Clinical Features, Evaluation, and Management of OSA

Principles and Practice of Sleep Medicine
Chapter 114

Physiologic Effects of OSA

- Intermittent hypoxia
- Exaggerated negative swings in intrathoracic pressure
  - Leads to oxidant stress in brain and myocardium
    - Finding seen in those with poor LV function and in those with pulmonary hypertension
- Terminal arousals
  - Lead to heightened sympathetic tone
- OSA a major risk factor for cardiovascular disease, including hypertension, stroke, MI, and CHF

Clinical Features

- History
  - Snoring
    - Heavy snoring most common symptom
    - About 50% of men and 25% of women snore
    - Must be accompanied by other symptoms
  - Sleepiness
    - Assessed by Epworth Sleepiness Scale
      - Greater than 10 suggest significant sleepiness
    - Patients can underreport and overreport

Clinical Signs and Symptoms

- Nighttime Signs and Symptoms:
  - Snoring
  - Gasping for air
  - Periods of silence followed by snort or gasp (observed apneic episodes)
  - Tossing and turning
  - Sweating
  - GERD
  - Nocturia
  - Dry mouth or sore throat

Clinical Signs and Symptoms

- Daytime Signs and Symptoms:
  - EDS or fatigue
  - Impaired driving
  - Personality changes
  - Memory problems
  - Poor concentration and attention
  - Poor judgment
  - Decreased response time
  - Morning headaches
  - Impotence
  - Cognitive impairment
  - Vision problems

Gender and Symptoms

- Gender and Symptoms
  - Females
    - Insomnia
    - Less likely to have observed apneas
    - More likely to have diagnosed mood disorder and hypothyroidism and symptoms of RLS, nightmares, palpitations, and hallucinations
  - Males
    - Tend to use alcohol and caffeine more

Prevalence in Disease-Specific Cohorts

- OSA associated with cardiac, cerebrovascular, pulmonary, metabolic, and other comorbid diseases
- Up to 50% of patients with systemic hypertension have OSA
- OSA seen in 64% of those with difficult to control hypertension
- High prevalence of OSA in those with A Fib
- 11% of those with cardiomyopathy (LV ejection fraction < 45%) have OSA
  - CSA is seen more frequently in this group

Prevalence in Disease-Specific Cohorts

- 61% of those with systolic heart failure have a SRBD
  - 50% have OSA
  - CSA present in the remainder
- Three- to four-fold increased risk of stroke in moderate to severe OSA patients
- OSA associated with type 2 diabetes and metabolic syndrome
  - 58% with type 2 diabetes have an elevated AHI
  - In obese patients with type 2 diabetes, 87% have OSA

Prevalence in Disease-Specific Cohorts

- OSA also seen in patients with:
  - COPD
  - Asthma
  - Chronic kidney disease
  - Nocturnal GERD

Physical Findings

- Central obesity
  - BMI > 28 reflects risk factor for OSA
  - 40% of those with BMI >40 and 50% of those with BMI >50 have significant SDB
- Neck circumference
  - Men with circumference > 17 in (43 cm) and women with circumference >16 in (41 cm) have greater risk
- Nasal obstructions
- Hypertension

Other Risk Factors

- Age > 65 years
- Male gender
- Postmenopausal women
- Positive family history
- Alcohol ingestion near bedtime
- Tobacco use

Other Risk Factors

- Sedatives
- Sleep deprivation
- Sleeping in supine position
- Allergies and nasal congestion
- Craniofacial abnormalities

Clinical Examination

- Complete physical needed
  - Should be screened for comorbidities
- Obesity and Neck Circumference
  - Must take height, weight, BMI, and neck circumference
  - Neck circumference > 40cm = high risk for OSA
- QOL assessment
  - Use of Functional Outcomes of Sleep Questionnaire (FOSQ)

