An evidence based approach to managing children with a carious primary dentition

Nicola Innes
Clinical Senior Lecturer in Paediatric Dentistry
University of Dundee, Scotland
Njörg, Denmark, September 2014

What might be the barriers to providing high quality care using the surgical approach?

Children find the surgical approach challenging

Evidence that children don't like rotary instruments and injections

• comparing discomfort with bur and hand excavation (non-bur)
• comparing rotary instruments and hand excavation of caries
• preparing the tooth for injection
• comparing restorative treatment approaches and the use of local anaesthesia on children's discomfort.

Evidence of the influence of restorative treatment approaches and the use of local anaesthesia on children's discomfort.


What might be the barriers to providing high quality care using the surgical approach?

Children find the surgical approach challenging

And the approach can be difficult to deliver.

Administration of 190 local anaesthetic injections to 95 children, 6 – 12 yrs

<table>
<thead>
<tr>
<th>Local anaesthetic injections</th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injection 1</td>
<td>37 (19.9%)</td>
<td>37 (19.9%)</td>
</tr>
<tr>
<td>Injection 2</td>
<td>50 (26.3%)</td>
<td>62 (32.6%)</td>
</tr>
</tbody>
</table>

"Our study showed that the vast majority of children rated the injection experience as positive, although there were objective signs of pain like crying. This may be explained by the fact that in a good dentist-child rapport the child may want to satisfy the caregiver".

Ruan Q, et al. (2005) Reaction of children to dental injections with 27 or 38 gauge needles. Int J Paed Dent 17(5); 383-387

What we’re doing in Dundee

A Child Friendly approach

The Oral Health Assessment

Preventing caries

Managing caries in the primary dentition

Managing the early caries burden in the permanent dentition (and the pain too...)

We’re friendly dentists

Motivational Interviewing and its use for teeth brushing instruction

Dr Dafydd Evans & Dr Nicola Innes
University of Dundee

Can I borrow your car?

Your response to a “defensive” mother

Dr Dafydd Evans & Dr Nicola Innes
University of Dundee

10/10/2014
Do you have to remove dental caries? When, why and how much?

- Why complete caries removal is not necessary
- What do we mean by caries?
- The overall clinical evidence for:
  1. Complete caries removal and restore
  2. Stepwise caries removal and restore
  3. Partial caries removal and restore
  4. No caries removal and fissure seal
  5. No caries removal and restore
  6. (Non-restorative caries treatment)
- Conclusions

The goal we all share

An adult with good oral health, which they have the knowledge, skills and attitude to maintain for themselves, having had only positive experiences of oral health care through childhood and adolescence

Caries detectives - evidence

- what happens to teeth when all caries is not removed compared to those where all caries is removed?
- Comprehensive systematic review of ALL high quality evidence – Cochrane review
  - any language, any country, any publication
  - 5 studies on primary teeth
  - 4 studies on permanent teeth
- Also 2 other newer studies on primary teeth

Do you have to remove dental caries? When, why and how much?

1. Complete caries removal and restore
2. Stepwise caries removal and restore
3. Partial caries removal and restore
4. No caries removal and fissure seal
5. No caries removal and restore
6. (Non-restorative caries treatment)

How NOT to do it…
Complete caries removal?

- Restorative cycle is entered
- Need for local anaesthetic
- Reduces remaining dentine thickness
- Pulp exposure

Fusayama showed decades ago that demineralised dentine has the ability to remineralise

Remineralisation of demineralised dentine occurs through:
- Ameloblastic process, providing calcium & phosphate from vital pulp
- Diffusion of ions (fluoride, calcium, and phosphate) from materials placed on the floor of a restored cavity
- Contact of saliva with the carious lesion, providing calcium and phosphate, notably in root dentine in conjunction with oral hygiene measures

Microbiology

- 10 teeth with caries
- Duplicate standardized samples of infected dentine
- At baseline, before sealing
- and 5 months later - after the removal of the restorations


