Opioids & Sleep Apnea: Can They Exist in Harmony?

Kathy Lattavo, RN, MSN, RN-C

Objectives

1) Define sleep apnea.
2) Recognize signs & symptoms of sleep apnea.
3) Interpret current recommendations regarding the use of opioids with sleep apnea.
4) Develop a pain management plan of care for a patient with sleep apnea.

Disclosure

- No disclosures or conflict of interest identified.
What is sleep apnea?

- Obstructive sleep apnea (OSA): a syndrome characterized by periodic, partial or complete obstruction of the upper airway during sleep
- Cessation of airflow > 10 sec or shallow breathing
  - Leads to apnea-hypopnea, arousal & O₂ desaturation

- Apnea: cessation of airflow at nose & mouth for > 10 seconds; complete obstruction of the upper airway
- Hypopnea: 50% reduction in airflow for 10 seconds for 15 or more times per hour & a 4% decrease in O₂ saturation

- Apnea-Hypopnea Index measures severity:
  - Normal - 5 episodes/hour
  - Mild - between 5-14 episodes/hour
  - Moderate - 15-30 episodes/hour
  - Severe - >30 episodes/hour
Definition (cont)

- Central sleep apnea (CSA): brain fails to signal the respiratory muscles to facilitate breathing
  - Both airflow & ventilatory effort are absent
- Mixed sleep apnea: combination of OSA & CSA
  - Interval of no respiratory effort & interval of obstructed respiratory effort

Statistics

- OSA affects 1 in 5 adults (mild OSA)
- Estimated 18 million Americans have OSA
- 1 in 15 adults has moderate to severe OSA
- 75%-85% are undiagnosed
- Overt OSA estimated to be 2% in women & 4% in men
Pathophysiology

- Characterized by complete or partial collapse of the pharyngeal airway during sleep
- Relaxation of soft tissues causes complete collapse of airway with total obstruction of airflow
  - Respiratory effort is observed but airflow is restricted

Apnea is caused by a negative increase in intrathoracic pressure
- Increased pressure causes atrial stretching which triggers atrial natriuretic peptide
Repeated cycle of airway collapse leads to increased SNS activity, hypoxemia, hypercapnea, reoxygenation, changes in pressure, vascular endothelial dysfunction, increased oxidative stress, inflammation, increased platelet aggregation & metabolic dysfunction.

Risk Factors

- Obesity
- HTN
- Snoring
- Diabetes
- Genetic predisposition
- Large neck circumference
- Tobacco smoking
- Male gender
- Post-menopausal female
- Abnormal anatomy
- Age over 40
- Race
Signs & Symptoms of OSA
- Snoring
- Apnea
- Daytime sleepiness
- Awakening with choking
- Difficulty with concentration & attention
- Restless sleep
- Morning HA
- Moodiness
- Irritability
- Nocturia

Screening: STOP Bang
- S (snore)
- T (tired)
- O (observed)
- P (blood pressure)
- B (BMI >35)
- A (age > 50)
- N (neck circumference > 40 cm)
- G (gender male)

Epworth Sleepiness Scale
- Sitting & reading
- Watching TV
- Sitting inactive in a public place
- As a passenger in a car for an hour without a break
- Lying down to rest in the afternoon
- Sitting & talking to someone
- Sitting quietly after a lunch without alcohol
- In a car, while stopped for a few minutes in traffic
Polysomnography

- Gold standard for diagnosis

Treatment

- Behavioral modifications
- Continuous positive airway pressure (CPAP), bilevel positive airway pressure (BPAP) & automatic adjusting positive airway pressure
- Oral appliances
- Uvulopalatopharyngoplasty (UPPP)
- Uvulopalatal flap (UFP)
- Laser-assisted uvulopalatoplasty (LAUP)
- Somnoplasty
OSA & Pain Management

- What's the problem???
  - Anesthetics, sedatives & analgesics
    selectively decrease the activity of the upper airway & increase the tendency of the upper airway to collapse
  - These agents impair the arousal response
  - Opioids can depress the respiratory drive & subsequent oxygen desaturation
  - CNS depressants diminish the action of the pharyngeal dilator muscles

- Most common cause of reduced ventilation after surgery is depression of the ventilatory response to CO₂
  - Occurs in 4-8% treated with regional anesthesia
  - Occurs in 29-40% treated with IV opioids

- Opioids
  - Decrease respiratory rate at low doses
  - Decrease tidal volume at high doses
  - OSA patients are vulnerable to these effects
And the research shows…

