Obstructive sleep apnea: A PCP’s Perspective

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10/19/2010

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- Medical literature OSA- 1965 (French and German)

- Pickwickian syndrome- Sleep-related obesity-hypoventilation syndrome: William Osler (1849-1919)
  The Pickwick Papers (1836): Charles Dickens (1812-1870)

- “Apnea” = “Without breath” (Greek)
Sleep apnea - Types

- Obstructive: Partial/Complete airflow cessation, thoracoabdominal effort continues but obstruction +
- Central: Partial/Complete airflow cessation with lack of thoracoabdominal effort
- Mixed

Progression:

- Sleep related breathing disorders
  - Upper airway resistance syndrome (not hypoxic)
  - OSA

Sleep apnea = AbN pauses in breathing during sleep

Apnea = Stop breathing completely / <25% of a normal breath for > 10 secs

Hypopnea = 69% to 26% of a normal breath
  1. Neurological arousal ≥ 3 sec in EEG frequency or
  2. Oxygen desaturation of > 3-4% or
  3. Both
Apnea → Wide swings of heart rate
→ Precipitous decrease in O2 saturation
→ Brief EEG arousals

AHI: apnea-hypopnea index: Average number of episodes of apnea and hypopnea / hour.
RDI: respiratory disturbance index: Average number of respiratory disturbances / hour
(obstructive apneas, hypopneas, and respiratory event–related arousals [RERAs] per hour)

 Definitions

• AHI (apnea-hypopnea index) / RDI (respiratory disturbance index) ≥ 15 episodes / hour
• AHI / RDI = 5-14 episodes / hr + Symptoms of EDS (excessive daytime sleepiness), impaired cognition; mood disorders; insomnia; or documented hypertension, ischemic heart disease, or history of stroke

• Severity of OSA based on AHI:
  Mild: 5 - 15
  Moderate: 15 – 30
  Severe: > 30
- AHI alone can lead to under diagnosis of OSA by 30% when compared to RDI (esophageal manometry/ nasal pr. transducer)

- A 2007 study has suggested that approximately 6% of adolescents have weekly sleep-related disordered breathing
  - Males: 24%
  - Females: 9%

- Sleep disordered breathing - undiagnosed in 92% affected females and 80% affected males

Causes:
- Certain shapes of the palate and jaw-craniofacial abnormality
- Large tonsils and adenoids in children
- Large tongue
- Narrow airway- soft palate, parapharyngeal fat pads, lat pharyngeal walls
- Nasal obstruction
- Large neck or collar size
- Obesity (7) - 70% of Obese → OSA
Risk factors

- Male (? Female greater impairment in daytime functioning and symptoms (1))
- 40-65 years
- Family History
- Body habitus (7): overwt/ obese, central body fat distribution, >17" neck girth, UA abN, Craniofacial abnormalities, LE edema
- Race: AA 2.5 ↑ risk

- Alcohol
- Smoking
- Supine position
- REM sleep
- Stroke: 60% → OSA
- DM (7)
- Menopause
- Heart disease: 30-50% OSA

Symptoms:

- Usually associated with excessive daytime sleepiness, abnormal daytime sleepiness, including falling asleep at inappropriate times
- Awakening unrefreshed in the morning
- The Epworth Sleepiness Scale:
  - Self-report test = Severity of sleepiness
Likelihood of falling asleep during specific activities

- 0 = Unlikely to fall asleep
- 1 = Slight risk of falling asleep
- 2 = Moderate risk of falling asleep
- 3 = High likelihood of falling asleep

Situation vs Risk of Dozing (0-3)
- Sitting and reading
- Watching television
- Sitting inactive in a public place
- As a passenger in a car riding for an hour with no breaks
- Lying down to rest in the afternoon
- Sitting and talking with someone
- Sitting quietly after lunch without alcohol
- In a car while stopped for a few minutes in traffic

Other symptoms may include:
- Depression (possibly)
- Memory difficulties
- Morning headaches
- Personality changes (4)
- Poor concentration (4)
- Restless and fitful sleep
- Frequent waking up during the night to urinate
- Insomnia
- Hyperactive behavior, especially in children
- Leg swelling (if severe)

- Snoring
- 3 S: Snoring, Sleepiness, and Significant other report of sleep apnea episodes
- H/o of disruptive snoring- 71% sensitivity SDB
- Disruptive snoring and witnessed apneas: 94% specificity for SDB

STOP
- S: Do you snore loudly, loud enough to be heard through a closed door?
- T: Do you feel tired or fatigued during the daytime almost every day?
- O: Has anyone observed that you stop breathing during sleep?
- P: Do you have a history of high blood pressure with or without treatment?
> 2 Yes: Sensitivity - AHI > 5: 66%
AHI > 15: 74%

BANG

- B: Body mass index > 35
- A: Age > 50 years
- N: Neck circumference > 40 cm
- G: Gender - male
- Both STOP and BANG
- Sensitivity of AHI > 5: 93%
  AHI > 15: 83%

Obstructive sleep apnea patients are not sleepy because of carbon dioxide narcosis, but because of fragmented sleep due to the necessity to awaken to breathe.

