pulpal involvement or inter-radicular pathology and had a good amount of tooth structure for crown retention. In other words, the molar lesions were "captured" before they became pulpally involved. The HT was effective as it sealed the caries under the crown without LA, tooth preparation or caries removal. Priority was given to tooth 84 as it had the deepest lesion compared to the rest. The patient accepted the minute occlusal changes after cementation of each HT crown. The occlusion clinically appeared to have re-established itself in a very short time (see Fig. 7 using the primary canines as indices) and this was always checked before proceeding with the next phase. Managing the upper anterior cavities with permanent restorations would have been impossible in this case due to the child's lack of cooperation. Therefore, temporization of open cavities with GIC

was a straightforward way to introduce the child to dental procedures. It was also advantageous in terms of preventing the progression of caries, reducing the chance of sepsis and pain, reducing the oral load of plaque and a good source for fluoride. Composite strip crowns will be considered as an alternative if cooperation allowed. Coincidentally the patient's 51 became discoloured, albeit asymptomatic. Although no history of trauma was elicited in this case, it was assumed to be the case. Persistent dark discolouration in the patient's 51 may be associated with pulp necrosis. Since the tooth is asymptomatic clinically and in the absence of radiographic pathological signs, it was decided to keep under close review. Parents were aware that this tooth may require future treatment; a pulpectomy or extraction. As for the Es and Ds, the patient was followed up for 24 months after treatment was completed. He remained clinically free of symptoms and became a patient who enjoyed attending our clinic. They will remain under observation in the long term. Plans are in place to manage his upper anterior teeth as outlined above. As for the 26 impacted tooth, it was corrected within a week of removing and replacing the 65 SSC. No LA was used.

6. HT Discussion and literature review

The Hall technique was named after Dr Norma Hall, a Scottish dentist who worked as a salaried GDP in a remote high dental caries risk area in the North East of the UK. As she faced a high proportion of children with dental caries (dmft of Scotland was around 2.54 at the time), and was not a specialist in paediatric dentistry, she thought "outside the box" and used SSCs to seal in dental caries with no preparation and no LA. This technique caught the attention of the team of paediatric dentists/clinical researchers at Dundee Dental School in Scotland.¹⁷ They took an interest in Dr Hall's novel work (which she had audited) as they were facing very high levels of dental caries themselves. Subsequently a pilot trial by Evans et al. was published online in 2000.¹⁷ This prospective case series study assessed 49 patients who were fitted with SSC crowns using the HT from the patient, caregiver and dentist point of view. It was deemed a success as the study reported very high levels of satisfaction. In addition, the team of Dundee Dental School researchers shared their findings with The British Society of Paediatric Dentistry (BSPD) UK national conference meeting in Edinburgh (UK) in the same year (2000) to the astonishment of its audience (the second author of this paper was present that day and recalls the response!). Because the initial reaction to this technique by other paediatric dentists in the UK was profound,¹⁸ the team of Dundee University researchers (Innes et al.) undertook it upon themselves to investigate this technique by employing the most robust methods of evidence-based dentistry; namely a prospective randomized controlled clinical trial and first published their results in 2007.¹⁰ This study formed the pivotal event that made this technique a "school of thought" in paediatric dentistry in its own right. It was a prospective split mouth randomized control study that showed very high success rates of the HT

after two years.¹⁰ The 2007 study was a prospective split mouth randomized control study that recruited 132 child patients aged between 3-10 years all of whom had two matched dental carious lesions.¹⁰ Each child acted as his/her own control. One lesion was randomly treated using the HT and the other was randomly treated conventionally (mostly by glass ionomer cements). Seventeen GDPs treated these patients under the auspices of the paediatric dentistry team at Dundee University. The results were an outstanding success rate of 98% for the Hall SSC when compared to the control restorations 85% (in terms of major failures: pain due to pulpitis). Authors concluded that "The HT was preferred to conventional restorations by the majority of children, carers and GDPs. After two years, Hall SSCs showed more favourable outcomes for pulpal health and restoration longevity than conventional restorations. The HT appears to offer an effective treatment option for carious primary molar teeth". In 2011, Innes et al. published similar high success rates in the five year follow-up the same study.¹⁹

