A re-audit of post-operative vomiting (POV) rates after tonsillectomy in a tertiary paediatric hospital

What made the difference?

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Contents

- Aims and background of our audit
- Methodology
- Outcomes
  - POV
  - PAIN
- Discussion
  - Conclusions
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Alder Hey Children’s NHS trust

- Multidisciplinary paediatric tertiary referral center
  - Serves a catchment population of 7.5 million in Northwest England, Merseyside.
  - 18,000 surgeries/year
    - 25% ENT surgeries
    - 1,800 (10%) Tonsillectomies +/- Adenoidectomies/yr
The size of the problem- *POV*

- POV is a significant morbidity of tonsillectomy procedures, leading to poor oral intake, dehydration, pain, and delayed discharge. \(^1\)
- The incidence of PONV has been reported to be 40-73% in various paediatric centers. \(^2\)

Aim

- To assess the current POV rates of post-tonsillectomy patients.
  - Peri-operative management assessed
    - anti-emetic prophylaxis
    - intra-operative analgesic regimes
Background—our last PONV audit

- POV audit Alderhey 2003
  - 60 patients who underwent Adenotonsillectomy and Tonsillectomy.
  - 30 (50%) vomited.

- Type of cases: Daycases > all ENTs > T&A
  - POV rate: 6% 19.6% 50%!!
  - 50 (80%) received IV ondansetron

⇒ How effective is ondansetron alone in preventing PONV post-tonsillectomy?
Ondansetron combined with dexamethasone increases the effectiveness in preventing PONV in children.

In children at high risk of PONV, combination therapy of ondansetron and dexamethasone should be given. IV Ondansetron 50 mcg.kg⁻¹ and IV dexamethasone 150 mcg.kg⁻¹ should be given to children scheduled for adenotonsillectomy or strabismus surgery.

Dexamethasone given alone reduces the risk of PONV in children. It appears to be particularly effective in preventing late PONV (>6 hr).

A dose of dexamethasone 150 mcg.kg⁻¹ provides good reduction in PONV with no adverse effects. Doses as low as dexamethasone 62.5 mcg.kg⁻¹ are efficacious in reducing PONV in children. Dexamethasone should not be used in patients at risk of tumour lysis syndrome.
Use of opioids may be associated with increased risk of POV particularly if longer-acting agents are used in the postoperative period.

The anaesthetist should try to achieve satisfactory postoperative analgesia without the use of opioids whenever possible if POV is to be minimised, particularly in high risk patients.

Use of regional and local anaesthesia techniques are recommended where appropriate to reduce the need for opioids.

Peri-operative IV fluids may reduce POV in children after day case surgery.

POV in children may be increased if tolerance of oral fluids is mandatory before discharge from day case surgery.

Intra-operative fluids may reduce POV in children after day case surgery.

Oral fluids should be offered to children wishing to drink before discharge after day case surgery but should not be mandatory.

Ondansetron is more clinically effective than droperidol or metoclopramide in preventing POV in children. Ondansetron is equally effective to dexamethasone for early POV although the latter may be more effective in reducing late POV.

Ondansetron should be considered as a first line treatment in children with a high risk of POV. Combination therapy with a second agent may improve its efficacy (as detailed below).

Dexamethasone given alone reduces the risk of POV in children. It appears to be particularly effective in preventing late POV (>6 hr).

A dose of dexamethasone 150 mcg.kg⁻¹ provides good reduction in POV with no adverse effects. Doses as low as dexamethasone 62.5 mcg.kg⁻¹ are efficacious in reducing POV in children. Dexamethasone should not be used in patients at risk of tumour lysis syndrome.
Methodology

- Hospital audit department approval
- Prospective audit over 2 month period in 2011
- All patients admitted for Tonsillectomy (with or w/o other procedures) are included.
- Data collection using a **prospectively-designed data collection form**
  - starts upon admission in ward
    - all patients admitted for same-day tonsillectomy procedures were identified and demographics recorded
  - intra-operative data is recorded by the anaesthetist
  - post-operative data collected by the recovery nurse
  - ward data collection continued until the patient is discharged
Methodology

- Patient outcomes assessed
  - **POV**
  - post-opt pain scores in recovery
    - (<5 yrs: FLACC, >5 yrs: Numerical Rating scale)
  - patient satisfaction
  - post-opt bleeding

- Data entry
  - done by audit department personnel

- Data analysis
Results
Total number of responses = 88
Gender = M:F (50%:50%)
Demographics

- Mean age = 6.42
  - (41% aged 3-5 yrs, max 18 yrs)

