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Myths and Misconceptions in Pediatric Obstructive Sleep Apnea

Beyond Tonsillectomy: Myths and Misconceptions in Pediatric Obstructive Sleep Apnea

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Myths and Misconceptions in Pediatric Obstructive Sleep Apnea

Disclosures

- No Financial Disclosures

Myths and Misconceptions in Pediatric Obstructive Sleep Apnea

Objectives

1. Understand the significance of obstructive sleep apnea
2. Be familiar with the findings of obstructive sleep apnea on polysomnography
3. Know diagnostic alternatives to polysomnography, such as laryngoscopy and sleep endoscopy, for assessing sleep disordered breathing
4. Be aware of surgical options for obstructive sleep apnea



Myths and Misconceptions in Pediatric Obstructive Sleep Apnea

Obstructive Sleep Apnea Syndrome (OSAS)

- Episodes of complete or partial airway obstruction during sleep
- Hypoxemia during sleep
- Hypercapnia during sleep
- Sleep fragmentation



Myths and Misconceptions in Pediatric Obstructive Sleep Apnea

Myth: Tonsils are not taken out very often anymore

- OSA is very common
 - Affects 1-5% of the typical pediatric population
 - 30-66% of Down Syndrome population
- First line therapy for OSA/SDB is tonsillectomy and adenoidectomy
- 530,000 tonsillectomies performed every year in US¹
- The indication has changed
 - 30 years ago 90% of tonsillectomies were done for tonsillitis
 - Now 20% is done for recurrent tonsillitis and 80% is done for OSA/SDB

Myths and Misconceptions in Pediatric Obstructive Sleep Apnea

Myth: Tonsils are not taken out very often anymore

- Gold standard for diagnosing OSA is sleep study
- However sleep studies are often
 - Expensive
 - Time consuming
 - Unavailable
 - Can be inaccurate or non-representative of home sleep
- Required sleep study
 - Obese
 - Down Syndrome
 - Sickle Cell anemia
 - Craniofacial disorders
- Recommended
 - 1 or 2 strikes not 3

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Tonsillectomy then and now

- 1985
 - Preop blood work (PTT, bleeding time)
 - Bed rest
 - 7-10 days missed school
 - Overnight admission
 - Post-op narcotics
 - Restricted diet
- 2015
 - No blood work
 - Go home within 3 hours
 - Back to school in 2-7 days
 - No narcotics for younger children
 - Normal diet

Myths and Misconceptions in Pediatric Obstructive Sleep Apnea

3 Strikes You are Out!



- **3 strikes** (strong clinical history and parental observation)
 1. **Night-time symptoms**
 - Snoring, breathing pauses, gasping, mouth breathing, extended neck, restless sleep with frequent tossing and turning, bedwetting
 2. **Day-time symptoms**
 - Waking tired, irritability, frequent mood shifts, excessive daytime sleepiness, hyperactivity, fidgety, difficulty staying on task, decreased school performance, mouth breathing
 3. **Physical examination**
 - Tonsillar hypertrophy
 - Adenoid hypertrophy (diagnosed with nasal endoscopy or lateral neck x-ray)

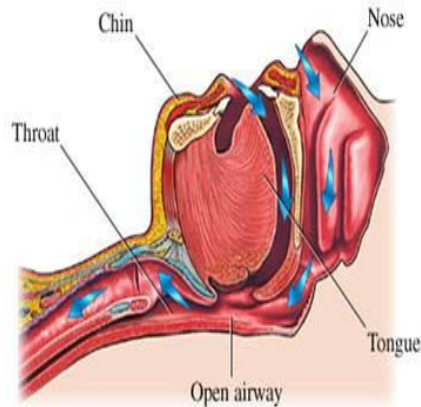
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Cure rate of tonsillectomy and adenoidectomy

- **T&A curative**
 - “typical children” 80-90%
 - Down syndrome children – about 50%
 - Important to get post-operative sleep study in all DS children
- **Beyond adenotonsillectomy**
 - What’s next for children with residual OSA s/p T&A

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Myth: Adenotonsillectomy is the only surgical option for children with obstructive sleep apnea



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<http://www.upmc.com/healthAtoZ/Pages/HealthLibrary.aspx?chunkid=20179>