Annually soft and wet but on re-entry harder and dryer (no change in colour)

Acid etching significantly reduced the number of microorganisms recovered

dentinal microbiota under the restorations were subject to significant environmental change reduction in the
- microbial load in the infected dentine
- microbial diversity


Cochrane Systematic Review


8 trials, 934 participants, 1372 teeth

8 comparisons:
1. stepwise caries removal vs complete caries removal (4 trials)
2. partial caries removal vs complete caries removal (3 trials)
3. no dentinal caries removal vs complete caries removal (2 trials)

Authors’ conclusions

• Stepwise and partial excavation reduced the incidence of pulp exposure in symptomless, vital, primary and permanent teeth. These techniques show clinical advantage over complete caries removal for managing dentinal caries.
• No difference in signs or symptoms of pulpal disease between stepwise excavation, and complete caries removal.
• Insufficient evidence to tell if there was a difference in signs and symptoms of pulp disease between partial caries removal and complete caries removal.

Do you have to remove dental caries? When, why and how much?

1. Complete caries removal and restore
2. Stepwise caries removal and restore
3. Partial caries removal and restore
4. No caries removal and fissure seal
5. No caries removal and restore
6. (Non-restorative caries treatment)

What happens? Stepwise vs complete caries removal?

• 2 studies in permanent teeth
• 2 studies in primary teeth

What happens? Stepwise vs complete caries removal?

• 4 studies
• Pulp exposure (mean incidence)
  – 15.4% in stepwise caries removal groups
  – 34.7% in complete caries removal groups
  – 56% less exposures in stepwise group*

*RR 0.44; 95% CI 0.33– 0.63, p=0.00001

What happens?
Stepwise vs complete caries removal

Pulp exposures with
Stepwise caries removal

Pulp exposures with
Complete caries removal

What happens?
Stepwise vs complete caries removal?

• 4 studies
• Pulpal S&S at one year — no difference


Stepwise caries excavation
Do you have to remove dental caries? When, why and how much?

1. Complete caries removal and restore
2. Stepwise caries removal and restore
3. Partial caries removal and restore
4. No caries removal and fissure seal
5. No caries removal and restore
6. (Non-restorative caries treatment)

Partial caries removal vs Complete caries removal
- 4 studies
  - 3 primary teeth
  - 1 primary and permanent

What happens?
Partial vs complete caries removal
- Pulp exposure (mean incidence - 2 studies)
  - 5% in the partial caries removal groups
  - 21.9% in complete caries removal groups
  - 77% reduction in partial groups

RR 0.23; 95% CI 0.08– to 0.69, p<0.009

What happens?
Partial vs complete caries removal
- Pulpal S&S no difference
- Restoration failure - ?no difference but evidence not of good quality

Partial caries removal; seal with a restoration
Partial caries removal and restore

Do you have to remove dental caries? When, why and how much?

1. Complete caries removal and restore
2. Stepwise caries removal and restore
3. Partial caries removal and restore
4. No caries removal and fissure seal
5. No caries removal and restore
6. (Non-restorative caries treatment)

Fissure sealant vs Complete caries removal

- 1 study in primary teeth


No caries removal, seal with a sealant

2 years later...
• Fissure sealants don’t “fail”
• We, or the parents/carers “fail”

What happens?
Fissure seal vs complete caries removal
• Lesion progression (radiographically)
  – 11.5% in F/S
  – 0% complete caries removal
• Sealant loss
  – 11.5% partial loss in F/S
  – 0% in complete caries removal

Do you have to remove dental caries? When, why and how much?
1. Complete caries removal and restore
2. Stepwise caries removal and restore
3. Partial caries removal and restore
4. No caries removal and fissure seal
5. No caries removal and restore
6. Non-restorative caries treatment
No caries removal and restore

- 2 studies
- 1 in primary teeth
  - Hall Technique
- 1 in permanent teeth (children and adults)
  - Amalgams and Sealed amalgams


