Obstructive Sleep Apnea in Children

Sleep Apnea in Children: A Wake Up Call
Harold S. Pine, MD, FAAP, FACS

Continuing Education

Objectives
- Identify areas of weakness regarding OSA in children.
- Define what is OSA and how it is different in kids when compared to adults.
- Illustrate what pediatricians can do in their own practices in suspected cases of OSA.
- Discuss new clinical practice guidelines on sleep studies and tonsillectomy.

Financial Disclosure
- I own 50 shares of Arthrocare, the parent company that makes coblation wands for tonsillectomy.
- I really want an Apple iPAD but my wife says I cannot afford one.

Who is Harold Pine?
- Wanted to be a Marine
- My proposal at 18,000 feet

Israeli Soldier
- This is my rifle...
- In the Negev

Life as a Surgeon
- Lecturing in Vietnam
- Post-op Rounds in Hanoi Vietnam

A short Quiz
- 18 question Quiz
- T or F
- How does your knowledge of OSA compare to the 497 doctors who did this Quiz back in 2005
- The mean score was about 70% correct (about 12 correct out of the 18)
- Mean score for ENT Dept 80%
1. Children with obstructive sleep apnea may present with hyperactivity. **T**

2. Approximately 10% of children snore on a regular basis. **T**

3. Nearly 2% of children have OSA. **T**

4. Obstructive sleep apnea is less likely to be associated with pulmonary hypertension. **T**

5. A polysonogram is a sensitive diagnostic test for obstructive sleep apnea syndrome in children. **T**

6. The degree of snoring (i.e., mild to severe) correlates with the severity of obstructive apnea in children. **F**

7. Excessive upper airway muscle tone loss during sleep contributes to OSA in children. **T**

8. Enlarged tonsils and adenoids are the most frequent contributing factor to OSA. **T**

9. Children with suspected OSA should have a thorough head and neck and oropharyngeal examination. **T**

10. Children with untreated OSA may have learning deficits. **T**

11. Snoring is most frequently reported at ages 2 to 8 years. **T**

12. Cardiac arrhythmias may be associated with untreated OSA. **T**

13. Children with sickle cell disease are at increased risk for OSA. **T**

14. Children younger than 2 years should have a polysomnogram prior to surgical intervention for suspected OSA. **T**

15. Significant OSA can occur without snoring in children. **T**

16. Failure to thrive can be an associated finding suggesting OSA in infants and young children. **T**

17. Children with severe OSA may have transient worsening of respiratory symptoms following tonsillectomy and/or adenoidectomy. **T**

18. A cardiorespiratory monitor can reliably detect both obstructive and central apneas in infants. **F**

What is OSA?

- A disorder of breathing during sleep characterized by prolonged partial upper airway obstruction and/or intermittent complete obstruction that disrupts normal ventilation during sleep and normal sleep patterns.
Obstructive Sleep Apnea in Children

Sleep Disordered Breathing
- Snoring
- Upper Airway Resistance
- Obstructive Sleep Apnea

OSA often Multifactorial
- Tonsils
- Allergy
- Obesity

Makes it hard to sleep

School Nurses and Teachers can Help
"Open Wide and Meet Your Tonsils!"

Sequelae of OSA
- Medical
- Behavioral
- OSA
- Cognitive
- Psychological

Interplay of Multiple Factors
- OSA
- Poor Diet
- Altered Hormones
- Obesity
- Reduced Activity

Deep sleep helps kids grow
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### OSA-18

#### Sleep Disturbance
- Caregiver Concerns
- Physical Symptoms
- Daytime Function
- Emotional Distress

#### Obstructive Sleep Apnea Syndrome Quality of Life Survey

<table>
<thead>
<tr>
<th>Physical Symptoms</th>
<th>None of the time</th>
<th>Hardly any of the time</th>
<th>A little of the time</th>
<th>Some of the time</th>
<th>A good bit of the time</th>
<th>Most of the time</th>
<th>All of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

#### Sleep Disturbance
- During the past 4 weeks, how often has your child had...
  - loud snoring?
  - breath holding spells or pauses at night?
  - choking or made gurgling sounds while asleep?
  - restless sleep or frequent awakenings from sleep?

#### Daytime Function
- During the past 4 weeks, how often has your child had...
  - excessive daytime sleepiness?
  - a poor attention span or concentration?
  - difficulty getting up in the morning?

#### Caregiver Concerns
- During the past 4 weeks, how often have the problems described above...
  - caused you to worry about your child’s general health?
  - created concern that your child is not getting enough air?
  - interfered with your ability to perform daily activities?
  - made you frustrated?

