Update in Surgical Management of OSA

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Learning Objectives

• Review changes in updated tonsillectomy guidelines

• Discuss tonsillectomy vs. tonsillotomy

• Identify methods used to evaluate sites of persistent sleep obstruction

• Discuss treatment modalities for persistent OSA
New Tonsillectomy Guidelines

- Ages 1-18
- Does not apply to partial tonsillectomy
- New evidence includes:
  - Clinical practice guidelines: 1
  - Systematic reviews: 23
  - Randomized control trials: 13
- 15 Statements
Statements #1, 2 & 3 – Discuss Paradise Criteria

- Candidates for tonsillectomy for recurrent throat infections should have had:
  - At least 7 episodes in the past year
  - At least 5 episodes per year in the past 2 years
  - At least 3 episodes per year in the past 3 years

- Episodes should have been accompanied by sore throat

- Episodes further characterized by T >38.5 °C, cervical nodes >2 cm, tonsil exudate, or culture positive for GABHS

- Episodes should be documented in the patient’s medical record

Paradise et al, NEJM, 1984

5

Statements #1, 2 & 3 – Recurrent Tonsillitis

- Statement #1 – Paradise criteria not met
  - Strong recommendation for watchful waiting

- Statement #2 – Paradise criteria met
  - Option for tonsillectomy

- Statement #3 – Paradise criteria not met, but should assess for modifying factors
  - PTA, PFAPA, antibiotic allergy or intolerance
## Statements #4-8, 12 – Obstructive Sleep Disordered Breathing (oSDB)

<table>
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<tr>
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<tbody>
<tr>
<td><strong>Statement 4</strong> Tonsillectomy for SDB:</td>
<td><strong>Statement 4</strong> Tonsillectomy for oSDB:</td>
<td>Changed to obstructive sleep disordered breathing (oSDB)</td>
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<tr>
<td>Clinicians should ask caregivers of children with SDB and tonsil hypertrophy about comorbid conditions that might improve after tonsillectomy, including growth retardation, poor school performance, enuresis, and behavioral problems.</td>
<td>Clinicians should ask caregivers of children with oSDB and tonsil hypertrophy about comorbid conditions that might improve after tonsillectomy, including growth retardation, poor school performance, enuresis, asthma, and behavioral problems.</td>
<td>Throughout document “Asthma” added to the list of co-morbid conditions that may improve</td>
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## Statement #5 – PSG Related

- Before performing tonsillectomy, the clinician should refer children with oSDB for PSG if they are under 2 years of age, or exhibit any of the following: obesity, Down Syndrome, craniofacial abnormalities, neuromuscular disorders, sickle cell disease or mucopolysaccharidoses Recommendation to refer

- PSG confirms indications and appropriateness of tonsillectomy, helps plan perioperative management, and provides a baseline of OSA severity

- **Consider:** Feasibility, cost, does it alter management?
Statement #6 Additional Recommendations for Preoperative PSG

Clinician should advocate for PSG prior to tonsillectomy for oSDB in children without comorbidities listed in statement 5 when:

- Need for tonsillectomy is uncertain
- Discordance between PE and the reported severity of oSDB

• Recommendation to advocate

Statement #7 Tonsillectomy for OSA

Clinicians should recommend tonsillectomy for children with obstructive sleep apnea (OSA) documented by overnight polysomnography. Recommendation based on randomized controlled trial and observational before-and-after studies with a preponderance of benefit over harm.

• Definition of OSA left intentionally vague

• Text statement of tonsil size: “There is recognition that any decision to recommend tonsillectomy should not be based solely on PSG findings but also on clinical history, examination, and the likelihood that tonsillectomy will improve sleep and lead to improvements in day and nighttime symptoms.”

• Text statement on exclusions: “There is a paucity of outcomes data in children with significant comorbidities and it remains unknown if tonsillectomy should be a first line treatment in these children, especially with mild OSA.”
Statement #8, 9 – Educate Caregiver

Statement 8. Counseling on persistent oSDB
Clinicians should counsel patients and caregivers and explain that oSDB may persist or recur after tonsillectomy and may require further management. **Recommendation** based on a randomized, controlled trial and observational studies, case-control and cohort design, with a preponderance of benefit over harm.

