MANAGING OBSTRUCTIVE SLEEP APNEA

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DISCLOSURES

- I have no financial disclosures
Managing OSA

- Be aware of the high prevalence of OSA
- Be familiar with the symptoms of OSA
- Be aware of the cardiac consequences of untreated OSA
- Be familiar with tests to diagnose OSA
- Be familiar with various treatments for OSA (especially CPAP or autoPAP)
COMMON SLEEP DISORDERS

- Chronic sleep deprivation
  - Most common sleep disorder in the U.S.
  - (>30%) 100 million people

- Chronic insomnia
  - (10%) 30 million

- Obstructive Sleep Apnea
  - (6-15%) 20 – 40 million
Obstructive sleep apnea syndrome (OSA) – disorder characterized by repetitive episodes of upper airway obstruction that occur during sleep, usually associated with a drop in blood oxygen saturation and an EEG arousal.
Obstruction to airflow in posterior pharynx

Worse sleeping on your back

Tongue

Uvula and soft palate
PREVALENCE OF OSA

- **Young et al, NEJM, 1993**
  - Prevalence of OSA in middle-aged men was 4%
  - Prevalence of OSA in middle-aged women was 2%

- **Sleep Heart Health Study, 2000**
  - Prevalence of OSA in men was 12%
  - Prevalence of OSA in women was 6%

- **Prevalence even higher in 2016**
  - 20% men and 10% women (50% cardiac pts)
SYMPTOMS OF UNTREATED OSA

- Loud snoring (LS)
- Excessive daytime sleepiness (EDS)
- Excessive daytime fatigue (EDF)
- Nonrefreshing sleep (NRS)
- Nocturia
- Irritability and morning headaches
- Poor memory and poor concentration
- Witnessed episodes of sleep apnea or gasping episodes while sleeping
RISK FACTORS FOR OSA
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- Obesity, Obesity, Obesity, Obesity, Obesity
- Age (> 40 years old, esp > 65 years old)
- Gender: male:female ratio = 2:1
- Enlarged tonsils and adenoids
- Medications that are CNS depressants – alcohol, sedative-hypnotics, narcotics
- Family history of OSA, especially blacks
- Hypothyroidism, Down’s syndrome
Consensus Guidelines based on apnea-hypopnea index (AHI):

Apnea – total obstruction to airflow
Hypopnea – partial obstruction to airflow

- **Mild OSA**  
  AHI 5-14 events/hour

- **Moderate OSA**  
  AHI 15-29

- **Severe OSA**  
  AHI 30 or higher

- **Very Severe OSA**  
  AHI > 60, 80, 100?
CONSEQUENCES OF UNTREATED OSA

Associated with increased risk of:

- Car crashes: 2 – 3 X
- HTN or poor control: 1.5 – 3.0 X
- Heart disease: 1.5 – 3.0 X
- Stroke: 2 X
- Diabetes or poor control: 1.5 X
- Healthcare costs: 2.5 X
- Death (CV mortality): 1.5 – 3.0 X
Untreated OSA has 3 undesired effects:

- Quality of life and safety issues
- Mood issues and neurocognitive dysfunction
- Sympathetic activation, endothelial dysfunction, atherosclerosis resulting in increased cardiovascular disorders, CV events, and CV mortality
CV CONSEQUENCES OF UNTREATED OSA

- Higher prevalence of HTN or poorly controlled HTN
- Higher prevalence of CAD
- Higher prevalence of stroke
- Higher prevalence of atrial fibrillation, PVC’s, other arrhythmias
- Worsening left-sided CHF and pulmonary hypertension
- Increased cardiovascular mortality
MANAGING OSA: DIAGNOSIS

Clinical suspicion

- History of snoring and daytime sleepiness, but highest correlation is witnessed apneas by wife
- Caveat: Men with CV disease and women in general may not present with EDS, but fatigue
- Epworth sleepiness scale > 10, but not always
- Degree of obesity and neck circumference
- Men > 19 inch neck and Women > 17 inch neck
- Abnormal overnight pulse oximetry, but this is not needed to pursue further diagnostic testing
Overnight Pulse Oximetry – not absolutely needed, but can screen for moderate-to-severe OSA in hospital or outpatient setting

