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Promoting Safety of Postoperative Orthopaedic Patients With Obstructive Sleep Apnea

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Orthopaedic patients with obstructive sleep apnea are at risk for postoperative complications related to administration of pain medications, anxiolytics, and antiemetics. They are more likely to experience respiratory and cardiac complications, be transferred to an intensive care unit, or have an increased length of stay in the hospital. This informational article is for nurses who care for postoperative orthopaedic patients with obstructive sleep apnea. The focus is on promoting patient safety through communication, vigilant postoperative sedation assessment, and nursing interventions that include appropriate patient positioning, patient education, and involving patients and their families in care.

A patient has just arrived to your care from the postanesthesia care unit (PACU) after undergoing a total knee replacement under spinal anesthesia. His medical history includes hypertension, non–insulin-dependent type II diabetes, high cholesterol, and obstructive sleep apnea (OSA). While you complete your initial assessment, the patient states that his pain is a 7/10. You check the record and note the patient was pain-free and did not receive any pain medication in the PACU. The physician has ordered morphine 4 mg IV for a pain score of 1–5 or morphine 10 mg IV for a pain score of 6–10, every 2 hours for pain. Your patient is 52 years old and 6 feet tall and weighs 275 pounds.

You decide, because of the patient's pain score, to give him the higher dose of morphine. Fifteen minutes later you check on the patient. He is sleeping but wakes easily to the sound of your voice. He reports his pain level is now a 3/10 and that he feels much better. Thirty minutes later you enter the patient's room and find his skin color is ashen and he does not arouse to verbal or tactile stimulation. You call for help and initiate rescue efforts.

What Went Wrong?

Hypertension, diabetes, and OSA are common comorbidities seen in today's orthopaedic patients. The scenario described reflects how OSA can significantly impact patient care and safety. It is estimated that up to 26% of adults in the United States have OSA and 80%–90% of these individuals are naive of their diagnosis (Lakdawala, 2011). Obstructive sleep apnea is linked to increased risk of hypertension, fatal and nonfatal cardiovascular events, atrial fibrillation and ventricular tachycardias, stroke, and diabetes (Park, Ramar, & Olson, 2011).

Orthopaedic patients with OSA are at higher risk for postoperative complications than patients who do not have OSA. They are more likely to experience respiratory and cardiac complications, be transferred to an intensive care unit, or have an increased length of stay in the hospital (Kaw et al., 2006). Administration of opioids and sedating antihistamines or antiemetics increases the risk of these complications (Pasero & McCaffery, 2002). How, then, can nurses confidently manage postoperative pain in patients with OSA without compromising patient safety? This informational article, for nurses who care for postoperative orthopaedic patients, addresses this issue. The focus is on promoting patient safety through communication, vigilant postoperative sedation assessment, and nursing interventions that include appropriate patient positioning, patient education, and involving patients and their families in care.

Background

Orthopaedic nurses are the healthcare team members on the front lines who are positioned to have the greatest impact on protecting the safety of patients with OSA. To better care for orthopaedic patients with OSA after surgery, nurses must first have a clear understanding of what OSA is and how it is impacted by anesthesia.

What Is OSA?

Obstructive sleep apnea is a serious medical condition that affects a person's ability to breathe during sleep. As

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a person relaxes during sleep, the upper airway either partially or completely collapses resulting in a decrease in or complete loss of airflow (McCabe & Hardinge, 2011). The loss of airflow and subsequent decrease in oxygenation and respiration put strain on the heart, lungs, and other vital organs. This can result in an exacerbation of underlying medical conditions and a risk of sudden death. Typical patient findings include reported tiredness during the day, snoring that disrupts the patient's and/or the patient's bed partner's sleep, and difficulty concentrating (Park et al., 2011). Symptoms and severity of the disease can range from mild to very severe.

OSA and Anesthesia

There are risks involved for anyone receiving anesthesia. Anesthesia and surgery have been shown to cause apneas and/or desaturations even in patients without OSA (Kaw et al., 2006). Anesthetic agents decrease upper airway muscle tone and inhibit natural arousal mechanisms (American Sleep Apnea Association, n.d.). The risks for patients with OSA, therefore, are compounded when a patient receives anesthesia. If a patient has OSA but has not been diagnosed, difficulty with airway management during induction of anesthesia is sometimes the first clue to the diagnosis (Haeck, Swanson, Iverson, & Lynch, 2009). If anesthesia staff encounter difficulties during the intraoperative phase, it is crucial that this information is passed on to postoperative staff to protect patient safety.

