Management of carious primary molars.

Pulp therapy,
Preformed Metal Crowns:
The Hall technique.
Look at:

• Pulp therapy.
• Stainless steel crowns (PFMC’s)
• Hall technique.
• Treatment planning.
Aims:

- To cover current concepts in the management of carious primary molars and apply them to teaching in dental student outreach.
Objectives

• Understand the indications and contraindications to pulp treatment in primary molars.

• Be able to choose appropriate techniques and medicaments.

• Know where to find evidence for the purpose of teaching students.

• Be able to choose appropriate techniques for placement of stainless steel crowns.

• Carry out pulpotomy and pulpectomy on plastic teeth in clinical skills.

• Placement of stainless steel crown following pulpotomy in clinical skills.

• Placement of Hall technique crowns in clinical skills.

• Hints and tips for placement of stainless steel crowns.
PRIMARY MOLAR PULP THERAPY.

- SAVE E’s.
- Avoid GA.
- Avoid trauma of extraction.
- Preservation of function.
- Avoid pain and sepsis.
Indications for primary molar pulp therapy.

- Broken marginal ridge.
- Extensive caries.
- Restoreable tooth.
- Co-operation.
- MH.
- Successor.
- Age of child.
Contraindications.

- Extensive caries (requiring multiple extractions).
- MH (endocarditis risk or immunocompromised).
- Co-operation.
- Parental attitude/visits/review.
- Close to exfoliation.
- Orthodontic considerations.
Developing dentition / active disease / caries risk / prevention
Clinical ± radiological indication of extent and consequences of caries:

• Pain

• Infection

• Mesial drift and space loss

• Food packing

• Ease of cleaning

• Function
Radiographic assessment:
Possible to leave softened dentine on cavity floor.

No Symptoms

Symptoms in response to Hot and Cold

Caries exposure/pulpal inflammation.

Spontaneous symptoms: keeps awake.

Clinical Radiographic Signs of infection.

Painful!!

Ledermix dressing.

Remove coronal pulp.

Stops bleeding

Will not stop bleeding.

Ledermix/zinc Oxide eugenol

Non-vital pulpectomy or extraction.

Indirect pulp cap.

Vital pulpotomy.

SDCEP Ca(OH)₂ ZnO Eug

Empty pulp chamber: no signs of infection

RESTORE

SCC
Principles.

• Local anaesthesia.

• Isolation.

• Removal of inflamed/infected tissue.

• Treat the healthy remaining pulp tissue.

• Cover with “stuff”.

• Seal (SSC).
Indirect Pulp Cap.

- No clinical or radiographic signs of pulp pathosis.
- Clear EDJ.
- Leave residual caries over potential exposure.
- Cover with Calcium hydroxide/GIC/SSC.
Direct Pulp Cap

• Very low success, just as well to do Ferric sulfate pulpotomy.
Vital Pulpotomy: technique.
Absence of spontaneous pain.

- Local anaesthesia and isolation.
- Coronal pulp amputation: slow speed bur or sharp excavator.
- 15% ferric sulfate on cw ~2 min.
- Zinc oxide eugenol cement.
- Stainless steel crown.

Level of amputation
Astringedent.
2 year shelf life.
£76.60+VAT 2 x 30ml
Coronal pulp amputation.

- To level of “healthy” pulp.
- Cover bleeding stumps with ferric sulphate for 2 min.
Haemostasis: brown stumps after washing.
Cover with Zinc oxide eugenol.
Cement SSC with GIC.
Ferric sulfate.

- Astringent.
- Optident. (01943605050)
- 2 year shelf life.
- £76.60+VAT 2 x 30ml

Caries has destroyed marginal ridge. Small tooth, big pulp!

Caries exposure reveals hyperaemic tissue in the coronal pulp chamber.

Amputation of coronal tooth to healthy radicular pulp tissue.

Application of ferric sulfate on cotton wool.
De-sensitising pulp therapy.

- Sensitive exposure or child will not accept LA.

- Dress with ledermix/ temp.

- 7-14 days.
No Symptoms
Possible to leave softened dentine on cavity floor.

Symptoms in response to Hot and Cold
Caries exposure/pulpal inflammation.

Spontaneous symptoms: keeps awake.

Clinical Radiographic Signs of infection.

Painful!!
Ledermix dressing.

Remove coronal pulp.
Empty pulp chamber: no signs of infection
SDCEP Ca(OH)$_2$
ZnO Eug

Will not stop bleeding.
Ledermix/zinc Oxide eugenol

Vital pulpotomy.

Inirect pulp cap.