**Pulse**

**Sat or SpO₂**
Home Sleep Test – diagnostic test approved by MCR in 2012 to qualify for CPAP therapy

Less expensive than Polysomnography

Not as sensitive for mild OSA

Can not accurately diagnose central sleep apnea, such as Cheyne-Stokes respirations

Best for uncomplicated patient with high clinical suspicion for at least moderate-to-severe OSA (not for severe CHF or COPD)
HOME SLEEP TESTING

Apnea-Link plus (ResMed)

- Nasal Pressure
- Thoracic Effort Belt
- Pulse Oximetry
- Heart Rate
Polysomnogram (facility-based sleep study): gold standard that is most sensitive/accurate

Split-night Sleep Study – regular PSG followed by CPAP titration in last 4-5 hours
TREATMENT OF OSA

- CPAP, autoPAP, BiPAP, other PAP
- Conservative Therapy
- Oral appliances
- Provent Nasal Valves
- Medications and other methods
- Upper airway surgery (UPPP/T & A)
- Surgery: MMA, Tracheostomy, UAS
CONSERVATIVE THERAPY

- Education regarding OSA
- Worsened by alcohol, narcotics, BZDs
- Regular exercise, usually “cardio”
- Weight loss program: lose weight to Ideal Body Weight (BMI ≤ 25)
- Sleep on side with special T-shirt with 3 tennis balls or Zzoma pillow
FDA-approved as positional therapy for OSA

Probably best for mild-to-moderate OSA that occurs mainly when sleeping on back
OTHER TREATMENTS FOR OSA

- Oral appliances
- Provent
- Winx

*All about 50% effective
TREATMENT OF OSA - INSPIRE

- Upper airway stimulation (UAS) via pacemaker for hypoglossal nerve
- Novel, expensive, for select patients who have failed CPAP/autoPAP
TREATMENT OF OSA WITH PAP

CPAP or autoPAP is often first line treatment

Nasal Mask

Nasal Pillows
TREATMENT OF OSA:

- **CPAP** = Continuous Positive Airway Pressure, at 10 cm H2O

- **CFlex-3 or EPR 3** = pressure drops by 3 cm on exhalation (standard in 2016)
TREATMENT OF OSA:

- AutoPAP = automatically adjusting CPAP, at 5-15 cm H2O
TREATMENT OF OSA:

- BPAP/BiPAP = BiLevel PAP, 15/10 cm H2O
  IPAP – inspiration
  EPAP – expiration

1992 2016
POPULAR NASAL MASKS, PILLOWS OR FULL-FACE MASKS

Nasal Pillows: Airfit P10

Nasal Mask: Dreamwear

Nasal Mask: Wisp

Full-Face Mask: Amara View
BENEFITS OF CPAP THERAPY

- Improve symptoms: LS, EDS, EDF, NRS
- Reduce risk of drowsy driving car crash
- Improve diabetic control
- Improve BP, perhaps by 7-10 mm Hg (select pts)
- Improve CHF
- Reduce chances of going back into A fib
- Unclear whether CPAP reduces risk of stroke/heart attack or reduces CV mortality until long-term studies are completed
UNTREATED OSA AS RISK FACTOR FOR HTN

Odds Ratios* for Incident Hypertension at 4-Year F-U with Baseline AHI >0
Wisconsin Sleep Cohort Study

*Adjusted for age, sex, smoking, ALC, BMI, neck girth
Peppard et al: NEJM 2000
Untreated OSA may increase risk of HTN by 2-3 times compared to controls.

Untreated OSA may be responsible for up to 30% of cases of “essential HTN”.

CPAP therapy > 6 hours per night may reduce sBP by 1 mm, 2 mm, 3 mm, 7 mm Hg in patients with resistant HTN.