Statement 9. Perioperative pain counseling
The clinician should counsel patients and caregivers regarding the importance of managing post-tonsillectomy pain as part of the perioperative education process, and should reinforce this counseling at the time of surgery with reminders about the need to anticipate, reassess, and adequately treat pain after surgery. **Recommendation** based on randomized controlled trials with limitations and observational studies with a preponderance of benefit over harm.

Statements # 10 & 11 – Perioperative Medications

- **Statement #10** – Clinicians should **not** administer or prescribe perioperative antibiotics to children undergoing tonsillectomy
  - Strong recommendation against

- **Statement #11** – Clinicians should administer a single, intraoperative dose of IV dexamethasone
  - Strong recommendation
Statement #12 Who to Admit Postop...

- Clinicians should admit children with for inpatient, o/n monitoring after tonsillectomy:
  - Under age 3 years
  - **Severe OSA** – AHI of 10 or more obstructive events/hr
  - Oxygen saturation nadir <80%
    - Recommendation to arrange monitoring

Definition of Severe OSA

<table>
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<tr>
<th>Oto-HNS</th>
<th>AAP</th>
<th>AASM</th>
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<tr>
<td>Severe OSA defined by following PSG findings:</td>
<td>Severe OSA defined by following PSG findings:</td>
<td>No recommendation made in guideline</td>
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<tr>
<td>- Obstructive AHI ≥ 10</td>
<td>- AHI&gt;24</td>
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<td>- Nadir oxygen sat &lt;80%</td>
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<td></td>
<td>- Significant hypercapnia</td>
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<td>(peak CO2&gt;60 mmHg)</td>
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Admit based on risk factors for individual patients and postoperative clinical state
Statements #9, 13, & 14 – Perioperative Medications

• Statement #9 – Recommendation to counsel patients and caregivers on importance of managing post tonsillectomy pain as part of perioperative education process & reinforce this counseling at time of surgery

• Statement #13 – Strong recommendation to use ibuprofen, acetaminophen, or both for pain control after tonsillectomy

• Statement #14 – Strong recommendation against administering codeine containing medications after tonsillectomy to children younger than 12 years

Statement #15 – Last One!
Post-tonsillectomy Hemorrhage

• 15 a-Recommendation to follow up with patients and/or caregivers after tonsillectomy and document in medical record if bleeding occurred

• 15 b-Recommendation for clinicians to track personal post tonsillectomy bleed rate
Partial Intracapsular Tonsillectomy (PIT)

Prior to 1930’s
Partial Intracapsular Tonsillectomy (PIT): Partial tonsillectomy, Subtotal tonsillectomy, Tonsillotomy

1930’s
Fowler – Total Tonsillectomy (TT)

2003 Koltai revisited PIT
Persistent Concerns: prolonged pain and delayed hemorrhage

Partial Intracapsular Tonsillectomy (PIT)
PIT preserves the tonsil capsule - no violation of pharyngeal muscles - provides biological “dressing”
### Post-tonsillectomy Healing

![Post-tonsillectomy Healing images](image)

- **Day 1**
- **Day 5**
- **Day 7**
- **Day 17**

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### Total vs Partial Tonsillectomy

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<thead>
<tr>
<th>Total Tonsillectomy (TT)</th>
<th>Partial Intracapsular Tonsillectomy (PIT)</th>
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<tr>
<td><strong>Benefits:</strong></td>
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<tr>
<td>No tonsil regrowth</td>
<td>Systematic reviews:</td>
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<td>Able to perform possible pharyngoplasty</td>
<td>Walton et al- fewer days before resolution of pain</td>
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<td>Mean of 5 with PIT vs 7 with TT</td>
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<td>Lower secondary hemorrhage rates PIT &lt;1%, TT 3%</td>
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<td></td>
<td>Zhang et al- return to normal diet reduced by 2.8days with PIT vs TT group</td>
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<td><strong>Risks:</strong></td>
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<td>2-3% postop hemorrhage</td>
<td>2-3% regrowth rate(potentially greater in Down Syndrome population)</td>
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<tr>
<td>Pain management</td>
<td>Persistent chronic tonsillitis</td>
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**Outcomes**