Non-vital pulpectomy or extraction.
Non-vital pulp (SDCEP).

• From SDCEP (draft) guidelines.

• If the root canal is clearly non-vital, place some non-setting calcium hydroxide (hypocal, ultracal) in the entrance to the canal using a straight probe before placement of zinc-oxide eugenol.
Non-vital pulp (SDCEP).

- Debride the coronal part of the canal that is accessible.

- Small round bur and copious irrigation/washing.
No Symptoms → Possible to leave softened dentine on cavity floor → Inirect pulp cap.

Symptoms in response to Hot and Cold → Caries exposure/pulpal inflammation.

Spontaneous symptoms: keeps awake → Caries exposure/pulpal inflammation.

Clinical Radiographic Signs of infection.

Possible to leave softened dentine on cavity floor → Inirect pulp cap.

Painful!! → Ledermix dressing.

Remove coronal pulp.

Will not stop bleeding → Ledermix/zinc Oxide eugenol

Stops bleeding → SDCEP Ca(OH)_2 ZnO Eug

Vital pulpotomy.

Non-vital pulpectomy or extraction.
Non-vital pulpectomy.

- Radiographic or clinical signs of infection.
- Rubber dam necessary.
- Irrigate chlorhex 0.4% or hypochlorite 0.5-1%.
- < size 30 files 2mm short or 2/3 length.
- Dry with PP.
- If not clean, Ca(OH) for 7-14 days.
- Obturate with pure ZnO Eug: spiral filler or PP.
- Restore as for vital pulpotomy.
BSPD Guidelines

- [http://www.bspd.co.uk/publication-9.pdf](http://www.bspd.co.uk/publication-9.pdf)

Pulp therapy for primary molars

H. D. RODD, P. J. WATERHOUSE, A. B. FUKS, S. A. FAYLE & M. A. MOFFAT
Restoration:

- **Stainless steel crown.**

  - Amalgam.
  - Composite/GIC.
Restoration:

• Stainless steel crown.
Pulpotomy: Other techniques

- MTA
- Formocresol
- Ledermix
Cochrane review:

• http://mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD003220/frame.html

• Not enough evidence exists to show the effectiveness of pulp treatments for children with dental decay that has reached the tooth's nerve.
Success......

• Ferric sulfate pulpotomy  86%%
• Pulpectomy          82.3%

Journal of Dental Research, Vol. 84, No. 12, 1144-1148 (2005)
Effectiveness of 4 Pulpotomy Techniques—Randomized Controlled Trial:
K.C. Huth et al

A retrospective radiographic evaluation of primary molar pulpectomies.
Barr ES, Flatiz CM, Hicks MJ.
Reading:

• 2006 UK national guidelines in paediatric dentistry. Pulp treatment for primary molars.

• 2004 Paediatric cariology. Hosey.

• 2005 Paediatric dentistry: 3rd ed. Welbury, Duggal and Hosey
• Follow-up............
Stainless steel crowns

Guy Jackson
Evidence

• UK National Guidelines in Paediatric Dentistry: Stainless steel preformed crowns for primary molars IJPD (Suppl 1): 20-28

• All papers concluded that the failure rate for SSC’s used in primary molar teeth is very low compared with plastic restorations.
Evidence:

- There is a strong need for prospective RCTs comparing PMCs and fillings for managing decayed primary molar teeth. The lower levels of evidence that have been produced, however, have strength in that the clinical outcomes are consistently in favour of PMCs, despite many of the studies placing PMCs on the most damaged of the pair of teeth being analysed.

- Innes Nicola P T, Ricketts David, Evans Dafydd J P. Cochrane systematic review 2007
Cost: £15.25 for 5 crowns: £3.05 each.
Concepts:

- Complete removal of caries, placement of “core”, preparation of tooth and cementation of SSC.

- Pulpotomy and caries removal followed by preparation and cementation of SSC
Concepts

• Caries removal with or without pulp therapy followed by cementation of SSC with minimal or no preparation.
Concepts

- Cementation of SSC with no caries removal or pulp therapy. The Hall technique.

Starve the bugs!

From the Hall technique manual
Hall technique.

- Symptom free carious tooth with no clinical or radiographic sign of infection (may not have a radiograph in pre-cooperative child).

- No caries removal.

- May use orthodontic separators.

- Choose crown.

- “bite crown smartly into place!” sealed on with GIC.
The Hall Technique:

- Describe the technique and the evidence to support it.

Courtesy of Norna Hall
Norna Hall: a GDP in Keith in 1980’s faced with overwhelming amounts of caries in deciduous teeth placed “NiCro’s” over carious molars and found after keeping careful records and auditing outcomes that the technique was working well.

