Pain, PONV, Parents

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“After tonsillectomy, children experience significant pain and severe functional limitation for 7 days after surgery. For many children, pain and functional limitation persists throughout the second postoperative week.”

Tomecka et al. 2012 Substantial postoperative pain is common among children undergoing laparoscopic appendectomy. Paediatr Anaesth 22(2): 130-135

- Laparoscopic appendectomy
- Retrospective, paracetamol + nsaid + opioid postop
- 1/3 had substantial pain (vas ≥ 4 for 60% of time) in PACU
- 1/6 had substantial pain through the postop hospital stay
- 1/5 had substantial pain during Pod 1
- 5% had median pain score of ≥ 7 during hospital stay
- Nothing seemed to predict who had more pain
**Pain**

**Routes**

For several refs, see: **Kokki 2003** Nonsteroidal anti-inflammatory drugs for postoperative pain: a focus on children. Paediatr Drugs 5(2): 103-123

- **i.v. > p.o. > p.r. > i.m.**
  - i.v. when available at hospital
  - p.o. is best
  - p.r. absorption varies manyfold
  - p.r. only if no i.v. and cannot take p.o.
  - NO i.m. injections! needle punctures may be the worst experience

**Absorption p.o.**

- Usually good
  - Example 1: ketoprofen p.o. = i.m. = p.r.
  - Example 2: diclofenac p.o. > p.r.
- May be delayed after surgery, if PONV
  - Proven at least for tonsillectomy and paracetamol
  - **CAVE!** enteral coated /slow release tablets
Rationale: better effect, less opioids, less adverse effects


- 180 children 1-7y
- NSAID as po premedication, pethidine at induction iv
  1. Pethidine 1mg/kg + naproxen 10mg/kg
  2. Pethidine 1mg/kg + paracetamol 20mg/kg
  3. Pethidine 1mg/kg + placebo
  4. Naproxen 10mg/kg
  5. Paracetamol 20mg/kg
  6. Placebo

- i.v. fentanyl in PACU as rescue
- Pethidine reduced the need for fentanyl but caused PONV
- Pethidine vs no-peth: fentanyl requirement 1.1 vs 2.2 doses  ponv 50% vs 25%
Concept: Opioid sparing effect

- 31 randomized controlled studies

- Opioid sparing most consistent:
  - multiple doses of NSAID (vs. just single shot)
  - 24h PCA requirements (vs. ‘bolus as needed’)
  - in group with highest need for opioids

- Reduction in PONV clearest:
  - groups showing greatest opioid sparing

- Effect with paracetamol:
  - lesser, influenced by route and dose
  - reduction in PONV with 40 or 60mg/kg loading dose (not 20mg/kg)
  - showing also highest opioid sparing effect

Concept: Opioid sparing effect


- 27 randomized controlled studies

- Opioid sparing:
  - in the PACU
  - the first 24 h

- Pain intensity reduced:
  - in the PACU (not 24h)

- Reduced PONV:
  - the first 24 h (not PACU)

- Coadministration of paracetamol reduced pain the first 24 h

- Type of surgery affected PONV the first 24 h
Concept: NSAID + paracet + local anesth. to omit opioids

For several refs, see reviews:


- Often adequate to exclude opioids
- Inform & equip the parents for the local anesthesia wearing off

... but do you *really* need to omit them?


- 60 pediatric orthopedic outpatients, description of procedure
- Paracetamol, ibuprofeine + tramadol (+ morphine rescue)
- Epidural, caudal, plexus, popliteal
- Metoclopramide on demand

<table>
<thead>
<tr>
<th></th>
<th>Tramadol needed</th>
<th>PONV</th>
<th>rescue MO</th>
</tr>
</thead>
<tbody>
<tr>
<td>PACU</td>
<td>11.7%</td>
<td>6.7%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Op day</td>
<td>3.3%</td>
<td>8.3%</td>
<td></td>
</tr>
<tr>
<td>Pod 1</td>
<td>31.7%</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Pod 2</td>
<td>6.7%</td>
<td>0%</td>
<td></td>
</tr>
</tbody>
</table>
Options: NSAIDs