- Mean wt = 29.2 kg
  - (range 11.8-74.8 kg)
Surgical factors

Surgical indications

- Recurrent Tonsilitis
- O.S.A
- Other reasons
- Not recorded

Other reason(s)
- Frequent chest infections
- Disturbed sleep
- Snoring

<table>
<thead>
<tr>
<th>Indication for surgery</th>
<th>N=88</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurrent Tonsilitis</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>64.8%</td>
</tr>
<tr>
<td>O.S.A</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>30.7%</td>
</tr>
<tr>
<td>Other reasons</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>4.5%</td>
</tr>
<tr>
<td>Not recorded</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>12.5%</td>
</tr>
</tbody>
</table>
Surgical techniques

- Coblation was used in majority (53.4%) of patients
- LA bupivacaine swabs was used in 73.9% of patients

<table>
<thead>
<tr>
<th>Surgical technique used:</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bipolar/diathermy</td>
<td>21 23.9%</td>
</tr>
<tr>
<td>Ties</td>
<td>13 14.8%</td>
</tr>
<tr>
<td>Both</td>
<td>5 5.7%</td>
</tr>
<tr>
<td>Coblation</td>
<td>47 53.4%</td>
</tr>
</tbody>
</table>
Overall POV rate 18%

- No patients vomited in recovery
- Out of the 16 who vomited in the ward, 8 (50%) vomited a 2\textsuperscript{nd} time, 1 patient vomited a 3\textsuperscript{rd} time
Pain

- Median pain score in recovery
  - On awakening
    - Majority of pts (96.7%) had pain score \( \leq 2 \)
  - On discharge
    - Majority of pts (97.8%) had pain score \( \leq 2 \)
  - 3 patients required rescue analgesia, given in the form of fentanyl

\[ <3\% \text{ patients had pain score} > 2 \text{ in recovery} \]
Patient satisfaction

- 45.5% felt that ‘pain is better than expected’ 😊
- 18.2% felt that pain is ‘same as expected’.
- 4.5% felt that pain is ‘worse than expected’.
What was prescribed....

- Anti-emetic prophylaxis
- Analgesic regimes
Intra-opt **anti-emetic** by POV rate

<table>
<thead>
<tr>
<th>Intra-operative anti-emetic</th>
<th>Total</th>
<th>PONV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=88</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>10.2%</td>
<td>10.2%</td>
</tr>
<tr>
<td>Ondasetron</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>1.1%</td>
<td>1.1%</td>
</tr>
<tr>
<td><strong>Both</strong></td>
<td>70</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>79.5%</td>
<td></td>
</tr>
<tr>
<td>Neither</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>9.1%</td>
<td></td>
</tr>
</tbody>
</table>
73.9% were prescribed ondansetron post-opt.

| Number of Responses | 88  
|---------------------|-----
| Post op anti-emetic prescribed (Ond): | 100.0% |
| Yes                  | 65  
|                      | 73.9% |
| No                   | 23  
|                      | 26.1% |

| Number of Responses | 88  
|---------------------|-----
| Post op anti-emetic prescribed (Dex): | 100.0% |
| Yes                  | 1  
|                      | 1.1% |
| No                   | 87  
|                      | 98.9% |
NSAIDs and Paracetamol

85 out of 88 (96%) had paracetamol
- 61% PO premed (20 mg/kg)
- 39% IV intra-opt (15 mg/kg)

80 out of 88 (90%) had NSAIDS
- 26% PO Diclofenac (1 mg/kg)
- 73% PO Ibuprofen (10 mg/kg)
- 1 intra-opt as suppository
## Intra-opt analgesia

<table>
<thead>
<tr>
<th>Intra-operative analgesia</th>
<th>Number of Patients (%)</th>
<th>Mean dose given (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphine</td>
<td>63 (71.6 %)</td>
<td>55.9 mcg/kg (15-150)</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>8 (9.1%)</td>
<td>0.94 mcg/kg (0.6-1.6)</td>
</tr>
<tr>
<td>Remifentanil</td>
<td>8</td>
<td>1.31 mcg/kg</td>
</tr>
<tr>
<td>Ketamine</td>
<td>25 (28.4%)</td>
<td>0.34 mg/kg (0.14-1.0)</td>
</tr>
<tr>
<td>Clonidine</td>
<td>4</td>
<td>2 mg/kg</td>
</tr>
</tbody>
</table>
Intra-opt analgesia combinations

- Diclofenac & Paracetamol & Morphine
- Paracetamol, & Fentanyl
- Paracetamol & Ketamine
- Paracetamol & Ketamine & Morphine
- Paracetamol & Morphine
- Morphine & Ketamine (most common)
- Clonidine, Ketamine & Remifentanyl
- Clonidine & Remifentanyl
- Clonidine & Ketamine
What about OSA patients?