What happens?
No dentinal caries removal vs complete

- Pulp exposures - None in either study
- Pulpal S&S
  - Hall Technique
  - No caries removal teeth better off
  - Restoration in permanent teeth
  - No failures in either group
- Restoration longevity
  - Hall Technique
  - No caries removal teeth better off
  - Restoration in permanent teeth — no difference
2 year follow up
Lois McLellan

Non-restorative caries removal
Non operative caries treatment

Jason (age 5 years)

Treatment plan
- Encouragement regarding attendance
- Intensive brushing support
- Duraphat varnish
- Diet advice
- Tooth Mousse

Jason (5 months later)

Jason (9 months later)

Jason (one year later)

Jason (1½ years later)
Do you have to remove dental caries? When, why and how much?

1. Complete caries removal and restore
2. Partial caries removal and restore
3. Stepwise caries removal and restore
4. No caries removal and fissure seal
5. No caries removal and restore
6. (Non-restorative caries treatment)

Conclusion 1.
- Stepwise and partial caries removal
  - In symptomless, vital carious primary or permanent teeth significantly reduced the risk of pulp exposure
  - Restoration failure and pulp S&S no worse
  - Therefore, clinical advantageous
- How much to remove?
  - Unknown but enough to get a seal and restore

Conclusion 2.
- Stepwise or partial?
  - Don’t need to re-enter in primary teeth
  - For permanent teeth, there is growing evidence to support partial over stepwise but this is less strong, so stepwise should be carried out
Conclusion 3.

- Fissure sealing over dentinal caries
  - In symptomless, non/micro-cavitated primary teeth there was no increase in pulp S&S
  - Still not a lot of evidence to be sure what results we can expect and not long-term evidence
  - Restoration failure
    - Possibility of material failing must be built into clinical decision

Conclusion 4.

- No dentinal caries removal and restore
  - Similar to partial caries removal
  - Only 1 study in primary teeth
  - Only 1 study in permanent teeth
  - For permanent teeth – not recommended as stronger evidence that other approaches can be successful
  - For primary teeth – the Hall Technique is recommended to seal caries in, in the right conditions.

Overall

- Used to only have one word for caries – there was only one thing we could do with it – remove it

  Now, however

- Different options and need to learn when best to use each of them for our patients’ benefit

Thank you!

An adult with good oral health, which they have the knowledge, skills and attitude to maintain for themselves, having had only positive experiences of oral health care through childhood and adolescence.

References

1. Magnusson (1977) Stepwise vs Complete

1. “Consequently, although the clinical and radiographic stepwise removal of dentin with a calcium hydroxide inlay may decrease the carious number, the use of complete removal may currently be indicated for high caries risk primary molars.”
2. “Application of an adhesive restorative system did not affect the clinical performance of the restoration.”
3. “… sealing-in caries by the Hall Technique statistically, and clinically, significantly outperformed the GDPs’ standard restorations. These results strongly support the Hall Technique as a predictable restorative option, with low failure and, therefore, re-treatment, rates for managing caries in primary molars in a Primary Care environment.”
4. “The results suggest that persistence of bacteria does not seem to be a reason for reopening of cavities in deciduous teeth after partial caries removal.”
5. “Indirect pulp therapy in both primary and young permanent teeth can be restoratively, and stabilisation by the Conventional approach is advisable.”
6. “Fissure sealing and tooth restoration were equally effective in the management of non-cavitated dentine occlusal caries in primary teeth. Invasive procedures can be replaced with the non-drilling approach with no adverse consequences for paediatric patients.”
7. “The clinical and radiographic evaluations after 12 months indicated that partial soft caries removal at EDJ followed by GIC restoration was comparable to that of ART and conventional approaches.”
8. “The retention of carious dentine does not interfere in pulp vitality. Data from this 18-month study suggest that the procedure of reopening the cavity to remove the residual infected dentine is not necessary.”