Protecting Our Patients with Obstructive Sleep Apnea During the Perioperative Period

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ABSTRACT

Patients with obstructive sleep apnea (OSA) are potentially at higher risk than unaffected patients of developing complications during and after surgery, including respiratory arrest, cardiac arrhythmias, and myocardial ischemia. To address the particular needs of OSA patients during the perioperative and postoperative periods, we developed a set of guidelines for pre-anesthesia screening, perioperative management, and postoperative monitoring that we expect will reduce their risk of complications. Although awareness of their propensity for surgical complications is increasing, more needs to be done to improve the care of patients with OSA. As a multidisciplinary team, we can better understand which patients are at risk, optimize preoperative and perioperative care, and plan for safe postoperative management.

INTRODUCTION

Obstructive sleep apnea (OSA) is characterized by intermittent complete or partial airway obstruction during sleep, which causes hypoxia and hypercarbia. OSA thus not only causes fragmented sleep, but also more serious conditions, including hypertension, myocardial infarction, stroke, and even sudden death due to cardiac arrhythmias.[1, 3, 4, 6]

Considering OSA's effects on patients who are not undergoing surgery, it's no surprise that OSA may contribute to adverse surgery-related outcomes, including substantial respiratory and cardiac complications such as arrhythmias, myocardial ischemia, unplanned ICU transfers, and reintubations. We already know that many commonly used anesthetic drugs, including opioids, benzodiazepines, and neuromuscular blockers, increase the tendency for the upper airway to collapse. These drugs also suppress the action of the pharyngeal muscles in obese patients with OSA and inhibit normal arousal mechanisms that help OSA patients during sleep.[1,3] In addition, in the days following surgery, many patients cannot sleep properly because of pain, surgery-related anxiety, and other factors. Lack of sleep only exacerbates the problems of the postoperative recovery period, and patients with OSA may experience more severe apnea during this time.[3]

OSA is quite common, occurring in 2% of women and 4% of men, yet as many as 80-95% of patients are undiagnosed.[3, 5, 7] As is well known, OSA is far more prevalent in patients who are obese: 60-90% of patients with OSA have a body mass index (BMI) of 30 kg/m^2.[2,3] As the incidence of obesity continues to increase, we should find more patients with the surgical risks associated with OSA. Yet, despite the growth of this problem most of the literature has been confined to the risks in OSA patients undergoing airway-related surgery, such as uvulopalatopharyngoplasty. And though several articles have suggested that the risks of anesthesia-related morbidity and mortality in patients with OSA are considerable, the actual causes of perioperative morbidity and mortality have been poorly defined, as there have been few studies of complications during operations that are not specifically related to treating the patient's OSA.

THE LGH EXPERIENCE

To evaluate our complication rate in patients at risk for OSA at Lancaster General Hospital, we retrospectively reviewed all charts of patients who underwent an inpatient or outpatient operative procedure from July to October 2005, and focused attention on those with either a diagnosis of OSA or weight greater than 299 lbs. We recorded whether the procedures required sedation, regional anesthesia, or general anesthesia, and also recorded the incidence of complications such as death, ventilator use, or readmission within 31 days. We focused on specific procedures expected to pose a higher risk of postoperative complications, such as airway (i.e., ENT) operations, and total hip or knee replacement (because of the enforced restriction on mobility), and we compared the incidence of complications in OSA patients with the incidence in the general population.

During the four-month study period, we treated approximately 355 patients with a known diagnosis of OSA and were pleasantly surprised that – at least in this small sample – perioperative complication rates were far below the high level that one would have expected in patients with

OSA from the few reports in the literature. However, the sample size may have been too small to detect this predicted level, and our study was not designed to precisely evaluate this end point. Nonetheless, the study helped us realize that we might easily be missing many patients at risk for OSA in the obese population, and that LGH procedures may have been less than optimal in the care of these individuals.

DEVELOPMENT OF GUIDELINES

To better define our population with OSA at risk for complications, we sought to more precisely identify these patients and to prepare for care of this higher risk population. National organizations such as the American Society of Anesthesiologists[6] and the American Academy of Sleep Medicine[5] have in recent years developed guidelines to address the perioperative management of OSA patients, and the Joint Commission is considering including the goal of reducing the risk of postoperative complications for patients with OSA in its 2008 National Patient Safety Goals and Requirements.

Based on published guidelines and scoring systems, we developed pre-anesthesia, perioperative, and postoperative guidelines that use a scoring system to standardize preoperative evaluation, perioperative management, and postoperative decision-making. We anticipate that with the implementation of these guidelines, standardization of care will improve quality and safety for this group of patients, as it has for many others.

