Obesity and Postoperative Surgical Risk
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This quarter Dr. Marcus addresses patterns of severe postoperative respiratory depression in obese patients.
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Obesity rates in the United States continue to rise. According to the National Institutes of Health (NIH), one method of determining obesity is through the use of body mass index (BMI), where a BMI over 30 is considered obese.1

During an analysis of cross-specialty claims, The Doctors Company noticed an increase in the number of claims filed by patients who are overweight or obese. As a result, The Doctors Company believes it is especially important for member physicians to be aware of the risks of treating obese patients, beginning with examining surgical morbidity and mortality related to obesity.

Claims reviews revealed a pattern of severe postoperative respiratory depression in obese patients who had either a known or suspected diagnosis of obstructive sleep apnea (OSA). The following case reports illustrate the importance of a focused preoperative evaluation to identify patients who are at risk for OSA and to appropriately manage and monitor postoperative pain control without compromising respiratory status.

• This 33-year-old patient was 5 feet 6 inches and weighed 312 pounds (BMI 50.4). She underwent bladder suspension and inguinal hernia repair without a preoperative history or evaluation for OSA. Postoperatively, Dilaudid 2 mg and Phenergan 100 mg IV were administered while in the post anesthesia care unit (PACU), and the patient was transferred to the floor at 10:00 AM. Over the next eight hours, she received a total dose of 12 mg of IV Dilaudid. That evening the nurse recorded that the patient was “sleeping quietly,” and at 8:45 the patient was “sleeping, snoring.” At 9:15 the nurse found the patient pulseless and in respiratory arrest. The patient was declared brain dead and died two days later. Subsequently, the husband reported her prior history of nocturnal symptoms consistent with OSA.

• A 51-year-old male with height of 5 feet 6 inches and 210 pounds (BMI of 33.9) underwent a partial colectomy. The patient received a total of fentanyl 100 mcg and morphine sulfate 5 mg over one hour in the PACU. The patient initially experienced oxygen desaturation, which improved during the next few hours. The patient was then transferred to the floor with an order to maintain the O₂ saturations above 90. However, the patient was not continuously monitored while on morphine sulfate patient-controlled analgesia (PCA) pump. The nurse recorded an SaO₂ of 89 percent and received orders from the surgeon to increase inspired oxygen to 6 liters/min. Subsequently, the patient was found nonresponsive and pulseless with a pCO₂ of 130. The patient died a week later. The autopsy noted the cause of death as global anoxic brain injury.

• A 42-year-old patient who was 5 feet 5 inches, 220 pounds (BMI 36.6), with a known history of OSA was admitted overnight following a hysterectomy. She was medicated with morphine sulfate, monitored on pulse oximetry, and received continuous positive airway pressure (CPAP). The patient was discharged with oral narcotics for pain control but without orders to continue CPAP. She expired at home 24 hours after discharge.

The Clinical Picture
Obstructive sleep apnea has been defined as “an apnea–hypopnea index (AHI—the total number of episodes of apnea and hypopnea per hour of sleep) of five or higher in association with symptoms of excessive daytime somnolence.”2 Symptomatic sleep apnea is common and occurs in 4 percent of men and 2 percent of women ages 30 to 60.3 Furthermore, 24 percent of men and 9 percent of women have an AHI of at least five, although they may not complain of daytime somnolence.4 It has been estimated that more than 80 percent of men and 90 percent of women with OSA do not have a documented diagnosis.5

Risk factors include obesity, increased neck circumference, craniofacial abnormalities, and hypothyroidism.6 Patients with upper body/abdominal obesity are at highest risk for OSA. Additional risk factors include African American race, current cigarette smokers, and upper airway soft tissue abnormalities.7

The pathophysiology of OSA involves a balance between neural respiratory...
stimulation and mechanical airway patency. Brainstem nuclei coordinate the ventilatory actions of upper airway muscles, chest wall muscles, and the diaphragm. Upper airway patency is maintained by the bony, cartilaginous, and skeletal muscle structures of the naso and oropharynx. Patients with OSA have a reduced upper airway size due to excess soft tissue or a highly compliant airway. Upper airway obstruction occurs when the negative pressure generated by the inspiratory muscles exceeds the capacity of the upper airway dilator muscles to maintain airway patency. A reduced airway size, combined with diminished neural output to upper airway muscles during sleep, can result in partial or complete upper airway collapse.

Opioids and OSA
Opioids, both oral and parenteral, may profoundly impair respiration in the postoperative period in patients with OSA leading to obstructive apneas, drastic oxygen desaturation, and elevated end-tidal CO₂. The effect of opioids on respiratory depression occurs both as a direct depressant action on neural activity of respirations as well as a reduction in pharyngeal muscle tone. This may result in decompensated respiratory depression, which may not be recognized by the caregiver. Patients with OSA receiving sustained-release oral opiates for chronic pain have longer apnea duration, more severe hypoxia, irregular respiratory pauses and gasping, and long periods of obstructive hypoventilation.

Making the Correct Diagnosis
The key to making the diagnosis of OSA starts with a careful history regarding symptoms of irregular and abnormal respiratory patterns during sleep; daytime symptoms due to disrupted sleep, such as drowsiness, fatigue, and poor concentration; and signs of disturbed sleep, such as snoring, restlessness, and resuscitative snorts. Measuring the neck circumference in centimeters and adjusting for other conditions may be used to predict OSA.

Patient Safety Tips
Based on the numerous case reports of adverse postoperative outcomes, such as respiratory arrest in the light of opioid use and obesity, there are a number of strategies that can be used:
- The preoperative evaluation should include a focused history and calculation of BMI and neck circumference: Consider a sleep apnea study when appropriate prior to scheduled surgery.
- Patients thought to be at substantial risk for OSA or with a proven history of OSA should be identified and placed on continuous monitoring—ideally with apnea monitors, oximeters, and capnometers.
- Opiates must be prescribed only with the greatest care. Consider the use of nonopioid medications (such as NSAIDS) instead of or in combination with judicious and careful opioid dosing, and use regional analgesic techniques rather than systemic opioids whenever possible.
- Anecdotal evidence shows that CPAP can alleviate postoperative airway obstruction and may decrease major postoperative complications.
- Do not assume that an obese surgical patient requires higher doses of medication to control pain—he or she may need less than the patient with a normal BMI.
- Be aware that oral opiates may cause respiratory depression in OSA patients.
- Patients who use CPAP devices at home should use them while in the hospital, especially if they are receiving narcotics.
- Ensure that everyone involved in the patient’s treatment plan is aware of the diagnosis or suspected diagnosis of OSA, particularly in obese patients.
- Health care professionals providing postoperative monitoring should be trained in recognizing potential signs of sleep apnea.

In future articles we will discuss other obesity-related issues in the surgical setting, such as those patients at increased risk for pulmonary emboli and specific anesthesia-related concerns.

References
3. Ibid.
6. Flemons W. Obstructive sleep apnea.
8. Ibid.
9. Ibid.
12. Ibid.
16. Flemons W. Obstructive sleep apnea.
17. Overdyk F. Postoperative respiratory depression and opioids.

For more information:
The health care reform measure recently signed into law by President Obama includes provisions to address access to medical diagnostic equipment for people with disabilities—including patients who are obese. Visit the U.S. Access Board at www.access-board.gov/news/medical-equipment.htm to learn more.

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