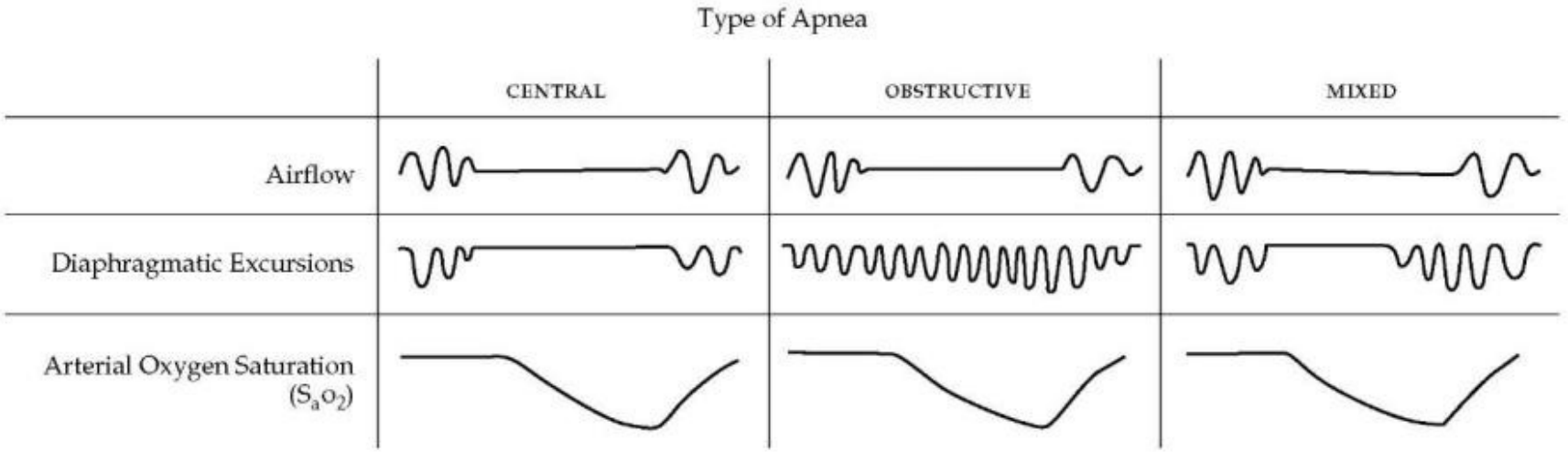
Clinical Examination

- Upper airway
  - Look for abnormalities
  - Patient should be examined in both seated and supine positions
  - Oropharynx exam looks for large tongue
  - Chronic snoring effects can be seen as edema of uvula
  - Can be done via endoscopy or MRI
  - Mallampati and Friedman scales

Diagnosis

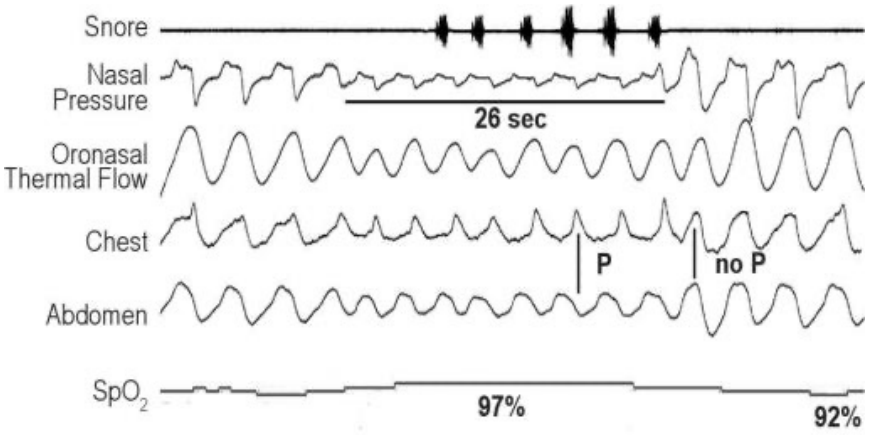
- PSG
  - Gold standard is overnight PSG
- Definitions
  - AHI
  - AASM scoring manual
    - Apnea = drop in peak thermocouple excursion by > 90% of baseline, lasting at least 10 seconds
      - Obstructive = Respiratory effort
      - Central = No respiratory effort
      - Mixed = Effort absent at beginning with resumption of effort before resumption of airflow

Diagnosis


Type of Apnea
CENTRAL
OBSTRUCTIVE
MIXED
Airflow
Diaphragmatic Excursions
Arterial Oxygen Saturation
(S_aO_2)