In addition, rapid eye movement (REM) sleep disturbances make the postoperative period especially dangerous for patients with OSA. The REM sleep can be lost during the initial postoperative period. This leads to sleep disturbances and the tendency for REM sleep to return in a rebound fashion (Kaw et al., 2006). During REM sleep, pharyngeal muscle tone is decreased and patients have an increased risk for loss of airway tone and hypoxemia (Kaw et al., 2006). Patients with OSA are at risk of prolonged apnea during sleep for up to 1 week after surgery (Paje & Kremer, 2006).

The risk of surgery and anesthesia to patients with OSA is clear. The following describes how orthopaedic nurses can confidently medicate for pain and protect the safety of patients with OSA.

Promoting Patient Safety: Communication, Sedation Assessment, and Nursing Interventions

An extensive search of CINAHL, MEDLINE, and PubMed, as well as a systematic review of published guidelines, revealed a paucity of empirical evidence guiding the development of practice recommendations for the care of orthopaedic patients with OSA. Clinical practice guidelines summarized in the U.S. Department of Health and Human Services' Agency for Healthcare Research and Quality's National Guideline Clearinghouse (NGC) are based largely on expert opinion with some limited supporting evidence. Further research is needed to clearly identify standards of practice. In October 2012, the American Society of PeriAnesthesia Nurses (ASPAN) published an evidence-based practice recommendation for the care of patients with OSA in perioperative settings based on ASPAN's critical appraisal of the existing evidence. There are several commonalities in the NGC and ASPAN recommendations and they form the basis of the practice suggestions noted here.

Shared in both practice recommendations is the need to thoroughly assess patients preoperatively for diagnosis of OSA or signs and symptoms indicative of undiagnosed OSA using a standardized screening tool (Hooper & Odom-Forren, 2012; NGC, 2010). This process should initiate a chain of communication with the patient, the primary care physician, and the healthcare team members who care for the patient before, during, and after surgery. Additional key points include standards for postoperative care, vigilant postoperative monitoring, and effective patient and family education.

Gleaned from the resources is a plan to promote safety of postoperative orthopaedic patients with OSA. The three key components addressed here are communication across the continuum of care, vigilant postoperative sedation assessment, and nursing interventions that include appropriate patient positioning, patient education, and involving patients and their families in care.

Communication

Successful communication to promote safety of postoperative orthopaedic patients with OSA begins with early assessment and interaction between healthcare team members, especially with one quarter of adults in the United States having sleep apnea and up to 90% of them being naive of their diagnosis (Lakdawala, 2011). Successful communication begins with early detection of patients who may be at risk. In the absence of a definitive diagnosis, use of a standardized screening tool, such as the STOP-BANG questionnaire (Lakdawala, 2011) to assess for occult OSA, may identify patients who would otherwise go undiagnosed and be at risk following orthopaedic surgery. An evidence-based practice study by Dolezal, Cullen, Harp, and Mueller (2011) found that implementation of a standardized screening tool for OSA is essential and requires a team effort to ensure continuity of care from the preoperative period through discharge home. Assessment for occult OSA can be completed in the surgeon's office when the decision for surgery is made, during preadmission testing, or at any time during preoperative, intraoperative, or postoperative care. See Table 1 for the STOP-BANG questionnaire.

Once it has been determined that a patient has a diagnosis of or is at risk for OSA, a plan can be put in place for multidisciplinary involvement including nurses, physicians, and respiratory therapy. Early involvement of respiratory therapy leads to early identification of at-risk patients and improvement of patient safety (Ramachandran, Kheterpal, Haas, Saran, & Tremper, 2010). Crucial times for clear communication are when a patient is transferred from the preoperative

Table 1. STOP-BANG Questionnaire

1. Snoring: Do you snore loudly (loud enough to be heard through closed doors)?	Yes or No
2. Tired: Do you often feel tired, fatigued, or sleepy during daytime?	Yes or No
3. Observed: Has anyone observed you stop breathing during your sleep?	Yes or No
4. Blood Pressure: Do you have or are you being treated for high blood pressure?	Yes or No
5. BMI: BMI more than 35?	Yes or No
6. Age: Age more than 50 years?	Yes or No
7. Neck circumference: Neck circumference greater than 40 cm?	Yes or No
8. Gender: Male?	Yes or No
High risk of OSA: Yes to 3 or more questions	
Low risk of OSA: Yes to less than 3 questions	