Recent Chest article showed increase in sBP of 10 mm Hg after withdrawing CPAP.
OSA AND HTN

Joint National Committee on Hypertension

- **JNC VI (1997)** - consider OSA as a cause of resistant hypertension

- **JNC VII (2003)** – consider OSA first on the list of identifiable causes of hypertension - not RAS, Cushing’s disease, or pheochromocytoma
What can improve LVEF in CHF patient with OSA?

A. ACEI  
B. CPAP  
C. Coreg  
D. Lasix  
E. AVN ablation with biV pacing in CHF/A fib  
F. Some of these  
G. All of these

*The answer is.......
All of these may help CHF

- CPAP therapy may improve LVEF by 9% in patients with systolic CHF and OSA.
- Interestingly, CPAP may also improve LVEF by 8% in patients with systolic CHF and Central Sleep Apnea (CSR), but did not improve mortality.
- Ideally for Cheyne-Stokes respirations, Adaptive servo-ventilation (ASV) may be best treatment, but first long term study (SERVE-HF) suggests CV mortality.
Tachy-brady pattern most frequent
Sinus pauses rarely symptomatic
PVC’s and NS ventricular tachycardia
Higher rate of atrial fibrillation
More difficult to convert atrial fibrillation to NSR and more difficult to maintain patient in NSR if untreated OSA
4X higher rate of developing A fib if severe OSA (AHI > 30) versus control (AHI < 5)
5X higher incidence of A fib in OSA patients versus nonOSA patients over 15 year followup
2X higher rate of recurrence of A fib after A fib ablation in untreated OSA versus CPAP-treated OSA
Ideally, should treat OSA adequately in stable chronic atrial fibrillation prior to attempts at electrical or chemical cardioversion
Clear that untreated OSA will cause vascular endothelial inflammation

Clear that untreated OSA will lead to higher risk of cardiac events such as ACS, MI, TIA, stroke, or death due to CV event

Logical question is: Does treatment of OSA with CPAP in cardiac patients result in lower risk of ACS, MI, CHF exacerbation, TIA, stroke, or death due to CV event
Observational studies suggest that CPAP Rx reduces the risk of CV events, especially if patient is adherent to CPAP therapy.

First large prospective randomized trial published Sept 2016 NEJM – SAVE trial:
- 2700 cardiac patients with mod-to-severe OSA
- 80% men, 63% Asian, BMI 29, AHI 29
- Most only mildly sleepy with Epworth score 7.4
- Patients with Epworth score >15 or severe oxygen desaturation < 80% (10% time) were excluded
SAVE trial results: CPAP vs Usual care

Average use by CPAP group - 3.3 hours/night

Only 42% of CPAP patients used CPAP > 4 hours/night

No significant reduction in CV events (ACS, MI, TIA, CVA, AF) or in mortality with use of CPAP versus Usual care - F/U 3.7 years

However, Epworth score, anxiety, mood, QOL, and sick days taken all improved with the use of CPAP, even suboptimal in duration
Criticisms of the SAVE trial:

- Symptomatic patients with severe OSA and severe sleepiness were excluded.
- Patients in CPAP arm did not use CPAP enough each night to receive cardiac benefit.
- If pts only used CPAP in the first 3.3 hours of sleep then pulled off the mask, they could have severe desaturations during REM sleep.
- In subgroup analysis of 561 pts who used CPAP > 4hrs, reduced risk of stroke (p<.05).
For cardiac patients who are sleepy and likely have OSA, pursue diagnosis and therapy with CPAP/autoPAP if appropriate

For patients with poorly controlled HTN (on 3 BP meds and BP high), think of untreated OSA that needs evaluation and Rx

For patients with atrial fib that is not well-controlled, think of untreated OSA that needs evaluation and Rx
OSA is a common disorder in cardiac patients and may be present 50% of the time.

Untreated OSA may lead a number of cardiac consequences: HTN, CAD, PAF, CVA.

Treatment of OSA with CPAP or autoPAP may improve BP control, diabetes control, atrial fib control, daytime sleepiness, QOL.

Minimally sleepy cardiac patient with OSA poorly compliant with CPAP may not be significantly harmed if he does not use CPAP.
QUESTIONS?

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