Diagnosis

- AASM scoring manual
  - Hypopnea = Requires nasal pressure transducer
  - Recommended rule= Reduction of nasal pressure excursion by > 30% of baseline, lasting at least 10 seconds, with > 3% desat or causes an arousal
  - Alternate rule = Reduction of nasal pressure excursion by at least 30%, lasting at least 10 seconds, with 4% desat



Diagnostic Criteria

- OSA
  - 5 or more obstructed breathing events per hour of sleep
  - CMS reimburses for CPAP for AHI >15 or an AHI >5 with associated hypertension, stroke, sleepiness, ischemic heart disease, or mood disorder

Other Diagnostic Approaches

- Prediction Formulas and Questionnaires
  - Questionnaires collect self-reported data from patient about signs and symptoms
  - Formulas include physical measures such as BP, BMI, or neck circumference
    - Try to predict AHI severity
  - Among most useful prediction formulas:
    - History of witnessed apneas
    - Males
    - BMI
    - Neck circumference
  - Specific oropharyngeal measurements also highly predictive

Other Diagnostic Approaches

- Home Sleep Testing
  - Controversy over accuracy
  - Screening has potential to delay diagnosis and result in false-negative results
  - Home monitoring can potentially:
    - Increase accessibility to sleep testing
    - Enhance patient convenience
    - Reduce costs
    - Better sleep in home environment
  - Problems:
    - Equipment problems can’t be corrected
    - Non-OSA disorders can’t be detected
    - Can’t perform split night studies and get patients on treatment faster
  - Some testing devices shown to be fairly accurate
  - Can only be used if no comorbidities present

Other Diagnostic Approaches

- Other diagnostic tools
  - Oximetry
  - Actigraphy
  - Measure of arterial tone

Clinical Course and Prevention

- SDB risk factor for:
  - Hypertension
  - Car crashes
  - Neurocognitive dysfunction
  - Cardiovascular disease
  - Impotence
  - Depression
  - Glucose intolerance
  - Reduced quality of life
  - Increased healthcare costs

Clinical Course and Prevention

- SDB progression can occur over relatively short time
- Worsening of AHI with weight gain is greater than reduction in AHI with comparable degree of weight loss
  - Weight gain more common than weight loss in SDB patients
- Because of dangerous side effects, need for diagnosis is public health problem

Treatment

- General measures
  - Modifying unhealthy behavior has major role in treating OSA
    - Weight loss can be curative
      - Even modest weight loss (10%) can relieve mild SDB
    - Relationship between weight, sleep, and appetite mediated in part by leptin, cortisol, insulin, and metabolic rate
    - Weight loss by dietary modification takes time
      - Minority can maintain weight loss
    - Quit smoking
    - Muscle relaxants (including alcohol and sleeping pills) can make apneas longer

Treatment

- General measures
  - Some patients have chronic rhinitis
    - Intranasal corticosteroid therapy may improve apnea severity but not snoring or sleep quality
  - Some patients have supine-dependent apnea
- CPAP
  - First line of treatment
  - Typically applied in range from 5-15 cm H2O through nasal or full face mask
    - Start at 5 cm and gradually increase until SDB eliminated
    - Machine can go up to 20 cm H2O though
  - Split night studies current standard approach

Treatment

- CPAP
  - Autotitrating machines more common now
    - Devices infer upper airway narrowing or collapse by real-time assessment of flow
    - Might not all be equally effective
    - Should have an in-lab titration if following factors exist:
      - Severe O2 desats
      - Sleep disruption
      - Mask leaks
      - Sleep with mouth open
      - Hypoventilation or possible central apnea
    - Can have better rates of compliance

Treatment

- CPAP
  - Patient compliance is key and difficult part of CPAP
    - About 50-60% of patients comply with therapy
      - Compliance rate comparable to common medical recommendation compliance
      - Humidification and education may improve compliance
  - Complications
    - Ulcer, rashes, or irritation on bridge of nose
    - Chest or sinus discomfort
    - Claustrophobia
    - Nasal congestion

Treatment

- CPAP
  - Associated with reversal of many OSA complications:
    - Mortality
    - Auto accidents
    - Hypertension and other cardiovascular diseases
    - Cognitive impairment
    - Sleepiness
    - Increased healthcare costs
    - Impaired quality of life
    - Depression
    - Impotence