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Case #1: "She Snores Like an Old Man"

- 10-year-old female with Down syndrome
- Adenotonsillectomy less than age 1 for failure to thrive and sleep disordered breathing
- Complains of heroic snoring, gasping for air, and restless sleep
- Daytime sleepiness
- Mother does not think child will tolerate CPAP
- Physical Exam
 - Mid-face and mandibular hypoplasia with relative macroglossia
 - Mouth breathing
 - Obese

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Sleep Study

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- **Electroencephalogram**
- **Electrooculogram**
- **Carbon Dioxide Level**
- **Airflow.**
- **Rib cage motion.**
- **Pulse oximeter (S_aO_2).**
- **Abdominal motion.**
- **Electrocardiogram**

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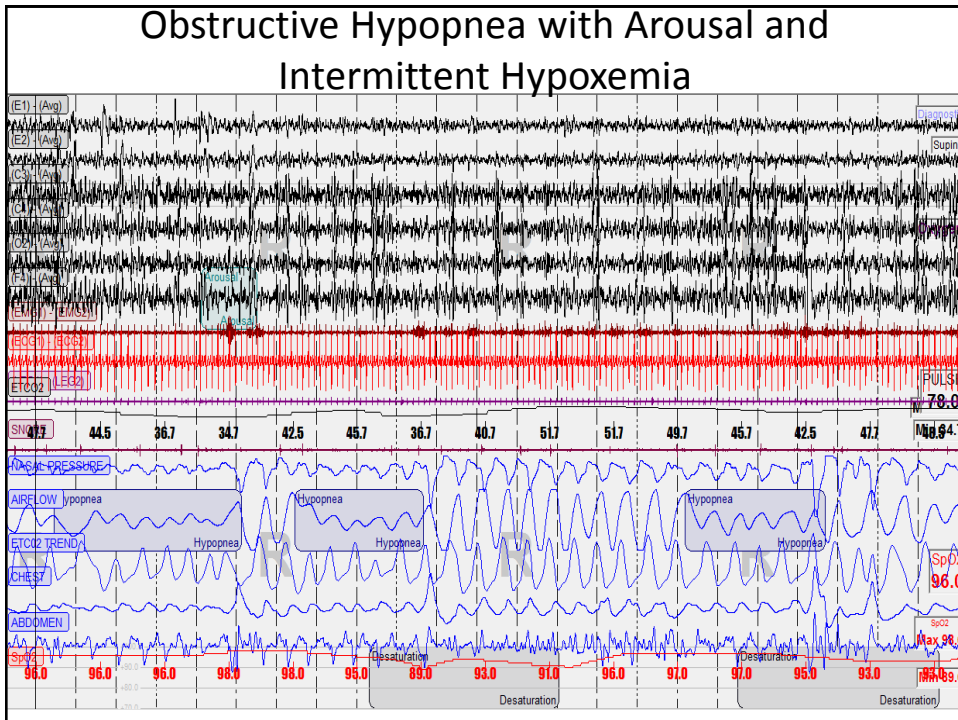
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Sleep Study

- Total sleep time was 6.3 hours, 14.7% in rapid eye movement (REM) sleep.
- Apnea hypopnea index (AHI) of 4.6/hr (Normal < 1.5/h)
 - $AHI = \frac{\# \text{ obstructive apneas} + \# \text{ obstructive hypopneas}}{\text{total sleep time (hrs)}}$
- 10.1% of sleep with an end-tidal carbon dioxide ($ETCO_2$) > 50 mmHg and a maximum $ETCO_2$ of 58 mmHg (during REM sleep)
- The mean oxygen hemoglobin saturation (S_aO_2) was 98.4% and lowest S_aO_2 was 89.0%

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Myths and Misconceptions in Pediatric Obstructive Sleep Apnea

Flexible endoscopy - Office

- Nasal obstruction
 - Deviated septum
 - Turbinate hypertrophy
 - Narrow nasal cavity
 - Polyps or polypoid degeneration
- Adenoid regrowth
- Lingual tonsil enlargement

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Drug-induced Sleep Endoscopy (DISE)