**MAXIMUM SCORE: 126**
OSA and Enuresis

- Bedwetting present in 1/3 of kids with OSA
- Proposed factors include:
  1. Decreased arousal response
  2. Impaired Urodynamics—Increased abdominal pressure leading to increased bladder pressure
  3. Affects secretion of ADH

Periodic leg movement disorder

- Involuntary limb movements which cause frequent arousals
- Score greater than 5 is abnormal
- Association with iron deficiency

OSA and ADHD

- These 2 problems share many of the same behavioral manifestations.
- In any child where a diagnosis of ADHD is being considered, please think about the possibility of underlying OSA

What Should the Pediatrician Do?

- Clinical Practice Guidelines 2002- “A sleep history screening for snoring should be part of routine health care visits.”
- In children, OSA less likely in the absence of habitual snoring.
- If snoring, then what?
- Clinical Practice Guidelines 2012- “If a child snores on a regular basis and has signs and symptoms of OSA, then either obtain a sleep study or refer to a sleep specialist or otolaryngologist”

How to Grade Tonsils

Malampati Score

Class 1: soft palate, faucets, uvula, pillars
Class II: soft palate, faucets, portion of uvula
Class III: soft palate, base of uvula
Class IV: hard palate only
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Fig 1. The Friedman palate position is based on visualization of structures with the mouth open widely without protruding the tongue.

Diagnostic Techniques
- History and physical
- Questionnaires
- Parents report
- Audiotaping
- Videotaping
- Overnight oximetry
- Nap polysomnography
- Home polysomnography
- Formal sleep center polysomnography

Pediatric Sleep Questionnaire
- 22 Questions
- If "don't know" is circled, drop the question
- To get score, divide the number of "yes" by the total number of answered either "yes" or "no".
- Score > 0.33 is positive
- Sensitivity 0.85
- Specificity 0.87

Sensitivity 0.85
Specificity 0.87

How Do I Feel Today?
Think about how you feel. Circle the word that tells how you feel today.

- I do  
- I don't  
- feel sleepy today.
- I do  
- I don't  
- feel hungry today.
- I do  
- I don't  
- have tonsils that look big today.
- I do  
- I don't  
- have a sore throat today.
- I do  
- I don't  
- have lots of energy today.
- I do  
- I don't  
- feel well and happy today.

A couple key points
- Large tonsils and adenoids do not indicate the presence of OSA
- Loudness of snoring does not correlate with degree of OSA
- A formal sleep study remains the gold standard in diagnosing OSA and other sleep related disorders.

A sleep study gives a lot of info
- EEG
  - Stages of sleep
  - Eyes
    - Stages of sleep
    - Slow rolling eye movement
    - REM
  - Legs
    - Periodic limb movement disorder
  - 02 sats
- EKG
  - Chin
    - Muscle atonia during REM
  - Nasal/Oral Airflow
  - Snoring
  - Thoracic Effort
  - Abdominal Effort
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Sleep Lab at UTMB

OK, now you can go to sleep

Could you sleep hooked up to all these wires?

There’s video too

- The parents are not supposed to sleep in the same bed

Red arrow is OSA

Who Needs a Sleep Study?

- Obese
- Down syndrome
- Craniofacial abnormalities
- Neuromuscular disorders
- Sickle cell
- Mucopolysaccharidoses
- When the need for surgery is uncertain or if the physical exam does not match the severity of the history

Big Tonsils
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Sometimes I'm wrong

- 12 year old
- 146 lbs
- BMI = 28.6 (>95%)
- Big Tonsils
- Good student
- Thought for sure he had OSA
- RDI = 0

This child really did have big tonsils

Not all overweight Kids Have OSA

- 11 year old
- Weighs 166 lbs
- BMI = 34.2
- Had negative sleep questionnaire
- Negative sleep study as well with RDI = 0.7

I just did not believe the sleep questionnaire

 Definitions

- Apnea
- Hypopnea
- RERA (Respiratory Event Related Arousal)

Our sleep lab will report the RDI (respiratory disturbance index) which includes all of the 3 above. In children, an RDI greater than 1 is considered abnormal.

What is OSA?