Treatment

- Surgery
  - Uvulopalatopharyngoplasty (UPPP)
    - Most commonly performed to correct OSA and best studied
    - Success rate of approximately 50%
    - Less effective in more severely affected, heavier patients
      - Outcomes poorer for those with BMI >30 or with lowest SaO2 less than 88%
    - Relapse occurs in as many as half who get initial response
    - Complications:
      - Postoperative bleeding
      - Voice change
      - Perioperative upper airway obstruction
      - Death

Treatment

- Surgery
  - Laser-assisted uvulopalatopharyngoplasty (LAUP)
    - Success rate of 0% to 48% for OSA
    - Done as an outpatient procedure
    - Surgeons feel only appropriate for snoring and rarely undertaken for OSA treatment
  - Palatal Implants
    - Office-based treatment for reduction of snoring and treatment of mild to moderate OSA
    - Cylindrical implants made of braided material inserted under local anesthesia into upper soft palate to stiffen tissue and reduce flutter
    - Not recommended as first-line therapy in OSA patients, especially with moderate to severe OSA

Treatment

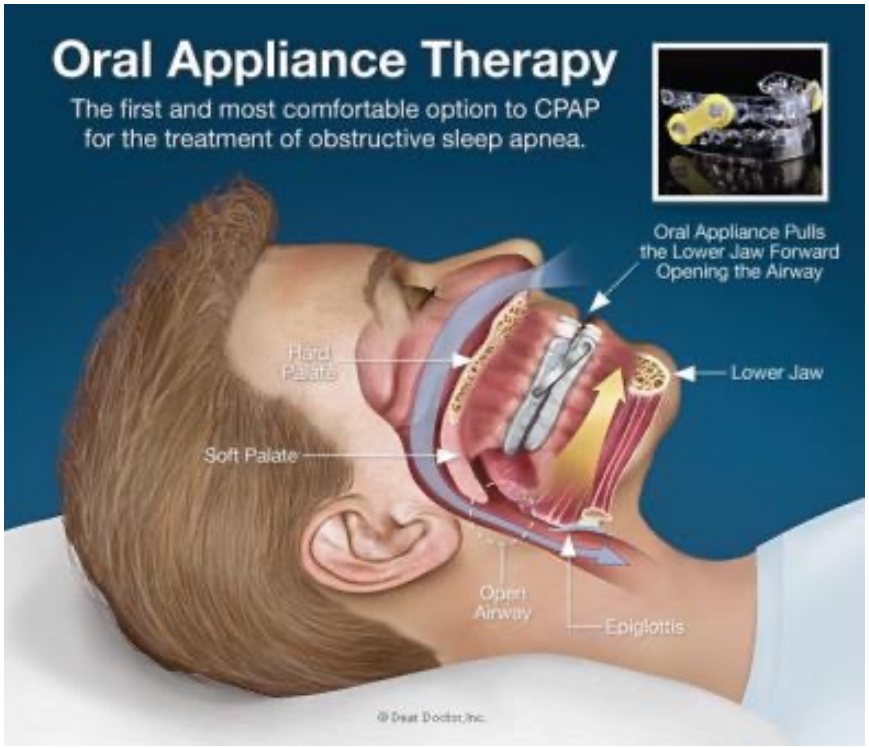
- Surgery
  - Oromaxillofacial surgery
    - Maxillomandibular advancement (MMA) may be beneficial for non-obese patients who can't or won't accept CPAP
  - Septoplasty
  - Radiofrequency volumetric tissue reduction (Somnoplasty)
    - Has been applied to palate, tongue base, and nasal septum
    - Safer and less painful than LAUP
    - Not considered a cure for OSA
    - Used mainly for snoring
  - Tonsillectomy – Ineffective in adults

Treatment

- Surgery
  - Tracheostomy
    - First and only approach to very severe OSA in those who can't tolerate CPAP or Bilevel PAP and face an immediate life-threatening risk
    - Last resort treatment
  - Bariatric surgery
    - Gastric bypass treatment of choice due to greater weight loss and better weight loss maintenance
    - Laparoscopic approach has fewer complications
  - Rates of success can be 50% reduction in AHI/RDI and improvement of symptoms