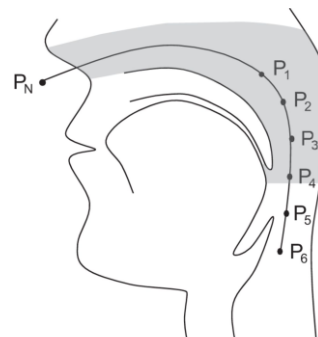
- Patient sedated in OR
- Dexmedetomidine + ketamine
- Spontaneous respirations
- Target depth of respiration to approximate sleep

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DISE Technique

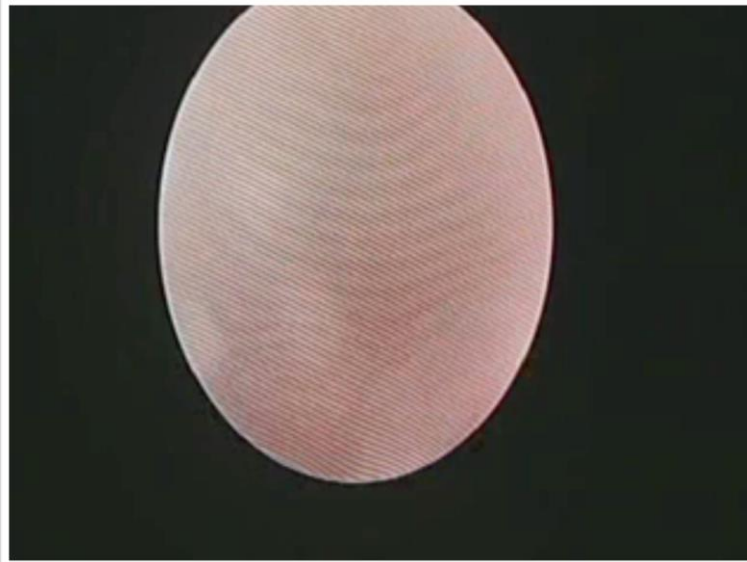
Table 1 The VOTE classification

STRUCTURE	DEGREE OF OBSTRUCTION ^a	CONFIGURATION ^c		
		A-P	LATERAL	CONCENTRIC
Velum				
Oropharynx lateral walls ^b				
Tongue Base				
Epiglottis				



