Risk Stratification in Adenotonsillectomy

Who stays and who goes?

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Ben Who?

- Consultant paediatric anaesthetist
- Public
  - RCH (Melbourne VIC)
  - PMH (Perth W.A.)
- Private
- ENT
- Operation Rainbow Australia
Risk stratification…

• Statistical process

• Identification of factors before the occurrence of an event
Risk Stratification...simple

• Risk:
  • Probability of danger, loss or injury

• Stratify:
  • To place into layers

• K.I.S.S. – Low, Moderate or High Risk
For anaesthetists…

• What % of patients on your (paediatric) ENT lists:
  • Have had overnight oximetry or polysomnography?
  • Have adenotonsillectomy (for OSA) based on clinical history (SNORES ++ ) and (examination) alone?
History

• Many children undergo surgery
  • based on history and examination alone

• Snoring has poor specificity for OSA
  • Nightly snoring is:
    • Sensitive – 91%
    • But not completely specific – 75%

• Most apnoea occurs in REM (early hours of morning – often missed).
So - How can we stratify…

If all of our patients are not completely investigated prior to their intervention?

Size (& Snore) - doesn’t always matter
What’s new?

• What’s not new?
  • OSA have an ↑ risk for complications intra/post-op (A&A 2009).

• What hasn’t changed?
  • Agreement to disagree – on everything
    • Diagnostic criteria (OSA) & Investigation
    • Classification – SEVERITY
  • Patient selection
  • Choice of facility
Indications for T’s & A’s

Figure 1 The rate of adenotonsillectomy (T&A), normalized to 100,000 person years, in Olmsted County, Minnesota, USA between 1970 and 2005. The nadir surgery occurred 1980–1984, but in the 1990s there has been a resurgence in the rate of T&A. Reproduced with permission from Erickson et al. (7).

Figure 2 Surgical indications for adenotonsillectomy (T&A) in Olmsted County, Minnesota, USA between 1970 and 2005. Reproduced with permission from Erickson et al. (7).
ENT position paper - 2008

• ↑ in access to adenotonsillectomy for children with mod/severe OSA is urgently required.
What is OSAS..?
Sleep disordered breathing

- Continuum of severity
  - Partial upper airway obstruction
    - Primary snoring (5 – 27%)
  - Intermediate conditions
    - Upper airway resistance syndrome
    - Obstructive hypoventilation
  - Continuous episodes complete upper airway obstruction
    - OSAS (1 – 3%)
Not a new problem...

- 1889 (Hill - BMJ)
  - Snoring and restlessness at night – cause of backwardness and stupidity in children.

- First case series in children – 1976
Left untreated..?

- Neurocognitive/psychological
- Behavioural
- Failure to thrive
- Poor school performance
- Cardiovascular dysfunction
- Pulmonary disease
What’s the big deal...

• Children with OSA are at increased risk for post-operative respiratory complications (A&A 2011)
  • Airway obstruction
  • Post-obstructive pulmonary oedema
    • Relief of longstanding PEEP
• Pneumonia
• Respiratory failure
Where...

• Where do the majority of these complications occur?

  • Recovery
  • Ward
  • Home
Most important risk factor...

- **Severity** of OSA
  - Important determinant of this risk
  - **BUT**...

- It is the **most difficult risk factor to assess** (A&A 2011).

Coexisting medical conditions and young age – close runners up
Who cares?

- Estimated mortality 0.6 per 10,000
  - <1/3 mortality associated with bleeding

- 1985 – 2007
  - 36 malpractice claims – death/brain injury
    - 19 - airway complications/post-op airway events
Case 1

• 5 year old – female
• Recurrent tonsillitis
• 18kg.
• URTI 4 weeks ago.
• Snores a bit – Parents – no apnoea
• No other medical problems

Can she go home?
Who goes home...