**Early Audit 1990**

- 111 crowns fitted in previous 2 years
- Still present or exfoliated naturally 91
- Fell off or restored conventionally 3
- Extracted 16
- Crown removed (patient not happy) 1
Keith Dental Practice
Audit of Stainless Steel Crowns Fitted to Deciduous Teeth from 1987-2000

259 children (894 crowns)

Crowns present 45%
Crowns shed 39%
Crowns failed and left or restored conventionally 3%
Crowns extracted 13%

Data, photographs and radiograph courtesy of Norna Hall.
Controversy…..

British Dental Journal 201, 68 - 69 (2006)
Published online: 22 July 2006 | doi:10.1038/sj.bdj.4813842

• Sir, it was with great interest and some concern that I read the recent paper authored by Innes, Stirrups and Evans et al. (BDJ2006; 200: 451–454) concerned with the retrospective analysis of what was described in the title of the article as, 'a novel technique' for managing primary molar caries in general practice.

• this paper records an egregious failure over an extended period to respect the rights of one of the most vulnerable groups in society.

C. Dean

Response from Dafydd Evans:

• It is correct that there was no evidence from RCTs when Norna Hall started to use the technique (as, interestingly, there is still no evidence to date from RCTs supporting the use of the correspondent’s favoured technique, that of conventionally fitted PMCs), but there was already some evidence in 1987 regarding the effect of sealing in caries in permanent teeth on its progression.

• Norna Hall, who practised in a remote and rural area with little specialist support, actively did something to help her child patients achieve their fundamental right to oral health and freedom from dental pain.
Evidence for the Hall technique:

The Hall technique: a pilot trial of a novel use of preformed metal crowns for managing carious primary teeth. *Tuith Online*; http://www.dundee.ac.uk/tuith/Articles/rt03.htm

- **Innes, N. P. T., Stirrups, D. R., Evans, D. J. P. and Hall, N (2006)**

- **Innes N, Evans DJP, Stirrups DR (2007)**

- **Innes NPT, Ricketts D, Evans DJP. (2007)**

- **UK National Clinical Guidelines in Paediatric Dentistry (2008):**

- **Innes NPT, Evans DJP. Hall N. (2009).**

- **A.A. Dean, J.E. Bark, A. Sherriff, L.M.D. Macpherson, A.M. Cairns (2011)**


- Split mouth Randomised Controlled Trial. 264 teeth (132 children).

- At 60 months, Hall technique restorations significantly outperformed the GDP’s standard restorations.

- At 60 months, Hall technique outcomes were comparable with those of standard restorations in secondary care.

- These results strongly support the Hall Technique as a predictable restorative option, with low failure and, therefore, re-treatment rates, for managing carious primary molars in a Primary Care environment.
2 year results for 124 teeth treated with the Hall Technique compared to 124 conventional restorations in a split mouth study with matched caries lesions prior to treatment.

From the Hall technique manual
And is the Hall Technique acceptable to children, their parents and dentists?

In the same clinical trial, the children, their parents/carers and dentists stated whether they preferred the Hall or conventional restoration when both procedures were completed (see Figure 4).

From the Hall technique manual
A new pain-free method of treating tooth decay could see an end to the drilling and filling procedures endured by countless children every year. Known as the Hall technique, it involves fitting stainless steel crowns over diseased baby teeth and cementing them in place until the tooth falls out naturally. Developed by Norna Hall, a dentist in Aberdeenshire, the method aims to prevent spread of decay without the need for dental intervention.

Seven-year-old Shaunni Coleman, from Dundee, is one of the first children in Scotland to undergo the Hall technique as part of a pilot study. With decay in two of her milk-teeth molars, she was fitted with the crowns in a procedure that takes just minutes to perform.

Her mother Valerie says: 'Shaunnii has always found going to the dentist a big step. 'She didn't like having her teeth filled - it's not a nice experience - and even though she had only small holes in her teeth, they still had to be drilled out and a lot of filling put in.

'When we were asked about taking part in the trial, we thought it was a good way of saving her from the distress of more drilling or from having her teeth out in the future.'

No anaesthetic is needed and, unlike standard techniques that remove decay and some sections of tooth before a crown is fitted, the Hall technique simply involves slipping a metal crown over the decaying tooth and cementing it into position onto the tooth.

Dentist Dr Dafydd Evans, from the children's department of the University of Dundee's Dental School, conducted the study of 49 children between the ages of five and nine in Tayside.

