Review of Sleep Disordered Breathing

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Objectives

• Identify common sleep breathing disorders
• Identify Sleep Apnea symptoms and causes
• Identify which patients to refer for testing
• Identify common treatments for Sleep Apnea
Sleep Disordered Breathing

• Obstructive Sleep Apnea
• Central Sleep Apnea
• Cheyne-Stokes Respiration
• Obesity Hypoventilation Syndrome
• Nocturnal Hypoxemia
• Restless Legs Syndrome (Willis-Ekbom Disease)
• Periodic limb movement disorder
• REM Sleep Behavior Disorder
• Insomnia
• Narcolepsy
Prevalence

• Wisconsin sleep cohort found that undiagnosed OSA (AHI >5 events/hr) is prevalent in 9% of women and 24% of men

• It is estimated that 17% of adults in the US have mild or worse SDB
  (Young T, Peppard, PE, Taheri, S. Excess weight and sleep-disordered breathing. J Appl Physiol. 2005: 1592-1599)
Risk Factors

• Obesity
• Male gender
  – 2-3 times greater prevalence in men than women
• Airway anatomy/nasal congestion
• Smoking
• Menopause
• Alcohol consumption
CDC 2000 Obesity rates

http://www.cdc.gov/obesity/data/adult.html
CDC 2010 Obesity rates

CDC 2010 Obesity rates
http://www.cdc.gov/obesity/data/adult.html
Signs and Symptoms

• Common presenting complaint
  – Daytime sleepiness (patient)
  – Witnessed apnea/choking/snoring (bed partner)

  ▪ Frequent awakenings
  ▪ Non-refreshing sleep/fatigue
  ▪ Morning headaches
  ▪ Memory changes/poor concentration
  ▪ Nocturia
  ▪ Body movements
History

• **High Risk:**
  - Pre-bariatric surgery, A Fib, CHF, treatment refractory HTN/am HTN, CVA, pulmonary HTN, nocturnal dysrhythmias, type 2 diabetes, commercial truck drivers

• Patient with c/o daytime sleepiness, witnessed apnea, insomnia

• D/Dx: nonpathological snoring, laryngospasm 2/2 GERD, panic attacks, dyspnea
Physical Exam

- BMI
- Neck circumference
- Tongue/Mallampati
- Tonsillar hypertrophy
- Nasal abnormalities
- Retrognathia
The modified Mallampati classification for difficult laryngoscopy and intubation

The modified Mallampati classification\(^1\) is a simple scoring system that relates the amount of mouth opening to the size of the tongue, and provides an estimate of space available for oral intubation by direct laryngoscopy. According to the Mallampati scale, class one is present when the soft palate, uvula, and pillars are visible, class two when the soft palate and base of the uvula are visible, class three when only the soft palate is visible, and class four when only the hard palate is visible.

Suspect OSA?

• Questionnaires to help assess who to refer
  – Epworth Sleepiness Scale
  – STOP-Bang

• Referral to sleep specialist
## Epworth Sleepiness Scale

How likely are you to doze off or fall asleep in the following situations in contrast to just feeling tired? This refers to your usual way in recent times. Even if you have not done some of these things recently, try to work out how they would have affected you. Use the following scale to choose the most appropriate number for each situation.

<table>
<thead>
<tr>
<th>0 = would never doze</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = slight chance of dozing</td>
</tr>
<tr>
<td>2 = moderate chance of dozing</td>
</tr>
<tr>
<td>3 = high chance of dozing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Situation</th>
<th>Chance of dozing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitting and reading</td>
<td></td>
</tr>
<tr>
<td>Watching TV</td>
<td></td>
</tr>
<tr>
<td>Sitting inactive in a public place (e.g., a theater or meeting)</td>
<td></td>
</tr>
<tr>
<td>As passenger in a car for an hour without break</td>
<td></td>
</tr>
<tr>
<td>Lying down to rest during the day when circumstances permit</td>
<td></td>
</tr>
<tr>
<td>Sitting and talking to someone</td>
<td></td>
</tr>
<tr>
<td>Sitting quietly after lunch without alcohol</td>
<td></td>
</tr>
<tr>
<td>In a car, while stopped for a few minutes in traffic</td>
<td></td>
</tr>
</tbody>
</table>

**STOP-Bang questionnaire**

<table>
<thead>
<tr>
<th>Question</th>
<th>Y</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snoring: Do you snore loudly (louder than talking or heard through closed doors)?</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Tired: Do you often feel tired, fatigued, or sleepy during day?</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Observed: Has anyone observed you stop breathing during your sleep?</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Pressure: Do you have or are you being treated for high blood pressure?</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>BMI: &gt;35 kg/m2?</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Age: &gt;50?</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Neck circumference: &gt;40 cm?</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Gender: Male?</td>
<td>Y</td>
<td>N</td>
</tr>
</tbody>
</table>

"High risk" for OSA: ≥3 questions "yes".  
"Low risk" for OSA: <3 questions "yes".  
STOP Bang Scoring Criteria