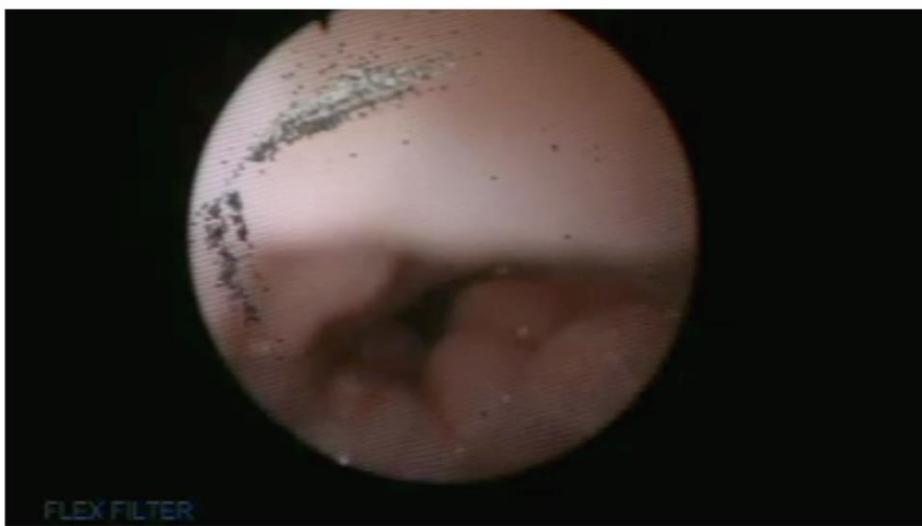
DISE Videos

Lateral Pharyngeal Wall Collapse



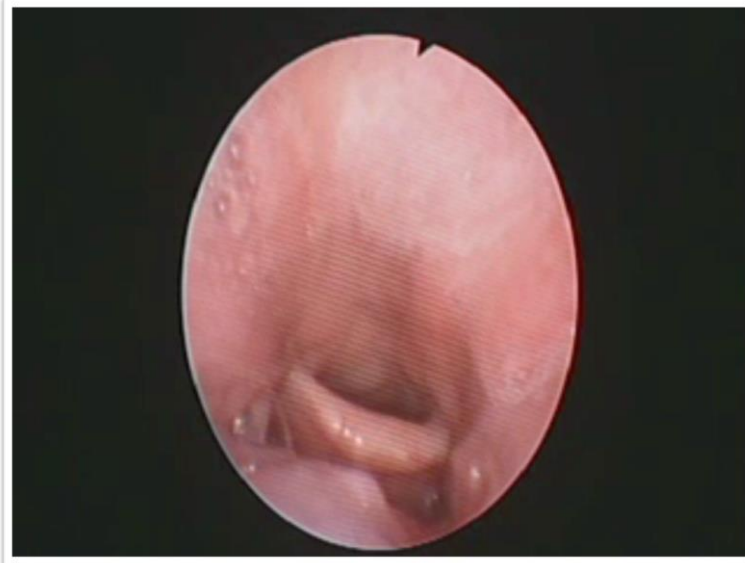
DISE Videos

Lingual Tonsil Hypertrophy



DISE Videos

Epiglottic Prolapse



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Surgical Options

- Palate Procedures
 - Expansion sphincter pharyngoplasty
 - Uvulopalatopharyngoplasty
 - typically too morbid for most children

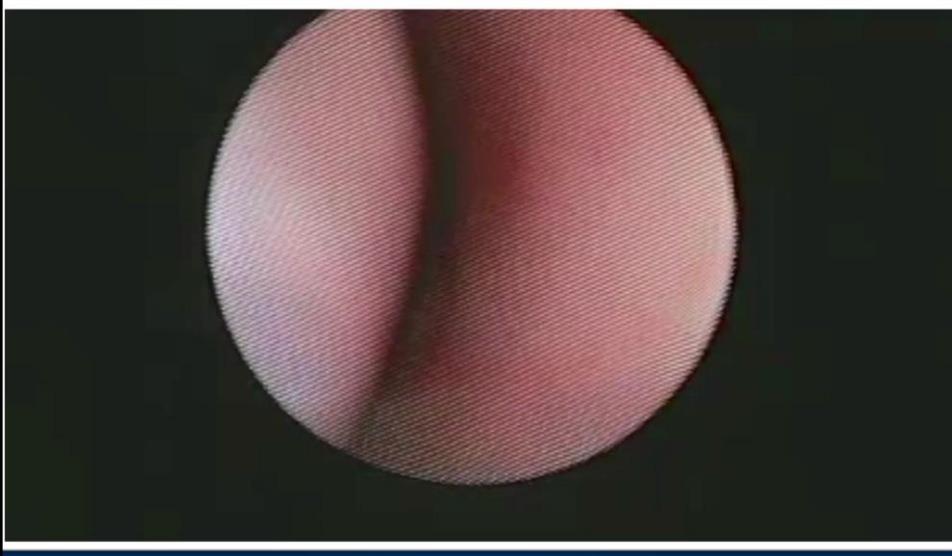
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Surgical Options

- Tongue base procedures
 - Lingual Tonsillectomy
 - Base of tongue resection
 - Robot assisted
 - Flaps
 - Coblator
 - Submucosal minimally invasive lingual excision (SMILE)
 - Epiglottopexy
 - Geniotubercle Advancement
 - Thyrohyoid Suspension
 - Maxillomandibular advancement
 - Hypoglossal Nerve Stimulation

Myths and Misconceptions in Pediatric Obstructive Sleep Apnea

Patient #1 Sleep Endoscopy



Surgical Intervention



Follow up

- Subjective – (per mother)
 - No longer snoring
 - No longer having labored breathing
 - Waking rested
 - Awaiting f/u sleep study
- Similar patient undergoing similar procedure
 - Preop PSG: AHI 16.7, O₂ nadir 89%
 - Postop PSG: AHI 0.3, O₂ nadir 93%