• At least 4 years or older (maybe >3)
• No significant OSA (normal oximetry)
• No medical co-morbidity
• Car, Sensible parents, Phone
• Within 1 hour of hospital
• Eat, drink, analgesia
• 6 hour stay in recovery
• No bleeding
Case 2

• 3 years, 10 months – Male
• Snores ++ and mouth breathes
• Frequent sleep arousals - parents
• Daytime somnolence
• Seen by private ENT surgeon
  • Large tonsils
• 15kg, currently well
Clinical Tidbit

- Children with SpO2 nadir of < 85%
  - Post-adenotonsillectomy
  - Required half the total analgesic morphine dose post-op
    - Compared with children in >85% group
Diagnosis OSA

- History
- Overnight oximetry
- Polysomnography
Overnight Oximetry

- Easy & Inexpensive
- High positive predictive value
- BUT a normal/inconclusive result doesn’t rule out OSA

*Pre-op overnight SpO2 nadir <80% is associated with increased risk of post-op complications*
Nixon – Pediatrics 2004

- Periodic clusters of desaturations
  - 3 or more desaturations <90%
  - 97% PPV for OSA in otherwise healthy children

**TABLE 1.** The McGill Oximetry Scoring System Devised in Phase 1 and Validated in Phases 2 and 3

<table>
<thead>
<tr>
<th>Oximetry Score</th>
<th>Comment</th>
<th>Criteria</th>
<th>Other</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Normal study/inconclusive for OSA</td>
<td>&lt;3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>OSA, mild</td>
<td>≥3</td>
<td>≤3</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>OSA, moderate</td>
<td>≥3</td>
<td>&gt;3</td>
<td>≤3</td>
</tr>
<tr>
<td>4</td>
<td>OSA, severe</td>
<td>≥3</td>
<td>&gt;3</td>
<td>&gt;3</td>
</tr>
</tbody>
</table>

Additional evaluation of breathing during sleep required to rule out OSA

Recommend T&A on the waiting list

Recommend surgery within 2 wk

Recommend urgent surgery (within days)
Case 3

• 2 year old – Female
• 10kg, Currently well
• Crouzon syndrome
• Large tonsils – grade 4
• Snores++, restless ++, sleep arousals+, apnoea
• ?Airway – MRI with LMA
Case 3

Severe OSA

• SpO2 nadir
  • 44%
• AHI – 35
• REM-RDI
  • >60
Very few go to ICU…

- Age < 2 years (≥ 3 years) +/-
- Severe OSA
- Weight < 3rd centile (+/- morbid obesity)
- Neuromuscular Disease
- Syndromes (prone to airway obstruction)
- Complex/congenital heart disease
- Cor pulmonale, RVH or PHTN
- Risk of haemorrhage post-op
Polysomnography

• Gold standard in diagnosis of OSA
• Detailed evaluation of:
  • Sleep quality
  • Breathing during sleep

Does not predict which patients will have adverse outcomes post-op

But SEVERITY is linked to adverse peri-operative events
PSG

- Mild OSA:
  - AHI 1 – 4/hr

- Moderate OSA:
  - AHI 5 - 9/hr

- Severe OSA:
  - AHI > 10/hour
High risk predictors…

• Overnight oximetry nadir <85%

• Severe OSA on PSG or oximetry

• Young age - <2

• Co-morbid conditions (craniofacial, syndromes, muscular, weight < 3rd centile, obesity, airway)
OSA & Adenoidectomy: Day case, Overnight or ICU?

Leong & Davis, J. Laryngol, 2007

**Low Risk**
- Most children

**Moderate Risk**
- Age < 3
- Overnight oximetry nadir < 80%
- FTT
- Asthma
- Recent RTI
- Obesity

**High Risk**
- Age < 2
- PSG: Severe OSA or >30% central
- A: Craniofacial etc
- B: Prem. lung disease
- C: Pulm. HT
- Neuromuscular disease.
- Morbid obesity

**Day case (am list)**

**Overnight (SaO2, CPAP)**

**ICU**
Mild-Mod. OSA (Moderate Risk)

- Abnormal oximetry
  - SpO2 nadir >85%
  - Age > 3
- No co-morbidity
- Probably ok for peripheral/private
- Close observation
- Oximetry overnight

- Abnormal oximetry
  - SpO2 < 3 dips <85%
  - Age < 3
- OSA on oximetry or PSG
  - Not meeting ICU criteria
  - Tertiary facility, ward oximetry overnight
Summary

• Most important predictors of risk...

  • **Severity of OSAS**

  • Young age

  • Co-existing medical conditions
Summary

• Low risk - Majority of children
  • Day case (if done in AM)

• Moderate
  • Facilities/staff to administer CPAP
  • Overnight oximetry - ? 2\textsuperscript{nd} night

• High risk
  • Very few need ICU
Summary

• SpO2 nadir <85%
  • Predictive of respiratory complications

• Children with pre-op SpO2 nadir <85%
  • Very sensitive to opioids
Conclusion

- More children presenting with OSA.

- Identifying children at risk of post-op complications - challenging.

- Right patient in the right hospital with the right personnel.
References

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