Treatment

- Oral appliances
  - Can be indicated for patients with mild SDB or CPAP intolerant
  - Beneficial effects on snoring, sleepiness, and mild SDB
  - CPAP more effective in treating SDB events
  - More patients prefer oral appliances
  - More effective than UPPP
  - Complications:
    - Craniofacial and bite changes
    - Exacerbation of TMJ pain
  - Contraindications:
    - Insufficient teeth
    - Periodontal problems
    - TMJ disorder

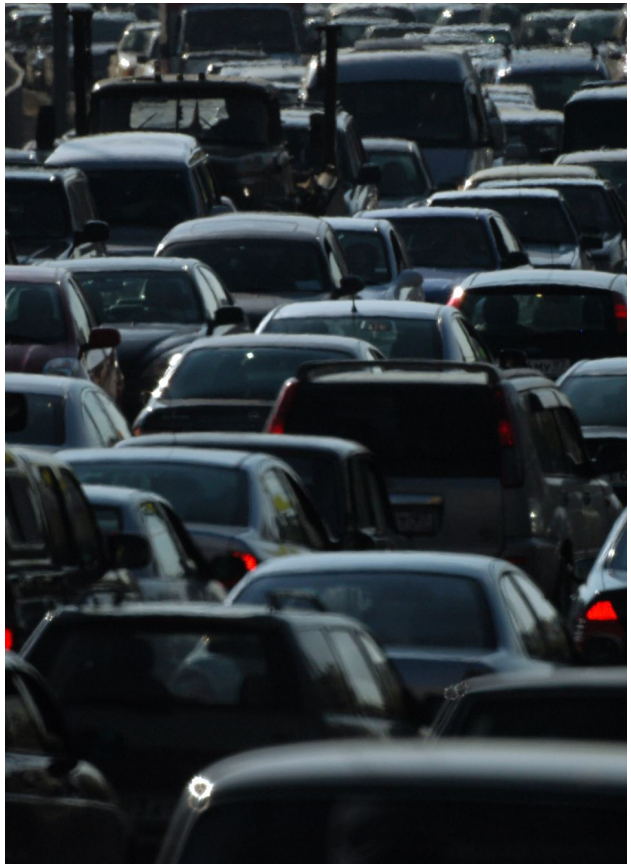


Common Clinical Problems

- Negative Sleep Studies
  - Contributing factors:
    - Poor-quality sleep
    - Absence of REM
    - Sleeping on one's side rather than supine
    - Omitting usual alcohol or sedative agent on study night
    - Insensitive monitors of airflow or respiratory effort
- CPAP Compliance
  - Next to weight loss, most significant challenge
  - CMS payment contingent on patient compliance
  - Non-compliant patients must be educated of risks and document discussion in medical record

Common Clinical Problems

- Driving Risk
  - SDB increases accident risk
- Inadequate response
  - Repeat studies uncommon due to:
    - Cost
    - Inconvenience
- Sleepiness after CPAP treatment
  - Common
  - Types:
    - Excellent initial response to treatment and becomes sleepy again
    - Never had an improvement in sleepiness despite CPAP use



Common Clinical Problems

- Managing OSA in Special Patient Groups
  - COPD
    - Overlap syndrome = Have COPD and OSA
    - Sometimes still hypoxemic despite correction of apneas and hypopneas
    - Sometimes Bilevel PAP, with or without a backup rate, helps
    - Supplemental O2 can be added to CPAP circuit
    - Smoking cessation imperative
  - Perioperative Patients
    - Helps to minimize complications following surgery
    - Some surgeries require sleep study prior to surgery

Common Clinical Problems

- Managing OSA in Special Patient Groups
  - Critically Ill Patients
    - Increased healthcare costs due to comorbidities
    - May end up in ICU due to CPAP noncompliance
    - Intubation may be most definitive and effective initial course for critically ill patients with OSA and respiratory distress
    - Tracheostomy is long-term solution
  - Treatment-Emergent Central Apneas or Complex Sleep Apnea
    - Complex Sleep Apnea = Central apneas and periodic breathing that develop when CPAP is applied to treat OSA patients
    - More prevalent in older men with CHF
    - Can appear when patients are overtitrated
    - ASV effective and well tolerated in about 50% of patients