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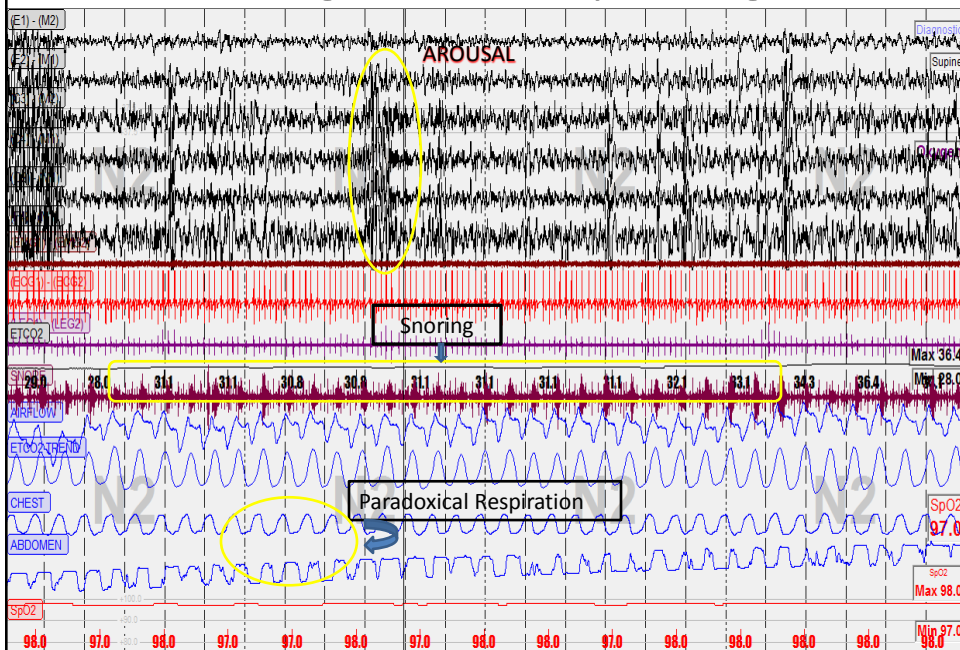
Case #2: Life After Tonsillectomy

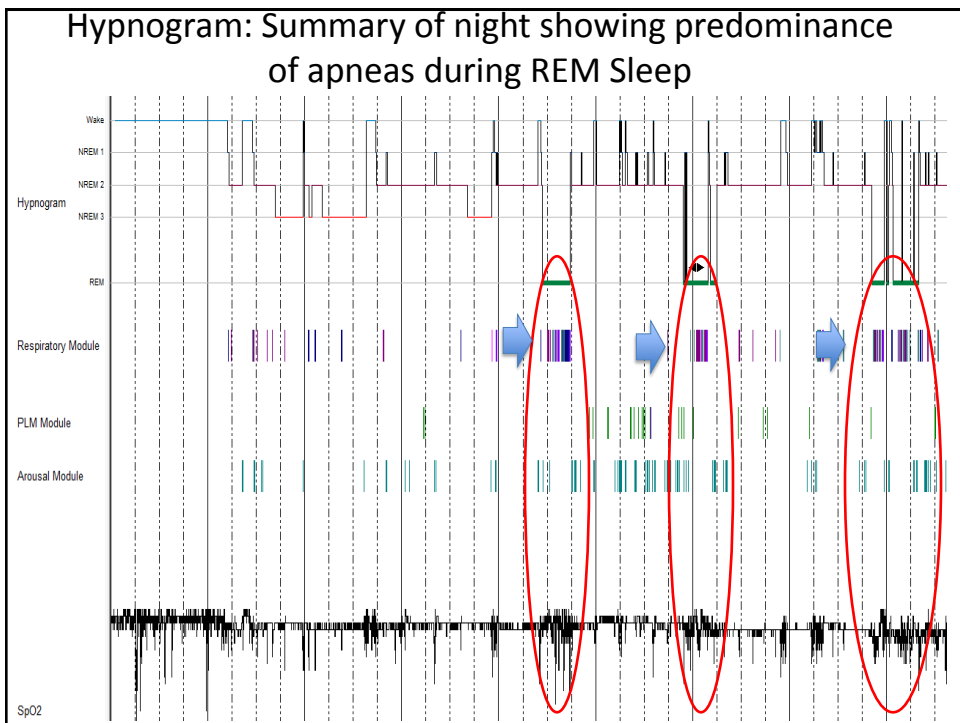
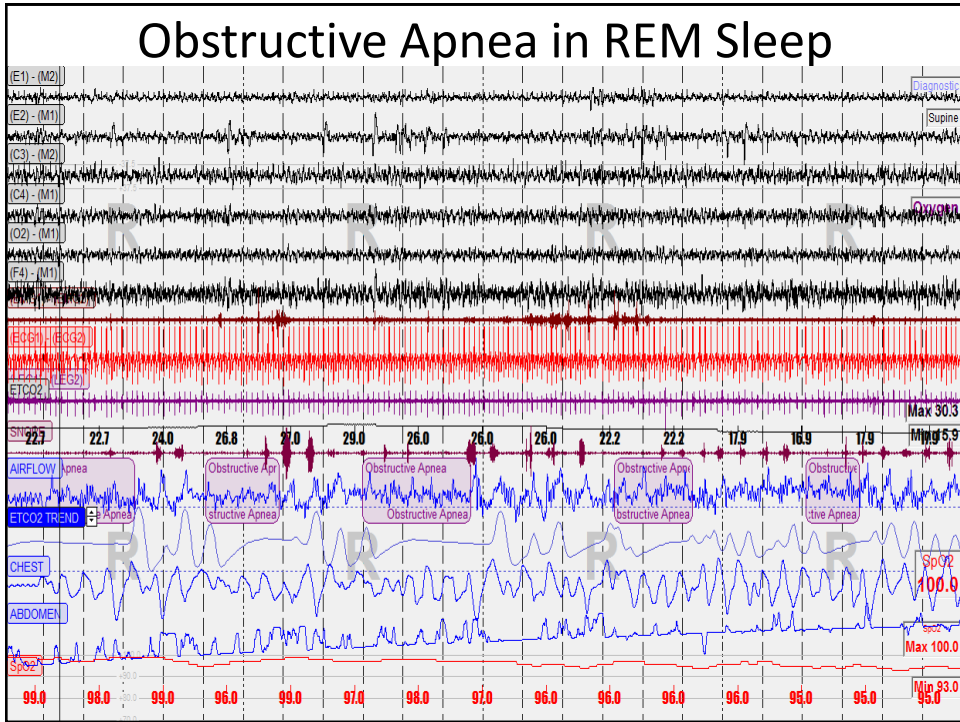
- 6 year old female with history of autosomal dominant polycystic kidney disease presents with chronic snoring
- Tonsillectomy and adenoidectomy at age 5.
- Snoring partially improved after tonsillectomy but then worsened
- Sleep study ordered