For several refs, see reviews


- Various NSAIDs fairly similar effect if given in right doses

### Table 1. Suggested dosages of some NSAIDs for postoperative pain management in children >3 months of age

<table>
<thead>
<tr>
<th>Agent</th>
<th>Single doses (mg/kg)</th>
<th>Frequency (hourly)</th>
<th>Maximal daily dose (mg/kg)</th>
<th>Comment</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diclofenac</td>
<td>1</td>
<td>8–12</td>
<td>3</td>
<td>Also IV preparation</td>
<td>18,38,51,68,72,74,80-90</td>
</tr>
<tr>
<td>Ibuprofen</td>
<td>10</td>
<td>6–8</td>
<td>4</td>
<td></td>
<td>66,91-96</td>
</tr>
<tr>
<td>Flurbiprofen</td>
<td>1</td>
<td>8–12</td>
<td>5</td>
<td>Also IV preparation</td>
<td>72,77</td>
</tr>
<tr>
<td>Ketoprofen</td>
<td>1–2</td>
<td>6–8</td>
<td>5</td>
<td>Also IV preparation</td>
<td>15,19,22,23,26,31,34,35,53,54,57,62-64,76,79,97,98</td>
</tr>
<tr>
<td>Ketorolac</td>
<td>0.3–0.5</td>
<td>6–8</td>
<td>2</td>
<td>Also IV preparation</td>
<td>25,50,75,76,99-116</td>
</tr>
</tbody>
</table>

a. The same doses may be used intravenously, by mouth, and rectally.

IV = intravenous.
Options: NSAIDs COX-2


- No proven benefit over standard NSAID in children
- Interest has gone down
- Small survey in 2010 in USA
  - 57% fewer prescriptions
  - 26% no longer use them.
Options: NSAIDs contraindications

- liver dysfunction, renal dysfunction, coagulation disorder, thrombopenia, hypovolemia, hypotension, bleeding

**Lewis et al. 2013** Nonsteroidal anti-inflammatory drugs and perioperative bleeding in paediatric tonsillectomy. Cochrane Database Syst Rev 7: CD003591

- NSAIDs, bleeding and PONV in tonsillectomy
  - The number of bleedings requiring surgical or nonsurgical intervention was not statistically significantly increased but the confidence interval does not exclude an increased risk.
  - There was significantly less vomiting when NSAIDs were used

For several refs, see 

- Asthma: NSAIDs are usually ok if mild
  - Best evidence of safety for ibuprofen and diclofenac

- Bone healing: No evidence on children
  - Consider ONLY on fusion procedures, limb lengthening, or with previous bone healing problems
Options: Paracetamol dose

Korpela et al. 1999 Morphine-sparing effect of acetaminophen in pediatric day-case surgery. Anesthesiology 91(2): 442-447

- 120 children 1-7y mixed day surgery (hernia, orchido, adenoid)
- paracetamol loading p.r. 0,20,40,60 mg/kg
- adds to total of 80-100mg/kg first day which is ok
Options: Local anesthesia


- Excellent compact review of techniques, benefits, risks and limitations
- Integral part of multimodal pain control
- Ultrasound is “present day”
- Restrictions
  - Always have rescue medicine in the protocol
  - Inform & equip the parents for local anesthesia wearing of


- Tune your caudal to the max?
Pain

Concept: Keep the enemy at bay

- NSAIDs better preventing than reliving pain?
- (“Pre-emptive” means drugs before CAUSING pain, concept poorly proven in children)
- Start NSAID before pain sets in
- Give regularly (=proactive) over the assumed period of worst pain

Lönnqvist et al. 2006 Paediatric day-case anaesthesia and pain control. Curr Opin Anaesthesiol 19(6): 617-621
Hannam et al. 2012 Tears at breakfast. Paediatr Anaesth 22(4): 419
The child cannot be calmer than his/hers parents

- Anxious parents perform poorly
- Fasting, arriving in time / in right place, filling of forms
- Risk factors: young parents, young child, only child, first surgery

- Analgesia at home may be insufficient
- 261 children 2-12y, ENT
- Pod 2: despite 86% significant pain, 24% received 0-1 dose
- Pod 3: 67% having significant pain, 41% received 0-1 doses

Norrington et al. 2013 Does day case pediatric tonsillectomy increase postoperative pain compared to overnight stay pediatric tonsillectomy? A prospective comparative audit. Paediatr Anaesth
- 60 children tonsillectomy, half overnight, half day surgery
- Roughly 50% gave regularly as instructed, 30% gave as needed
- Slightly higher “overall pain level” at home
- Similar max pain
The parents may have...

**Bastable et al. 2005** Parents' management of their child's postoperative pain. Paediatr Nurs 17(10): 14-17

- Misconceptions about pain:
  - Child does not remember
  - Higher pain threshold
  - Needs to learn pain as integral part of life, life shouldn’t be painless
- Difficulties in dealing with a child in pain
- Tendency to underestimate the pain
- Problems in administering the prescribed drug
- Misconception of drugs:
  - Fear of adverse effects
  - Fear of addiction
  - Drug is always the last resort, not for prevention
Inform the parents about...


