Sleep Disorders and the Metabolic Syndrome

Tom V. Cloward, M.D.
Intermountain Sleep Disorders Center
LDS Hospital

Objectives

- Describe how sleep disorders impact your daily medical practice
- Don’t do this, do that
- Why is a sleep doctor speaking at this conference?
- Screening for sleep apnea
What Is Sleep Apnea?

- Snoring is usually present, and is associated with pauses or shallow breathing
- Repetitive collapse of the upper airway during sleep
- Every apnea ends with an arousal from sleep
- Every arousal puts stress on the heart and brain
Pathophysiology of Sleep Apnea

- Mallampati Anesthesia Classification correlates with the presence of sleep-disordered breathing.

Causes of Sleep Apnea

- Large uvula, broad soft palate
- Back of throat is narrow (may be due to enlarged tonsils or fat pads)
- Enlarged tonsils or congenital facial deformity is usually the cause of sleep apnea in children
Predicting Sleep Apnea

- 4 questions can capture the majority of sleep apnea subjects
  - History of snoring
  - Choking, gasping, or pauses in breathing during sleep
  - Presence of high blood pressure
  - Neck circumference > 18.5 inches (men) or >17 inches (women)

Determinants Of Sleep Apnea

- **Anatomical Factors**
  - Obesity
  - Nasal congestion or obstruction
  - Facial features
  - Enlarged tonsils
- **Decreased Muscle Tone or Respiratory Drive**
  - Alcohol
  - Narcotics
  - Muscle relaxants
  - Anesthesia
- **Environmental Factors**
  - Sleeping on back
  - Sleep deprivation
  - Living at altitude

Case Report

- 30 year old healthy male developed sore throat
- Went to emergency room, found to have a viral upper respiratory infection
- Was given Lortab (an oral narcotic) to relieve throat pain
Case Report

- That night, his wife found him in bed not breathing, blue, and without a pulse
- She called 911, and began CPR
- Admitted to intensive care unit on ventilator

Case Report

- He survived
- Had overnight sleep study, and was found to stop breathing 117 times per hour (severe sleep apnea)
- His apneas lasted for 10-31 seconds

Case Report (Before)

- Exam shows small mouth, long uvula, and enlarged tonsils
- Mildly overweight, but not obese
Case Report

- He was placed on nasal CPAP (Continuous Positive Airway Pressure) and oxygen
- Referred to an Ears, Nose and Throat surgeon

Individual Health Consequences of Sleep Apnea

- Depression
- Hypertension
- Stroke
- Diabetes
- GERD
- ADHD
- Coronary Artery Disease
- Chronic Fatigue
- Poor Work Performance
- Motor Vehicle Accidents
- CHF
- SpO2
- Cardiovascular Events During an Obstructive Apnea

![Graph showing SpO2 levels during sleep with Obstructive Apnea](image-url)
OBSTRUCTIVE SLEEP APNEA

- Fatigue
- Unusual craniofacial features
- Obese
- Male
- Impotent

RESULTS OF TREATING SLEEP APNEA

- Effects of nasal CPAP
  - Reduces blood pressure in patients with HTN
  - Reduces left ventricular hypertrophy after 3-6 months of therapy
  - Improves EF by ~7% in patients with CHF
  - Reduces or eliminates nocturnal arrhythmias
  - After diagnosis of CAD, reduces likelihood of 2nd incident of CAD by 2/3
Effects of CPAP on Blood Pressure

Baseline Arm

Therapeutic Arm

n = 60 patients

Effect of CPAP on Blood Pressure in Hypertensive Patients

T = 9 weeks

Effect-free Survival in CAD Patients with OSA: CPAP Therapy and Control Arms

N=54
OSA and Metabolic Dysfunction

- OSA is associated with glucose intolerance and insulin resistance, independent of potential confounders.
- OSA is an independent risk factor for the metabolic syndrome (Coughlin et al., *Eur Heart J.*, 2004).
- Hypoxemia may be the predisposing factor to the metabolic alterations associated with OSA.

Change in Glucose with CPAP (Babu Arch Intern Med 2005)

Change in HbA1c with CPAP
Type 2 Diabetes, Glycemic Control and CPAP in OSA

Postmeal glucose values significantly reduced with CPAP

CPAP Improves Insulin Sensitivity after 2 Days and 3 Months

Utah Obesity Study

Harsch, et al. AJRCCM 2004

Improvement Following Bariatric Surgery

Screening For Sleep Apnea

Several questionnaires exist (Flemons' Sleep Apnea Clinical Score, Berlin Questionnaire, and STOP-BANG).

All of which focus on:
- Snoring
- Observed Apneas
- Presence of Hypertension
- Neck circumference

STOP-BANG Questionnaire
A Tool to Screen Patients for OSA

S: Snoring
T: Tired
O: Observed apnea
P: Pressure (HTN)
B: BMI (greater than 35)
A: Age (50 and older)
N: Neck Size (>40 cm)
G: Gender (male)

High risk of OSA: answering yes to 3 or more items
Low risk of OSA: answering yes to less than 3 items

Chung F. Anesthesiology. 2008; 108(4):821-827

N=177
(2974 pre-operative patients)
STOP-BANG Questionnaire
A Tool to Screen Patients for OSA

Chung F  Anesthesiology 2008; 108:812-821
STOP-BANG Questionnaire
A Tool to Screen Patients for OSA

Positive Predictive Value using STOP-BANG Criteria

Summary
- Common medical problems are often manifestations of sleep disorders
- If your patient complains of poor sleep quality, think “AIR”
  - Apnea, Insomnia, Restless Legs
- Avoid muscle relaxants, respiratory depressants, and opioids if sleep apnea diagnosed or suspected
Summary

- Fatigue, Sleepiness, and Insomnia are symptoms, not diseases.
- Determine underlying cause of symptom first (if possible) before prescribing the “anti-symptom” medication.

Summary

- Obstructive Sleep Apnea is a risk factor for glucose intolerance, insulin resistance, and metabolic syndrome.
- CPAP improves insulin sensitivity (both acutely and chronically), acute glycemic control, and HgA1C.
- STOP-BANG screening questionnaire is easy to administer with high sensitivity, PPV, and NPV.

Summary

<table>
<thead>
<tr>
<th>MEASURE</th>
<th>GOAL</th>
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<tbody>
<tr>
<td>Snoring often louder than your partner</td>
<td>&lt;30 dB</td>
</tr>
<tr>
<td>Difficulty breathing during sleep</td>
<td>&gt;10 events/hr</td>
</tr>
<tr>
<td>Risk of sleep-related breathing disorders</td>
<td>&gt;15 events/hr</td>
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<tr>
<td>High blood pressure on overnight test</td>
<td>&gt;90 mmHg</td>
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</tbody>
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Screen for Sleep Apnea?