- At least a 10 second cessation of airflow despite continuous ventilatory effort or 2 breaths
- May or may not be associated with an oxyhemoglobin desaturation of at least 3% or 4%
- May or may not be associated with a cortical arousal
- May or may not be accompanied by snoring
- May be REM (rapid eye movement) related
- May be positional

How is Pediatric OSA different from adults

- Surgery is often first line therapy
- AHI > 1 is abnormal (adults require >5)
- Minimum O2 saturation < 92 (adults < 85)
- Kids often do not have daytime sleepiness
- Kids often have behavioral manifestations

“Snores like a Bear”

- Really cute little girl
- 7 years old
- Weighs 104 lbs
- BMI = 29.2
- Sleep questionnaire = 0.81
- RDI = 52.6 with 336 apneas
Not quite as cute anymore

☐ 1 year older and a lot heavier, she is not so cute

Therapy

- Remains first line
- Very helpful
- Treat underlying allergy

Sometimes it gets complicated

- Sleep Study done Feb 2010 revealed RDI of 42.9 and 306 apneas

Amazing What Surgery Can Do

Indications for Tonsillectomy

- “Right now, doctors, a lot of times, are forced to make decisions based on the fee payment schedule that’s out there. So if they’re looking and -- and you come in and you’ve got a bad sore throat, or your child has a bad sore throat, or has repeated sore throats, the doctor may look at the reimbursement system and say to himself, ‘You know what? I make a lot more money if I take this kid’s tonsils out.’

- “Now, that may be the right thing to do. But I’d rather have that doctor making those decisions just based on whether you really need your kid’s tonsils out or whether it might make more sense just to change -- maybe they have allergies. Maybe they have something else that would make a difference.”

Just so you know Mr. Obama

- Medicaid pays me $218.00 for a Tonsillectomy and adenoidectomy
- That includes all the preop care, the surgery, and any care I give the child for 90 days after surgery
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So what are the indications?

- Obstructive Sleep Apnea
- Recurrent Tonsillitis
  - Paradise Criteria
    - 7 in one year
    - 5 each year for two years
    - 3 each year for three years

Paradise Criteria
- Documentation in the medical record of each episode of sore throat and one or more of the following:
  - Temperature greater than 38.3
  - Cervical adenopathy
  - Tonsillar exudate
  - Positive strept test

Modifying Factors per Guidelines
- Multiple antibiotic allergy/intolerance
- PFAPA (periodic fever, aphthous stomatitis, pharyngitis, and adenitis)
- History of PTA (peritonsillar abscess)
- I would add PANDAS (Pediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal Infections)
- Severe dysphagia

Tonsillectomy in the 21st Century
- By combining radiofrequency energy with a saline solution, Coblation is able to gently and precisely remove tonsils without damaging surrounding healthy tissue

Coblation is Cool

Coblation in Action
- One of my Chief Residents in action.
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Large Tonsils

3 year old with RDI of 30.4

Kissing Tonsils
- 89 apneas
- 93 hypopneas

Pos in Nose

6 hrs After T&A Surgery

- As I approached the room all I could hear was crying.

Post op Sleep Study

- 11 year old a few months after T&A
  - 159 lbs
  - BMI 33.2
  - Preop RDI= 5.7
  - 40 apneas
  - Post op sleep study reveals RDI=0
  - When to order post op sleep study?

Even with child gaining weight, the benefits of the T&A remain

What can the pediatrician do?

- Be aware of the far reaching consequences of untreated OSA
- Understand how tonsils may contribute to the problem
- Dispel common myths about tonsils
- Raise awareness of the issue among parents, teachers, and students

Tonsil Myth #1

- Tonsils are mainly removed for sore throats and tonsillitis.
### Tonsil Myth #1
- Actually, 75% of tonsillectomies are now performed to help treat obstructive sleep disorders.

### Tonsil Myth #2
- Doctors don’t remove tonsils anymore.

### Tonsil Myth #3
- Actually, despite what President Obama might think, we don’t unless there is a good reason.
- There are roughly 600,000 tonsillectomies performed per year in the US.

### Tonsil Myth #4
- Actually, several studies show that by using low temperature techniques, there is less pain after surgery than with traditional electrocautery.
- Most are pain free by 2 weeks.

- Children can only eat ice cream after a tonsillectomy.
- This one made famous by the Brady Bunch episode where Cindy and Carol both had tonsillectomies and got to eat ice cream in bed.
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Tonsil Myth #4
- Actually, using low temperature techniques, children can return to a regular diet 3x faster.

Tonsil Myth #5
- Tonsillectomies have always been performed the same way.
- Keep in mind the first one was done with a finger by Celsus in first century BC.

Tonsil Myth #5
- Actually, there are multiple newer techniques. Just recently, coblation tonsillectomy become the most common single instrument to do the procedure.

Classroom Poster
- Open Wide and Meet Your Tonsils!

Family Letter
- What's Inside Your Mouth?
  - Part 1. Label the picture with each part of your mouth. One word is done for you.
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Dr. Pine’s Pearls

- Recognize that OSA is becoming more common
- Screen kids for snoring but also have a pediatric sleep questionnaire available in the office
- Please consider OSA in patients with bedwetting
- Please consider OSA in patients with ADHD

My boys on their very first day of school.

Don’t forget to refer to your friendly neighborhood pediatric ENT surgeon

References

Questions?