Despite the fact that the HT is now considered the "Gold Standard" in managing the multisurface carious primary molar in the UK²⁰ there was a mixed international reaction to its development in paediatric dentistry circles, with many advocating such a treatment method^{21,22,23} while others opposing it completely.^{24,25,26} It is important to note that there is no disagreement about the fact that SSCs are the restorative materials of choice in multi-surface caries affecting primary molars.^{13,27} The disagreement lies in the method used to apply them. Interestingly this debate came to a head during a joint meeting between the American Academy of Pediatric Dentistry (AAPD) and the Royal College Surgeons of Edinburgh (UK) in 2011, where clinical methods employed in the USA and UK were compared. The discrepancy between advocates of the HT and the conventional school of thought became apparent. The president of the AAPD stated that "while we may not have agreed with our British and Scottish colleagues on every approach we all agreed that we benefitted by seeing how others practice"²⁸ and "Can we imagine informing our parents that we are placing a crown over an untreated, decayed tooth?"²⁹ In this sense, the success of the HT and its 2007 study design were questioned.²⁴ Criticism centered on the control restorations used in the main 2007 study. They were not considered the gold standard restorations which paediatric dentists use in the USA; namely the conventional treatment modality. In addition, in vitro laboratory studies showed that SSC cemented using the HT exhibited micro-leakage when using glass ionomer cements,²⁵ however the latter study lacked clinical relevance as what actually occurs in the mouth was not demonstrated. There had also been concerns that Hall SSCs props open the bite after placement by 1 mm on average, but there is clinical evidence that the bite resolves itself with dento-alveolar compensation taking place. The bite returns to normal levels within a week.^{9,14} A recent abstract submission to the International Association of Dental Research (IADR) highlighted that mild intrusion of the crowned tooth takes place,¹⁵

and this contributed to the self-correction of the high bite. It was based on a study that looked at recording the bite, pre/immediate post op/ and six weeks following SSC placement in 10 child patients. The measurements were carried out using photos, clinical measurements, models and laser 3D scanning. The bite had returned to normal levels after 2 weeks.¹⁵ Recently, in December 2014, a landmark article was published in the USA supporting the use of the HT in dental practice.²³ It was a retrospective clinical study, where the authors found that 97% of SSCs placed with the HT and 94 % of SSCs placed with the traditional technique were successful. This study confirmed that the HT was similar in its successful outcomes to those SSCs placed conventionally. This interesting debate within the paediatric dental circle is still ongoing even as this article is being written, and the debate is often as emotional as it is scientific. However, HT is now becoming more mainstream; it is now taught formally in the undergraduate curricula in 15 out of 16 dental schools in the UK³⁰ and more than half of European paediatric dentistry postgraduates will consider using this technique in managing child patients³¹ and the HT has recently celebrated its 10th "formal" anniversary.³² Despite it being very popular in parts of the world such as the UK and New Zealand, there is still reluctance to practice it in the UAE and the Gulf Cooperation Council Region as a whole.³³

7. Conclusion

Dental caries is a childhood epidemic disease. While prevention is of essence, in a society where dental caries is rampant, its treatment can be challenging especially in young children. The HT for restoring the carious primary molar is a newly developed technique that is based on an old concept: deprive caries from sugar substrate and it will arrest. The carious lesion needs to be detected early enough

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before it causes pulpal symptoms, emphasizing on the importance of early diagnosis using clinical examinations coupled with bitewings radiographs. This will enable the lesion to be caught at a very early stage, for it to be sealed in using a SSC utilising the HT. The crown could be fitted with minimal inconvenience to the child patient in a child friendly way. This will negate the need for LA injection, rubber dam, drilling the caries out.

While the conventional restorative approach is part and parcel of the skills of a specialist in paediatric dentistry, the HT must become part of the armamentarium in the fight against dental decay; a "tool" in the dentists "toolbox". One of the HT unique features is that it can be used in general dental practice by GDPs, where most children are treated; therefore, the HT is a suitable modality for the GDP environment. The HT manual showing the technique step by step is available online to be downloaded for free for those dentists who would like to use it in their practice.⁹ The case reported here is an "All Hall" case where the maximum capacity of the HT was used in one single child. Although well designed trials are in place to support the HT, this case highlights that restoring eight carious primary molars in one child, with no short to medium term complications, is achievable using the HT. The lesions need to be "caught" prior to any pulpal involvement. It may be of interest to GDPs and primary care dentists, in addition to specialists in paediatric dentistry, who deal with the majority of child dental patients.

Author Contributions

Equal contribution to the paper.

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Questions

Hall crowns can only be placed on

- a. Asymptomatic cavitated and non cavitated lesions in molars;
- b. Abscessed teeth;
- c. Molars with acute pulpitis;
- d. Molars with interradicular pathology.

The open bite following placement of a Hall crown subsides as a result of:

- a. Extrusion of teeth adjacent to the Hall crowned tooth;
- b. Dento-alveolar compensation or intrusion of the Hall crowned tooth;
- c. The open bite never subsides;
- d. The dentist grinds away the occlusal surface of the crown.

Fitting two Hall crowns in one appointment is possible in one of the following situations:

- a. In the same arch adjacent to each other;
- b. In the same arch opposing each other;
- c. On symptomatic teeth with irreversible pulpitis;
- d. Diagonally in opposing arches.

Restoring primary molars in a single patient with the Hall technique is possible in:

- a. Two primary molars only;
- b. One primary molar only;
- c. Four primary molars only;
- d. All eight primary molars.