OSA and COPD: What happens when the two OVERLAP?
Overlap Syndrome

Objectives

By the end of this session, you should be able to:

– Define obstructive sleep apnea (OSA), chronic obstructive pulmonary disease (COPD) & overlap syndrome
– Understand how COPD affects breathing during sleep
– Learn how to screen patients for overlap syndrome
– Understand effective treatment and reimbursement guidelines

What is Overlap Syndrome?
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What is Overlap Syndrome?

• The term “overlap syndrome” was introduced in 1985 by Dr. Flenley
• The combination of chronic obstructive pulmonary disease (COPD) and obstructive sleep apnea (OSA), which results in nocturnal hypoventilation and hypoxemia
• ~11% of OSA patients have some degree of COPD
• 20-40% of COPD patients have OSA
  Douglas, Sleep Disorders 1998

Prevalence Data

• OSA
  – 6% of US adults have moderate to severe SDB1
  – 17% of adults are estimated to have mild to moderate SDB1
  – 18 million Americans suffer from OSA (NH 2007)
  – 75% of cases of SDB remain undiagnosed2

• COPD
  – 12.1 million Americans suffer from COPD (CDC 2006)
  – An estimated 24 million Americans show signs of impaired lung function, indicating there are many unaware they have COPD (CDC 2006)
  – 4th leading cause of death in the US (NHLBI 2006)

1  Young et al. Sleep disordered breathing and mortality: Eighteen-year follow-up of the Wisconsin Sleep Cohort. SLEEP 2008
Chronic Obstructive Pulmonary Disease (COPD)

- General term describing major chronic lung disease – i.e., emphysema and chronic bronchitis
- Airflow from the lungs is permanently obstructed
- Result of lung injury due to smoking and exposure to environmental pollution

Normal Breathing

X-ray Findings
Consequences of Overlap Syndrome

- The coexistence of COPD and OSA:
  - Leads to more severe nocturnal desaturations
  - Leads to poor quality of sleep
  - Increases risk for pulmonary hypertension, cor pulmonale, hypercapnia and polycythemia than patients with OSA alone
  - Increases cardiac morbidity and mortality

Douglas, Sleep Disorders 1998

Desaturations During REM in COPD Patient’s

Identifying Patients with Overlap Syndrome

How do you know?
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Screening Patients in the Sleep Lab

- Review patient’s history & physical:
  - Does patient have history of cardiopulmonary disease?
  - Current medication list – pulmonary medications?
- Interview patient:
  - Ask patient if they take breathing treatments – inhalers/“puffers”?
  - Ask patient if they use oxygen at home?
  - Observe patient for shortness of breath (SOB) while walking with you to their room?
  - Is patient using accessory muscles to breathe?
  - Is patient telling you they can’t lie down flat to sleep?

What to Look For in a PSG

- During PSG:
  - Watch oximetry trending during study
  - Overlap subjects may demonstrate prolonged hypoxemia during sleep
  - SpO\(_2\) often does not recover between episodes of repetitive apneas
  - Significant desaturations during REM

Screening Patients in the Homecare Setting

- COPD patients: Do they have OSA?
  - Does O\(_2\) patient continue to have desaturations?
- Routinely ask COPD patients about their:
  - Sleep quality
  - Level of daytime sleepiness
  - Is patient on CPAP for OSA but noncompliant?
- Simple screening questions:
  - Do you snore?
  - Do you have shortness of breath at night or wake up choking?
  - Have you been told you stop breathing during sleep?
  - Do you have a history of hypertension?
  - Is your neck size > 17” (male) or > 16” (female)?
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Coexisting Signs and Symptoms

**COPD / Hypoventilation**
- Excessive daytime sleepiness
- Morning headaches
- Memory loss
- Hypoxemia (on O₂)
- Hypercapnia
- Worsening daytime blood gases
- Shortness of breath

**OSA**
- Excessive daytime sleepiness
- Morning headaches
- Memory loss
- Snoring
- Witnessed apneas
- Waking, gasping, choking

Screening Tools to Assist You

- Questionnaires
  - Berlin
  - Epworth Sleepiness Scale
- Nocturnal Oximetry
- Screening Device – ApneaLink™ Plus