Note. From "High STOP-BANG Score Indicates a High Probability of Obstructive Sleep Apnoea," by F. Chung, R. Subramanyam, P. Liao, E. Sasaki, C. Shapiro, and Y. Sun, 2012, *British Journal of Anaesthesia*, *108*(5), p. 774. Reproduced with permission.

unit to the operating room, from operating room to the PACU, and from PACU to the orthopaedic unit, and when the patient is preparing to be discharged home. Advanced planning can open up discussion about implementing safety measures such as apnea and capnography monitoring, pulse oximetry monitoring, use of supplemental oxygen, constant positive airway pressure (CPAP) devices and considering alternatives to opioid therapy to reduce the risks to patients.

Sedation Assessment

Postoperative orthopaedic patients with OSA are at risk for delayed effects of anesthesia. These risks are compounded when a patient receives opioid pain medications and other medications such as anxiolytics and antiemetics that often accompany the use of opioids. These medications increase sedation and decrease the effectiveness of the body's natural arousal mechanisms. As a result, orthopaedic patients with OSA require careful monitoring and assessment during the initial postoperative phase. Pulse oximetry and apnea monitoring are recommended (Paje & Kremer, 2006).

At a minimum, more frequent assessments, particularly sedation and respiratory assessments, should be done every 1–2 hours in the first 24 hours after surgery, depending on patient risk factors and the findings of initial assessments (Pasero & McCaffery, 1994). Implementation of a sedation scale standardizes sedation and respiratory assessment and is an important factor in preventing negative outcomes related to opioid administration. Although there are several sedation scales available, including the Pasero Opioid-induced Sedation Scale (POSS), the Inova HealthSystem Sedation Scale, and the Richmond Agitation and Sedation Scale, Nisbet and Cotter (2009) found that the POSS developed by Pasero (2009) is the most effective sedation scale for measuring sedation related to opioid administration. Their descriptive, survey-based study found that the POSS demonstrated high reliability and validity as well as a high percentage of agreement between POSS scores and appropriate nursing actions (Nisbet & Cotter, 2009). Refer to Table 2 for the POSS.

According to Pasero (1994), sedation precedes respiratory depression secondary to opioid administration. Therefore, careful monitoring of a patient's sedation level can help prevent negative outcomes related to opioid administration. Nurses can use the POSS to assess patients, standardize documentation of assessment findings, and confidently implement interventions based on assessment findings across the continuum of care.

The POSS assesses patients on the basis of five levels of sedation. The first level, "S," signifies a patient who is sleeping but easily aroused. Level 1 denotes a patient who is awake and alert, and Level 2 describes a patient who is slightly drowsy. Levels S, 1, and 2 describe patients who can safely receive opioid pain medication if necessary. Patients assessed at Level 3 are excessively drowsy and may drift off to sleep during conversation.

Table 2. Pasero Opioid-Induced Sedation Scale

S = Sleep, easy to arouse	*Acceptable; no action necessary; may increase opioid dose if needed*
1 = Awake and alert	*Acceptable; no action necessary; may increase opioid dose if needed*
2 = Slightly drowsy, easily aroused	*Acceptable; no action necessary; may increase opioid dose if needed*
3 = Frequently drowsy, arousable, drifts off to sleep during conversation	*Unacceptable; monitor respiratory status and sedation level closely until sedation level is stable at less than 3 and respiratory status is satisfactory; decrease opioid dose 25% to 50% or notify prescriber or anesthesiologist for orders; consider administering a nonsedating, opioid-sparing nonopioid, such as acetaminophen or a nonsteroidal anti-inflammatory drug, if not contraindicated.*
4 = Somnolent, minimal, or no response to verbal and physical stimulation	*Unacceptable; stop opioid; consider administering naloxone; notify prescriber or anesthesiologist; monitor respiratory status and sedation level closely until sedation level is stable at less than 3 and respiratory status is satisfactory.*

Note. From "Assessment of Sedation During Opioid Administration for Pain Management," by C. Pasero, 2009, *Journal of PeriAnesthesia Nursing, 24*(3), p. 187. Reproduced with permission.