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>O.S.A. patients - Intra Op analgesia</td>
<td>27</td>
<td>100.0%</td>
</tr>
<tr>
<td>Paracetamol</td>
<td>14</td>
<td>51.9%</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>4</td>
<td>14.8%</td>
</tr>
<tr>
<td>Ketamine</td>
<td>11</td>
<td>40.7%</td>
</tr>
<tr>
<td>Morphine</td>
<td>15</td>
<td>55.6%</td>
</tr>
<tr>
<td>Other intra Op analgesia</td>
<td>1</td>
<td>3.7%</td>
</tr>
<tr>
<td>Not Recorded</td>
<td>1</td>
<td>3.7%</td>
</tr>
</tbody>
</table>
### Post-opt analgesia

- **Combinations used...**

<table>
<thead>
<tr>
<th>Post Op Analgesia Combinations</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Paracetamol &amp; Codeine</td>
<td>5</td>
</tr>
<tr>
<td>Paracetamol, Codeine &amp; NSAID's</td>
<td>70</td>
</tr>
<tr>
<td>Paracetamol</td>
<td>1</td>
</tr>
<tr>
<td>Paracetamol, Codeine &amp; NSAID's &amp; Other</td>
<td>2</td>
</tr>
<tr>
<td>Paracetamol &amp; NSAID's</td>
<td>2</td>
</tr>
<tr>
<td>Not Recorded</td>
<td>8</td>
</tr>
</tbody>
</table>

Total: 88

- **100.0%**

- **5.7%**

- **79.5%**

- **1.1%**

- **2.3%**

- **9.1%**
Post-opt bleeding

Occurred in 4 patients

- Incidence of 4.5%
  - 0.95-5%* in other institutions*

- But none returned to OT
  - 3 Primary bleeds
    - 2 were observed overnight and 1 went home the same day
  - 1 secondary bleed at POD 4
    - Readmitted for observation
  - All 4 resolved with Hydrogen Peroxide gargle +/- Antibiotics

- All 4 given NSAIDs (2 diclofenac, 2 ibuprofen)
- Coblation performed in all 4 patients

Number of Responses

<table>
<thead>
<tr>
<th>Post op bleeding?</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>4.5%</td>
</tr>
<tr>
<td>No</td>
<td>84</td>
</tr>
<tr>
<td></td>
<td>95.5%</td>
</tr>
</tbody>
</table>


Discussion
The incidence of PONV is much lower in this audit (18%), compared to the last done in 2003 (50%), and to most paediatric centers worldwide (40-73%).

Combination anti-emetic prophylaxis was well-adhered to,
- 79.5% received both IV dexamethasone and ondansetron (cf. 80% receiving only ondansetron in 2003)

Routine peri-opt paracetamol and NSAIDs (≥90%).

Intra-operative analgesia consisted of low dose (morphine 0.5 mg/kg) or short-acting opioids (fentanyl, remifentanil) and other drugs (Ketamine and Clonidine)
Discussion – POV & Pain

Other factors that may have contributed to a low POV rate:
- Allowing free fluids up to 2 hrs pre-operatively.
- IV fluids (27.3%)

Pain control in the immediate post-operative period was adequate with our multi-modal analgesic regimes.

Patient satisfaction was generally good.
- with only 4 patients reporting that ‘pain is worse than expected’.
Recommendations
Recommendations

- A large proportion of children vomit at least once post-adenotonsillectomy.\(^4,5,6\)

- We are unsure to what extent opioid-usage compounds the problem\(^7\).
  - but a multi-modal analgesic approach, using low-dose opioid regimes will be most sensible.
    - Paracetamol, NSAIDS
    - Ketamine, clonidine
  - OSA patients at risk of post-operative respiratory depression benefits maximally from these techniques.

References:
- 4. Paediatr Anaesth 1995; 5: 253-256
Recommendations

- **Double anti-emetic prophylaxis**, in accordance with the APA 2009 guidelines is warranted for Tonsillectomy procedures associated with a high risk of POV.

- **Future studies**
  - TIVA in children?
  - Alternative opioids such as Tramadol?\(^8,9\)

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Acknowledgements

- Alder Hey Clinical audit department
  - Mr Steven Riley

QUESTIONS?

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- leeshuying79@yahoo.com.sg
From Liverpool, Thank you...

SCHOOL OF BRITISHNESS

YOU PASSED ON THE HOPELESS OPTIMISM FOR RUBBISH NATIONAL SPORTS TEAMS BUT FAILED ON KEEPING DOWN YOUR LUNCH AFTER 17 PINTS OF LAGER...