He says: 'I'm quite excited about this technique. Here, in Scotland, nearly half of our children have one baby tooth pulled out by the time they get to the age of eight, which is a shocking figure.'

Statistics show Scottish children have the highest rates of dental decay in Europe: 52pc of five-year-olds have at least one decayed tooth.

Shaunnii's dentist was one of a number of local practitioners who took part in the study. Because the Hall technique is so simple, Shaunni was able to have both of her teeth treated at the same time.

The first stainless steel crown was filled with dental cement and placed over one of her decayed teeth. The crowns are made of a soft alloy, attached by a thin alloy ribbon at the base of the tooth so that they can be moulded to fit each individual. Shaunni was asked to bite down hard on the crown, and to continue biting on it until the cement set - a matter of a few minutes. Because the soft alloy base of the crowns are malleable, they are easily pressed into position and fit tightly enough to remain in place until the tooth drops out normally, at around the age of ten. The crowns simply drop out with the tooth, as they are not attached to the gum.

Shaunnii says her new crowns 'feel just like normal teeth'.

Dr Evans explains: 'The beauty of this technique is that it doesn't involve any drilling, injections or extractions. THE decay is simply sealed in under the crown and we hope the tooth is shed before the decay has a chance to cause any trouble.'

'We believe the decay probably stops because it is starved of bacteria and oxygen, but it is almost certainly slowed down to such a rate that it doesn't cause any pain.

'We are starting randomised clinical trials to find a definitive answer to this question.' Nicola Innes, a research and training fellow with the chief scientist's office of the Scottish Executive, will now run the trial throughout Tayside. She says: 'The expectation is that the cavities or decay being sealed inside the tooth will stop developing because the bacteria is starved of nutrients such as sugar and oxygen.'

The results of the study, due out in two-and-a-half years' time, will also give dentists an idea of what level of tooth decay is suitable for sealing into the metal crowns. But it is the psychological implications of the technique that are likely to have the most dramatic effect on youngsters. Unlike fillings and extractions, which are distressing procedures for both children and their parents, the Hall technique is minimally invasive and pain-free. Experts have also found that by involving children in the positioning of their crowns, anxiety levels are reduced and a positive experience of dentistry is reinforced.

Nicola says: 'When children come to you with a hole in their tooth, if you can make it better without causing them distress, it makes dentistry a lot easier. Children who have undergone the technique are no longer fearful. They are proud to have managed it.'
Hall technique manual:

- Available online at:

  - http://nhshrmwebapp01.nhsh.scot.nhs.uk/cgi-bin/patience.cgi?id=b48f4eca-3c0d-11df-80a1-1d6cf6af25ef
Tips

Contra-lateral crown from opposing arch may fit tooth better if tooth has changed shape as a result of the caries.

If it fits, it fits…….

From the Hall technique manual.
Tips

Little bulgy bits and funny cusps…..

From Hall Technique manual
Tips

• If you can’t get the try in off…….
Advantages of stainless steel crowns:

• Quick and easy for young patients (cf drilling and placement of matrix band and filling).

• Hall technique: no LA and *no drills!*

• Children *really* like them!

• Good seal and longevity: minimal maintenance.

• Can be accessed through for subsequent pulp therapy.
Parental objections.

- Evidence base: this IS THE BEST THING!
- Compared to a filling: easier for the child, easier to keep clean, less likely to fall apart, less interventions.
- Compared to extraction………. 
What you will see....

• May be blanching round gingival margin.

• It will be high... (at first).
“so why prepare the tooth at all….”

Formocresol era with adult treatment concepts for provision of PFMC’s

Now there is a strong (and increasing) evidence base of simple, effective techniques that work.

Do as much as you can, as little as you need to…… Get ‘em back.
Fees in SDR

- Pulpotomy  £8.27
- Non-vital pulp therapy  £15.73
- Placement of PFMC  £20.69

- So: pulpotomy and SSC accrues a fee of  £28.96

Each crown costs £3.05

Time taken:

This is a viable prospect in general practice.
Treatment planning:

- Preventive framework.
- Acclimatization.
- Stabilization.
- Baby teeth fall out.
- Little people turn into bigger little people.

“For me, there is nothing more rewarding that providing high quality restorations for young children, and to see them happily accept treatment.

Surely our goal should be to end the dismal situation of thousands of children requiring multiple extractions under general anaesthetic every year.”

British Dental Journal 212, 347 - 348 (2012)
Deciduous and mixed dentition: Treatment planning.

Different approach to planning in the adult dentition.

Baby teeth fall out and little children turn into bigger children.
Thank you for listening....