- Systematic reviews provide comparative information between PIT & TT regarding pain, bleeding & regrowth
- Limited data comparing effectiveness in treatment of OSA and recurrent acute tonsillitis including QOL
- Limited long term outcomes in PIT
Persistent OSA

- Published 2006
- 14 studies included - 355 subjects
- Treatment success of T&A 82%
- Excluded: craniofacial syndromes, neuromuscular disorders, morbid obesity
- Included: subjects up to 18 years of age

- Published 2009
- 23 studies included - 1079 subjects
- Treatment success of T&A was 66%
- Excluded: craniofacial syndromes, chromosomal disorders & neuromuscular disorders
- Included: obese subjects, up to 20 years of age
Risk Factors for Persistent OSA after T&A

- Obesity
- Craniofacial/mandibular anomalies (Pierre Robin sequence, Treacher Collins)
- Genetic disorders
- Neuromuscular disorders
- Asthma in non-obese children
- Severe OSA prior to surgery

Where is the Persistent Obstruction??

PSG provides data on degree of OSA, does not identify level or levels of obstruction

Anatomic Sites Where Obstruction Can Occur:
1. Nose and nasopharynx
2. Posterior oropharynx
3. Lateral pharyngeal walls
4. Level of hypopharynx / obstruction of BOT
5. Larynx
Drug Induced Sleep Endoscopy (DISE)

Flexible laryngoscope  +  DLB set

DISE Findings
Dise Video 1 – Base of Tongue Obstruction

Dise Video 2 – Epiglottis Obstruction
Sleep State Laryngomalacia

Palatal Obstruction
Persistent Severe OSA

Positive Pressure
- Tolerance
- Long term use

DISE/Cine MRI/other

Soft Tissue Surgery
- Adenoid revision
- Lingual tonsils
- Base of tongue reduction
- Palatalplasty
- Supraglottoplasty
- Nasal surgery

Bony Surgery

Hypoglossal Nerve Stimulator

Preliminary Studies in Adults

Multi-center, prospective, single group cohort (N = 126)
- Inclusion: moderate-severe OSA 20<AHI<50, BMI < 32, no cardiopulmonary disease, no neuromuscular disorder

46 consecutive responders randomized to therapy withdrawal or maintenance groups (N = 23/group)

Outcomes:
- Primary: AHI reduction by 50% and score < 20 or ODI reduction of 25%
- Secondary: Subjective QOL (ESS and FOSQ questionnaires)
Pediatric HGNS Implantation Starting Point…

Phase I: Initial Pilot Study
• Small n (4-6)
• Safety / Efficacy

Phase II: Expanding Pilot Study
• Slightly larger n (15-20)
• Efficacy and outcomes

Phase III: Pivotal Study – 13 Sites Nationally

Goal N = 50
Inclusion Criteria

- Adolescents/young adults with Trisomy 21 (aged 10-21)
- Persistent OSA post T&A
- Moderate to Severe OSA – AHI between 10-50
  <25% central apneic events contributing to AHI
- BMI <95%
- Unable to tolerate positive pressure or tracheostomy dependent

Exclusion Criteria

- Recent open heart surgery, immunosuppression, chronic lung disease, or aspiration
- Serial MRI of chest
- Unfavorable pattern of collapse
HGNS in Children with Down Syndrome: Tolerability

One Month Post Implantation

Activation

Initial Titration

Repeat PSG At 6 months and 12 months

Retitrage to Therapeutic Level

Outcomes – 12 Month AHI

• 12 children currently at the 12 month mark
• Postop AHI: 2.58 (from 27.1)
• Postop reduction in AHI (%): 90%
Outcomes

• Average use of stimulator by subjects 39-70 hrs/wk (Group average 62 hrs/week or 8.8 hrs/night)

• Compliance with therapy was significantly higher than mean adherence to CPAP therapy in adult patients
  – Has been previously reported to be as low as 3.3hrs/night

Key Points

• PIT may offer some benefits over TT for length of recovery and secondary hemorrhage
• Up to 30% of children can have persistent OSA after T&A
• Children that continue to be symptomatic and children who are at higher risk for persistent OSA should undergo a sleep study after T&A
• DISE is a common tool used to identify sites of obstruction for children with persistent OSA
Thank You