Pathophysiology:

- Sleep fragmentation/ arousals
- Hypoxemia
- Increased -ve intrathoracic pr
- ? Hypercapnea
Leads to:

- Sympathetic activation
- Metabolic deregulation
- LA enlargement
- Endothelial dysfunction
- Systemic inflammation
- Hyper coagulation

Side Effects:

- Excessive daytime sleepiness - ↓ quality of life, daytime performance, neurocognitive deficits (4) - intellectual capacity, psychomotor vigilance, motor coordination
- Motor vehicle accidents risk (6)

Adverse effects:

- Hypertension - Blunted/ No decrease in nighttime BP → Increases all cause mortality rate
- 80% hard to treat HTN on 1 med → OSA
- 45% OSA without HTN develop HTN in 4 years
- CPAP (> 5.6 hr/night) - Decreases both systolic and diastolic hypertension

Cardiovascular disease
- CAD, Heart failure, arrhythmias

AHA and ACC Aug 2008

Somers et al – threshold for sleep study lower in cardiac disease

CHF - Increased by 2.3 X
AHI >15 increased mortality, CPAP can reduce mortality
- OSA pts have double the prevalence of CAD
- Increase in Subclinical CAD, sudden death
- AHI > 30 increases cardiovascular events
- CPAP decreases the risk to non OSA snorers

- Increase in SDB/ RDI = Increase AF and complex ventricular ectopy
- Severe SBD = 2-4 X increase in nocturnal complex arrhythmia
- Brady arrhythmias more in OSA
- CPAP – decreases frequency of PVC

- A.Fib after cardioversion:
  - 50% recurrence
  - With OSA → 80% recurrence

- Stroke: Risk 1.5 X
- Sleep Heart Health Study-
  - Strongest association with stroke than other cardiovas event
  - AHI >36 Hazard ratio increased by 3.3
Diabetes - Insulin resistance vs. type 2
CPAP reverses insulin resistance

Differentials:
- Narcolepsy and other Hypersomnia disorders
- Nocturnal panic attacks
- Asthma / COPD
- Laryngeospasm due to GERD
- Dyspnea due to pul edema

Central sleep apnea
Non obstructive alveolar hypoventilation
Depression
Hypothyroidism
Obstructive sleep apnea- hypopnea syndrome

Work - Up
- TSH
- ABG (obesity hypoventilation)
- MSLT: Multiple Sleep Latency Test
- MWT: Maintenance of Wakefulness Test
Polysomnography:
- PSG—sleep architecture, EEG, Eye movements (EOG), Chin movements, Airflow, Respiratory efforts, Oximetry, ECG, Body position, Snoring, Leg movements (EMG)

Imaging: endoscopy, fluoroscopy, lat cephalometry, CT scanning, MRI, radiography

Treatment
- Tracheostomy: 1970 Elio Lugaresi (University of Bologna, Italy)
- CPAP: 1981 Sullivan et al, Sydney, Australia
- Corrective surgery: 1981- Fugita et al Uvulopalatopharyngoplasty (UPPP)
- Oral appliances, stimulation of genioglossus
- Behavioral Treatment:
  - Lying on side
  - Weight loss:
    - 10% Wt gain → AHI ↑ 30%
    - 10% Wt loss → AHI ↓ 25%
  - Sleep hygiene: Reading/ TV, lighting/ noise, eating / exercise prior to bedtime
  - Relaxation – physical and mental prior to bedtime

- CPAP (1, 3) / Autotitration / BiPAP:
  - Positive pressure to the upper airway
  - Essentially "splints" the upper airway open
  - Prevents its collapsing (deeper stages of REM sleep)

- Surgeries:
  - Nasal, septal and adenoid surgery
  - Tonsillectomy
  - Genioglossus tongue advancement
  - Glossectomy
  - Uvulopalatopharyngoplasty
  - Maxillomandibular advancement
  - Radiofrequency tissue volume reduction
  - Hyoid suspension
  - Tracheostomy

- Medical:
  - Hypothyroidism
  - Nasal Obstruction: decongestants
  - Sinusitis
• Others:

• Modafinil: Residual daytime sleepiness despite optimal use of CPAP (? Sympathomimetic)

• Armodafinil: R-enantiomer of modafinil

• Others:
  Acetazolamide, Medroxyprogesterone, Fluoxetine, Protriptyline: not recommended

• Non response:
  • +ve airway pressure titration insufficient
  • Residual central sleep apnea
  • Not using the machine sufficiently
  • Change in medication/ alcohol use
  • Medical disorders
  • Weight gain
  • Other sleep disorders- narcolepsy

1. Gender Differences in Obstructive Sleep Apnea and Treatment Response to Continuous Positive Airway Pressure: Lichuan Ye, et al: Journal of Clinical Sleep Medicine, Vol.5, No. 6, 2009


3. Auto-PEEP to Treat Obstructive Sleep Apnea: David P. White: Journal of Clinical Sleep Medicine, Vol.5, No. 6, 2009


THANK YOU