- Webster et. al (2008)
  - 140 pts
  - 75% had abnormal apnea-hypopnea index
  - 39% had OSA
  - Median daily dosage of all opioids was 266 mg of morphine equivalents

- Direct relation between the index & daily dose of methadone but not to other around-the-clock opioids
- Results call for increased vigilance
- Pain & disordered sleep may potentiate each other
- Suggest that opioids (especially methadone) may be related to sleep apnea in chronic pain patients

Jungquist et. al (2010)

- Regardless of opioid dose or drug, management with opioids is not likely to exacerbate OSA at stable doses
- CSA was associated with opioid use
  - Positive linear relationship between morphine-equivalent dose & severity
  - Clinically relevant once the dose reaches 200 mg/day
McCormac et. al (2008)

- Continuous PtcCO₂ monitoring in 30 patients after major colorectal surgery
- Monitoring continued for up to 24 hrs
- Patients with PCAs had significantly higher elevation in PtcCO₂ compared to those with epidural infusions
- O₂ administered to all patients during the monitoring period
- No difference in sedation scores between the groups

A subtle state of subclinical respiratory impairment is likely to exist for several hours before obvious signs of respiratory distress

- Study confirms that pulse oximetry & respiratory rate are poor indicators of ventilatory function
- Transcutaneous capnometer may be a valuable adjunct for patient monitoring

Guidelines for Perioperative Management (ASA)

- Use of local anesthetic or peripheral nerve blocks rather than general anesthesia improves outcomes for peripheral surgery
- Use of major conduction anesthesia rather than general anesthesia improves outcomes for peripheral surgery
Perioperative Guidelines (cont)

- Extubate when fully awake
- Reverse neuromuscular blockade fully before extubation
- Position in semi upright position for extubation & recovery

Perioperative Guidelines (cont)

- Regional analgesic techniques rather than systemic opioids reduce the likelihood of adverse outcomes
- Use PCA basal rates with extreme caution or avoid entirely
- Consider NSAIDs & other modalities to reduce opioid requirements, if appropriate

Perioperative Guidelines (cont)

- Caution with concurrent use of sedatives & opioids
- Supplemental $O_2$ should be administered continuously until pt is able to maintain baseline $O_2$ saturation while breathing room air
- Continuous monitoring is recommended
Practice Guidelines with Neuraxial Opioid Administration (ASA)

- Patients should bring positive airway pressure devices to hospital
- Single-injection neuraxial opioids may be used in place of parenteral opioids
- Extended-release epidural morphine may be used in place of IV or conventional epidural morphine
- Continuous epidural opioids are preferred to parenteral opioids

Neuraxial Practice Guidelines (cont)

- Administer lowest dose of neuraxial opioids
- Cautious use of parenteral opioids in the presence of neuraxial opioids
- Increased monitoring for use of concomitant medications

Neuraxial Practice Guidelines (cont)

- All patients receiving neuraxial medication should be monitored for:
  - Adequacy of ventilation
  - Oxygenation
  - Level of consciousness
Neuraxial Practice Guidelines (cont)

- Supplemental $O_2$ should be available
- $O_2$ should be administered to pts with altered LOC, respiratory depression or hypoxemia
- Caution: routine use may increase duration of apneic episodes & may hinder detection of atelectasis, transient apnea & hypoventilation

Neuraxial Practice Guidelines (cont)

- Maintain IV access if recurring respiratory depression occurs
- Use reversal agents as needed
- Noninvasive positive pressure ventilation may be considered for improving ventilatory status

Case Presentation

- 60 year old male admitted with colon cancer for a R hemicolectomy
- Medical history includes hypertension, diabetes & coronary artery disease
What other information would you like to know?

List analgesic protocols appropriate for a patient with Hx of OSA
- During surgery
- Postoperatively

Discuss nursing care for post-op patient with OSA
Take Home Messages…

- Can opioids & OSA exist in harmony?
  - Yes
- What guidelines should be followed?
  - Judicious use of opioids
  - Consider neuraxial opioids
  - Consider single-injection neuraxial opioid instead of parenteral opioid

- Consider extended-release epidural morphine
- Continuous epidural opioids preferred to parenteral opioids
- Use lowest dose of opioid possible
- Caution with parenteral & neuraxial opioids together

- Supplemental O₂ may be required
- Use noninvasive positive pressure ventilation
- Use local anesthetic or peripheral nerve blocks rather than general anesthesia
- Use major conduction anesthesia rather than general anesthesia
Use regional analgesia instead of systemic opioids
- Caution with PCA basal rates
- Vigilant monitoring
- Use NSAIDs & other modalities
- Evaluate other medications

Questions???

Thank you!
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Selected References