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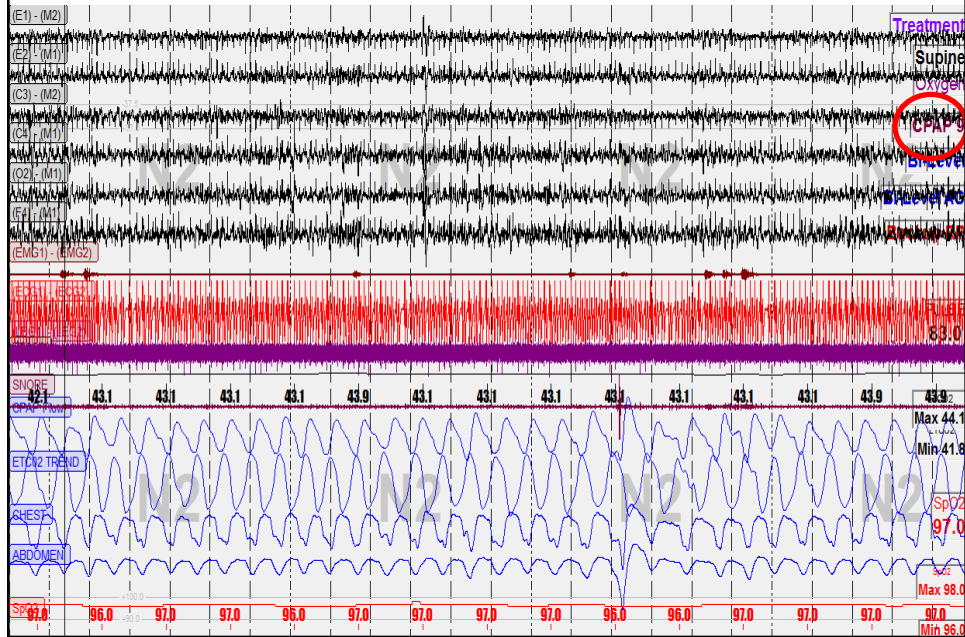
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Snoring – Not Always Benign





Yes, Children Can Use CPAP!