• For general population
  
  **Low risk of OSA:** Yes to 0-2 questions  
  **High risk of OSA:** Yes to 3-4 questions  
  **Very high risk of OSA:** Yes to 5-8 questions  
  ▪ Or yes to two of STOP questions + male gender  
  ▪ Or yes to two of STOP + male + BMI >35kg/m2

• For obese (BMI >35 kg/m2)
  
  **Lower risk of OSA:** Yes to 0-3  
  **High risk of OSA:** Yes to 4-5 questions  
  **Very high risk of OSA:** Yes to 6-8 questions

• Untreated sleep apnea may increase risk of:
  – HTN, MI, CVA, obesity, DM
  – Driving accidents
  – Daytime sleepiness
Figure Legend:
OSA indicates obstructive sleep apnea. Severity of OSA was defined by the apnea-hypopnea index (AHI) as mild OSA (AHI, 5.0-14.9), moderate OSA (AHI, 15.0-29.9), and severe OSA (AHI, ≥30.0). P value reflects an overall log-rank $\chi^2$ test, providing an overall survival difference among the 4 study groups.
What causes OSA?

• Complete cessation or reduction in airflow during sleep, must last more than 10 seconds (can last >60 seconds)

• Repetitive obstruction of the upper airway often results in oxygen desaturation and arousals from sleep
Airway in a person with sleep apnea

**Normal sleep**
- Open airway

**Sleep apnea**
- Blocked airway

Normally when a person sleeps, the airway remains open, and air can pass from the nose and mouth to the lungs. In a person with sleep apnea, parts of the throat and mouth drop into the airway and block off the flow of air. This can cause loud snoring and interrupt breathing for short periods.
OSA Risk Factors

- Obesity (BMI >30)
- Maxillofacial irregularities
- Large Neck (>15 inches in women, >17 inches in men)
- Current smokers are 3x more likely to have OSA than never smokers
- Nasal Congestion
OSA Definitions

• **Apnea**: cessation of airflow for at least 10 seconds
• Usually results in drops in oxygen saturation
• **Hypopnea**: reduction in airflow accompanied by a >3-4% drop in oxygen saturation

Apnea- Hypopnea Index (AHI):
number of times you stop breathing per hour
Sleep Apnea Categories

• **Obstructive Apnea**
  – Absent airflow despite respiratory effort

• **Central Apnea**
  – Absent airflow for ≥ 10 seconds without respiratory effort

• **Mixed Apnea**
  – Initial central portion, followed by obstructive portion
Obstructive sleep apnea in which there is continuing respiratory effort, as shown by progressively increasing fluctuations in esophageal pressure (Pes) at the time of cessation of airflow. The arrow illustrates that arousal in obstructive apnea occurs simultaneously with the resumption of airflow.
Mixed sleep apnea

The apnea initially appears as a central apnea (without respiratory effort as evidenced by the constant esophageal pressure [Pes]). This is followed by a period of obstructive apnea (with respiratory effort as evidenced by changes in esophageal pressure).
Central sleep apnea

There is no respiratory effort, as shown by absence of changes in esophageal pressure (Pes), at the time of cessation of airflow. The arrow illustrates that arousal in central apnea typically occurs in the middle of the hyperpneic phase.
OSA Severity

• Normal Sleep, No OSA = 0-5 events/hr
• Mild = AHI 5-15 events/hr
• Moderate = AHI 15-30 events/hr
• Severe = AHI >30 events/hr
Common Sleep Apnea Tests

• In-laboratory polysomnography (EEM, EOG, EMG for sleep staging as well as monitoring of airflow, respiratory effort, SaO2 and leg EMG)

• Home Sleep Test
  – Level 1: Attended PSG (full monitoring)
  – Level 2: unattended PSG (with full monitoring)
  – Level 3: Cardiopulmonary study (attended or unattended)
  – Modified Portable Sleep Apnea Testing: Airflow, Respiratory effort, ECG or heart rate, SaO2
  – Level 4: continuous single or dual bioparameter (attended or unattended)
Common Tx

• PAP (Positive Airway Pressure)
  – CPAP
  – APAP
  – BiPAP
  – Adaptive servo-ventilation
Alternatives to PAP

- Surgery (UPPP)
- Dental appliance
- Nasal EPAP/valves
- Weight Loss!!!
Primary Care...

• Make sure that the patient brings all their PAP equipment for their hospital stay or procedure

• All patients who are on PAP should be able to use their own PAP without any problem

• Ensure that they use their PAP post-op
Common Complaints/PCP Troubleshooting

• “I can’t use my mask cause I feel like I choke.”
• “I can’t use my mask because of claustrophobia.”
• “The mask is blowing my face off, the pressure is too high!”
• “My bed partner doesn’t like the mask and it gets in the way of sex.”
When to refer back to Sleep Specialist:

- DME unable to find appropriate mask
- Unresolved/increased in symptoms
  - Consider NON-OSA causes of fatigue
    - DEPRESSION
    - Thyroid
    - Anemia
    - Other
- Major weight/craniofacial changes
- Patient refuses PAP therapy
Questions?