ApneaLink™ Plus
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Treatment Options for Overlap Syndrome

Treating Both Diseases

- OSA Treatment: CPAP Therapy (gold standard)
  - CPAP splints the upper airway
  - Challenges:
    - CPAP alone will not provide ventilatory assistance to overcome hypoventilation
    - CPAP may increase work of breathing

- Nocturnal Hypoventilation Treatment: Bilevel Therapy
  - Augments the patient’s tidal volume (minute ventilation) and decreases work of breathing
  - Improves gas exchange
  - ∆ P must be at least 4 cm H₂O in order to provide ventilatory assistance

* ∆ P = IPAP - EPAP
Two Uses of Bilevel

Comfort
- Non-tolerant CPAP patient
- High pressure
- Difficulty exhaling
- CPAP ineffective

Ventilation
- Nocturnal hypoventilation
  - Disease states with reduced ventilatory function during sleep
- Overlap syndrome
  - Patients with COPD and OSA

Bilevel Therapy
Pathway for titration and reimbursement

Bilevel Titration Protocol
Comfort Features

- Comfort feature enhancements were developed to provide a more comfortable and customized titration
- TiControl™—combination of features:
  - Rise time (S,ST and T modes)
  - Ti Max and Ti Min (S,ST and VAuto Modes)
  - Trigger and cycle sensitivities (S,ST and VAuto modes)
  - Vsync™
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**Ti Max**

- Ti Max = maximum time the device will stay at inspiratory (IPAP) pressure
- Created to resolve poor IPAP-to-EPAP transitions due to mouth leak
- Adjust to ensure that COPD patients have adequate expiratory time
- Improves effectiveness of therapy where mouth leaks are present
  - Mouth leak reduces effective treatment
  - Toschter et al, Eur Respir J 1999

**Leak on Competitor Bilevel**

- Time-cycled breath ends after 3 seconds
- Actual breath ends when leak occurs

**Leak on VPAP with Ti Max**

- Normal flow-cycled breath
- Actual breath, Ti Max cycled
- Inspiration ends
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**Trigger & Cycle Sensitivity**

- **Trigger Sensitivity** – further synchronizes pressure response to patient’s breathing effort
  - High sensitivity accommodates even pediatric patients on the VPAP

- **Cycle Sensitivity** – helps synchronize breath termination to the patient’s needs

- **Vsync**
  - Automatic leak compensation to accurately stabilize trigger and cycle sensitivity
  - Ensures that VPAP machines stay in sync with patient’s breathing pattern even in the presence of leaks

**Using Bilevel to Ventilate**

- Ventilation may not occur without at least a 4 cm split in pressures (IPAP – EPAP)
- Less than 4 cm split, then it is “comfort” feature
- Per AASM guidelines of CPAP and Bilevel Titration:
  - “The recommended minimum IPAP-EPAP differential is 4 cm H₂O”

**ResMed**

**Respiratory Assist Device (RAD)**

**Qualifying Guidelines**

**ResMed**

**Restrictive Thoracic Disorders**

**COPD**

- For COPD patients to qualify for a RAD with backup use (CPAP)
- CPAP alone may not achieve the desired outcome

**Restrictions**

- Prioritizes additional evidence indicating cohabitation with the following
- Progression of symptoms
- Current or past diagnosis of COPD
- Presence of daytime hypersomnia
- Sleepiness or daytime drowsiness
- Reduced cognitive function
- Health care utilization
- Sleep study evidence

**Documentation**

- **ResMed**
  - MM2 guidelines: February 2011
 VERIFY NONCOMPLIANCE

- Work to improve compliance first by:
  - Providing effective patient/family education
  - Ensuring proper mask fit/mask choice
  - Using adequate humidification
- If patient continues to be intolerant of CPAP therapy, transition patient to VPAP bilevel therapy
- Medicare guidelines define compliance as use of PAP therapy for greater than 4 hours per 24-hour period

SUMMARY

- Overlap combines the morbidities of OSA and COPD
- COPD affects sleep negatively, especially the ventilation capabilities
- It is important to realize how to screen for overlap patients, since both diseases are frequently missed
- Know the best treatment for overlap is to assist the ventilation that is not adequate
- Know the guidelines to get reimbursed for bilevel therapy
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