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Follow up

- Started on CPAP with nasal mask
- Family reports she has a lot more energy since starting CPAP
- Required adjustments of facemask type and settings
- Some difficulties over time with adherence
- Referred to complex sleep clinic



Myths and Misconceptions in Pediatric Obstructive Sleep Apnea

Misconception: Adenotonsillectomy Cures All Obstructive Sleep Apnea

- Risk factors for obstructive sleep apnea (OSA)
 - Skeletal / soft tissue abnormalities (micrognathia, macroglossia, midface hypoplasia)
 - Craniofacial diseases
 - Chromosomal anomalies (Trisomy 21)
 - Abnormal airway tone
 - Cerebral palsy
 - Neuromuscular disease
 - Obesity
- Often multifactorial etiology



Tan, Expert Rev Respir Med 2016

Myths and Misconceptions in Pediatric Obstructive Sleep Apnea

Residual Obstructive Sleep Apnea and Obesity

- 43.5% of obese children with moderate/severe OSA had residual OSA after tonsillectomy¹
- Older age, severity of disease, and weight gain are significant risk factors¹
- Young children: Tonsillar hypertrophy a major contributor to presence of OSA
- Older children: Obesity may be more prominent determinant of OSA
- Increased weight gain has been well described post tonsillectomy²



1. Alonso-Alvarez, Eur Respir J, 2015
2. Katz, Pediatrics, 2014



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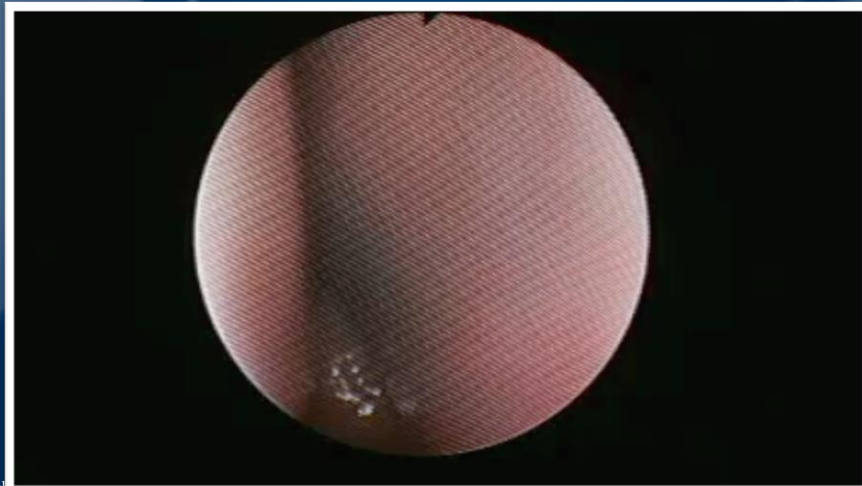
B-PAP and CPAP Myths

1. Myth: Children can't use CPAP
 - Desensitization
 - Importance of mask type
 - Consistency
2. Myth: CPAP is easy
 - Buy-in from family
 - Buy-in from child
 - Long-term care model



Myths and Misconceptions in Pediatric Obstructive Sleep Apnea

Sleep Endoscopy



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Follow up

- Only needed to do adenoidectomy
 - No tongue base collapse on sleep endoscopy
- Snoring resolved and CPAP discontinued

Myths and Misconceptions in Pediatric Obstructive Sleep Apnea

Summary

- Post-tonsillectomy obstructive sleep apnea occurs frequently in higher risk populations.
- Children can use CPAP, but successful therapy requires ongoing care.
- Although tonsillectomy remains the first-line treatment, it is not the only surgical option for children with obstructive sleep apnea.

Myths and Misconceptions in Pediatric Obstructive Sleep Apnea

Rady Children's Specialists: Complex Sleep Clinic

- Cares for children with complex health issues who have persistent sleep issues despite traditional management for obstructive sleep apnea.
- Uses the latest diagnostic tools and therapies, along with a coordinated care approach by sleep specialists from both respiratory medicine and otolaryngology.



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Thank You!

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