Level 4 describes a patient who is somnolent. Both Levels 3 and 4 patients require more frequent assessments and immediate intervention, including changing the patient's position and providing oxygen therapy if necessary. The POSS delineates a plan of care and nursing interventions at each assessment level. The result is standardized assessments, interventions, and language used for documentation. The outcome is improved communication between healthcare team members and decreased time to interventions. Use of the POSS facilitates orthopaedic nurses medicating for pain with greater confidence and helps improve overall patient safety.

Nursing Interventions

Nursing interventions are an inherent part of everyday nursing practice. They are the implementation of care based on identified patient needs. Specific nursing interventions to promote safety of postoperative orthopaedic patients with OSA include appropriate patient positioning, patient education, and involving patients and their families in care.

Patient Positioning

Patient positioning is a basic nursing intervention that can have an appreciable impact on the safety of patients with OSA. Unless contraindicated by the surgical procedure, patients should avoid a supine position. The two ideal positions for patients with OSA are either a 45°, modified sitting position or a lateral position (Paje & Kremer, 2006). Both positions facilitate ventilation and maintaining an open airway. However, it should be noted that patient positioning should be adjusted on the basis of individual patient needs. Patient size and shape may alter which position best facilitates breathing. Assessment of patient positioning should be included with each sedation assessment.

Patient Education

Patient education is another important tool in maintaining patient safety. Education should begin before surgery is scheduled and continue through the patient's hospital stay and discharge planning. Patient education should occur in three phases: preoperatively, throughout the patient's stay in the hospital, and at the time of discharge.

Preoperative education begins in the doctor's office when the decision for surgery is made and continues with any preadmission testing visits. The goal of preoperative education is to prepare patients and their families for the specialized care they will receive related to OSA. If a patient already uses a nasal or face mask with CPAP at home, the individual should be encouraged to bring the CPAP and mask on the day of surgery (Ross, 2008). This is an ideal time to assess patient knowledge regarding CPAP use and reinforce education as needed. It is important that patients understand their CPAP settings and provide that information to their care providers. If a patient is identified as at risk for OSA using the STOP-BANG questionnaire but has not been diagnosed, education should focus on the possible use of CPAP in the hospital and follow-up care with a primary care physician.

During the patient's hospital stay, the goal of education transitions to explaining care. Nurses can review the rationale of proper positioning, explain why frequent assessments are being completed, and reinforce preoperative education about CPAP use. The focus is on helping patients understand the relationship between nursing interventions and their safety. Another important aspect of patient education is encouraging patients to play an active role in pain management. Pain management education includes explaining the procedures for how pain medication is administered, encouraging patients to "stay ahead of the pain" and not wait until pain levels are high before asking for medication, and understanding alternatives to opioid pain medications.

As the time of discharge approaches, patient education shifts to patient self-care at home. Patients with OSA are at risk of prolonged apnea during sleep for up to 1 week after surgery (Paje & Kremer, 2006). Patients should be encouraged to have a family member stay with them at home. It is crucial that patients continue to be compliant with proper positioning and CPAP therapy. A facility-specific policy should be in place to ensure that patients who were identified as at-risk for OSA during their hospital stay follow up with their primary care physician or a sleep specialist.

Patient and Family Involvement

During all three phases of patient education and care, patient and family involvement is essential. Patients and family members can play an active role in maintaining patient safety. Patient education can be overwhelming. Family members can serve as "an extra set of eyes and ears" when patient education is completed. Friends or family can stay with the patient in the hospital and after the patient goes home to provide reminders of proper positioning, CPAP use, and judicious use of pain medications. Patient safety is best facilitated when healthcare providers, patients, and families work together.

Conclusion

Hypertension, diabetes, and OSA are common comorbidities seen in today's orthopaedic patients. Nurses caring for postoperative orthopaedic patients have an increased burden of care to protect the safety of patients with OSA. The patient scenario described at the beginning of this article does not need to happen. Clear communication, vigilant postoperative sedation assessment, and nursing interventions that include appropriate patient positioning, patient education, and involving patients and their families in care are crucial steps to protecting the safety of this population. Promoting safety of postoperative orthopaedic patients with OSA can be accomplished if healthcare team members assess, communicate, and educate.

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