- The procedure, incision, suture, dressings
- The possibility to be admitted if NOT normal:
  - vital signs, consciousness, airway, motor block, nausea, bleeding, pain, unexpected issues in surgery
- The possibility of behavioral changes:
  - prolonged reaction time (slowness) in 48h
  - impaired coordination (clumsiness) in 48h
  - attention seeking, tantrums, crying, nightmares in 8-20% for 1 wk
Give appropriate and clear instructions about..


- Pain management
  - signs of pain (Fig)
  - address normal vs pathological pain
  - advantage of continuous pain control
  - advantage of initiating early
  - dose, timing (as prescribed, NOT what says on the bottle!)
- General care
  - resuming activities
  - resuming eating
  - dressings
  - wound care
  - bathing and washing
- Who and how to contact if problems arise
- P.S. a follow-up isn’t a bad idea at all...
Appendix 1. The parents’ postoperative pain measure

Questions
Does your child...

- Whine or complain more than usual?
- Cry more easily than usual?
- Play less than usual?
- Not do the things s/he normally does?
- Act more worried than usual?
- Act more quiet than usual?
- Have less energy than usual?
- Refuse to eat?
- Eat less than usual?
- Hold the sore part of his/her body?
- Try not to bump the sore part of his/her body?
- Groan or moan more than usual?
- Look more flushed than usual?
- Want to be close to you more than usual?
- Take medication when s/he normally refuses?

<table>
<thead>
<tr>
<th>Categories</th>
<th>Scoring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Face</td>
<td>No particular expression or smile</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Legs</td>
<td>Normal position or relaxed</td>
</tr>
<tr>
<td>Activity</td>
<td>Lying quietly, normal position, moves easily</td>
</tr>
<tr>
<td>Cry</td>
<td>No cry (awake or asleep)</td>
</tr>
<tr>
<td>Consolability</td>
<td>Content, relaxed</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Each of the five categories Face (F), Legs (L), Activity (A), Cry (C), and Consolability (C) is scored from 0-2, which results in a total score between 0 and 10.

Has your child fasted as instructed? "Oh yes!"

Cantellow et al. 2012 Parents' understanding of and compliance with fasting instruction for pediatric day case surgery. Paediatr Anaesth 22(9): 897-900

- Q: What were the instructions?
  A: Solids 1 - 24 h (median) Fluids 0.5 - 24 h (3)
- Children actually fasted: solids 3 - 40 h (9.5), fluids 0.5 - 24h (5).
- During(!) the fasting, % of parents would allow:
  - 4.9% french fries
  - 22.3% toast/crackers
  - 17.5% cereals
  - 14.7% a candy
  - 14.9% a gum
  - 12.6% tea and milk
Risk factors for PONV

- Strabismus surgery
- G-scopia
- History of PONV
- Opioids
- Motion sickness
- Intubation
- Tonsillectomy
  - if the child vomits old blood “it’s good to get it out”
  - if the child vomits fresh blood “it’s time to call/go” (to hospital)
  - if the child vomits, but no blood, “give medicine”

The Drugs.. great variation in dosing.. how do you do it?


- Ondansetron less than chemotherapy dose needed?
  - 50yg/kg as effective as 100yg/kg  
  - Our dose 50-100


- Granisetron more than chemotherapy dose needed?
  - 40yg/kg better than 10yg/kg = placebo  
  - not in use

**Steward et al. 2011** Steroids for improving recovery following tonsillectomy in children. Cochrane Database Syst Rev

- 0.15-1mg/kg reduces PONV in 1/5  
  - permits earlier p.o., reduces VAS by 1  
  - Our dose dexamet 0.1mg/kg


- Droperidol 300yg/kg alone or especially with metoclopramide 0.15mg/kg reduces ponv  
  - Our dose droperid 50-75yg/kg metocl 0.1-.25mg/kg
Propofol i.v. anesthesia in selected cases?


- 156 children 1-7y mixed day surgery
- inhalation vs propofol

### Table 2. Vomiting during the Postanesthetic Period

<table>
<thead>
<tr>
<th></th>
<th>Group 1 inhaled</th>
<th>Group 2 propofol</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Emergence (OR)</td>
<td>2</td>
<td>65</td>
</tr>
<tr>
<td>PACU</td>
<td>5</td>
<td>63</td>
</tr>
<tr>
<td>DSU</td>
<td>15</td>
<td>53</td>
</tr>
<tr>
<td>Home</td>
<td>23</td>
<td>44</td>
</tr>
</tbody>
</table>

NS = not significant; PACU = postanesthetic care unit; OR = operating room; DSU = day surgery unit.