USE OF GUIDELINES FOR PRE-ANESTHESIA IDENTIFICATION

Preoperative evaluation and planning is essential to the care of the patient with obesity and/or OSA throughout the hospital course. The LGH Preanesthesia Clinic compiles comprehensive data on preoperative patients including the results of H&Ps, clinical laboratory tests, and studies such as X-ray and cardiac tests. Patients are assessed if they can be reached in advance by telephone, which generally includes about 77% of patients. Excluded categories include emergency cases, add-ons, cardiac surgery patients, and those receiving local anesthesia.

We developed specific screening guidelines based on weight, symptoms, and past history, and created a questionnaire that probes the likelihood of associated OSA. Answers to the questionnaire are converted to a score that preanesthesia nursing personnel can use to assess whether further workup is indicated.

MANAGEMENT IMPLICATIONS

Using guidelines proposed by the Ameerican Society of Anesthesiologists (ASA)[6,8] the preoperative evaluation is useful in predicting whether patients have an increased perioperative risk from OSA and whether the surgery should be performed on an inpatient basis. Patients who have an increased risk of perioperative complications (those with Score of 5 or greater on Table 1) are not good candidates for surgery as outpatients.

After consultation and review by an anesthesiologist, the patient can be referred to a pulmonologist for consideration of OSA studies and preoperative treatment with continuous positive airway pressure (CPAP). Preoperative treatment with bilevel positive airway pressure (BiPAP) or CPAP may protect some individuals from postoperative complications, but the optimal duration of preoperative BiPAP or CPAP treatment is unknown. Evidence proving the benefit of postoperative continuation of PAP is not available, but common practice is to continue the treatment in the postoperative time period.[4]

The severity of OSA is defined by the Apnea Hypopnea Index (AHI). This indicator is derived from the number of hypoxic episodes per hour noted during polysomnography or sleep studies. According to our pulmonologists, an AHI of 15-25 is considered mild, 26-35 moderate, and >35 severe. The scoring system is based on a point system of (0-3) assigned by the severity of the AHI, with an additional point added if resting PaCO2 is greater than 50 mmHg, or if the patient has a diagnosis of asthma or other respiratory disorder. A point is subtracted for preoperative treatment with CPAP or BiPAP, if the patient will be consistently treated postoperatively with these devices.

The invasiveness of surgery and need for general anesthesia determine the point score for the operative procedure. Major surgery or airway surgery with general anesthesia receives the highest score and indicates the greatest risk.

Finally, the need for postoperative opioids influences risk because of their action as respiratory depressants.[4] The patient who requires high doses of opioids is at greatest risk for postoperative respiratory difficulty. Patients may have hypercarbia and hypopnea and still complain of severe pain. For many of these patients, complete relief of pain may not be a safe or a realistic goal.

TABLE 1. PREOPERATIVE SCORING SYSTEM FOR ESTIMATION OF RISK.*

	Points
A. Severity of sleep apnea based on sleep study (or clinical indicators if sleep study is not available):	
None	0
Mild	1
Moderate	2
Severe	3
B. Invasiveness of proposed surgery and anesthesia:	
Superficial surgery under local or peripheral nerve block anesthesia without sedation	0
Superficial surgery with moderate sedation or general anesthesia	1
Peripheral surgery with spinal or epidural anesthesia (with no more than moderate sedation)	1
Peripheral surgery with general anesthesia	2
Airway surgery with moderate sedation	2
Major surgery, general anesthesia	3
Airway surgery, general anesthesia	3
C. Anticipated requirement for postoperative opioids:	
None	0
Low Dose Oral Opioids	1
High Dose Oral Opioids	3

*Scale 0-3 for each variable; maximum score = 6 (A, plus B or C – see text).

The overall score between 0 and 6 determines the estimate of the operative risk. The score is calculated by adding the score for OSA severity plus the greater of the score for surgery/anesthesia or for opioids.

PERIOPERATIVE CARE

Perioperative guidelines were developed to provide guidance that specifically results in consistent anesthesia management during the surgical process. Patients with OSA, especially obese ones, are more difficult to intubate and extubate; they experience oxygen desaturation during the peri- and postoperative periods; and they have problems with postoperative pain control. Decisions regarding the type of anesthesia, whether to intubate and extubate the patient while awake, and the choice of perioperative monitoring procedures, should be made based on the anticipated difficulty of intubation, length of procedure, use of nasal packing, severity of OSA, and type of surgery.

POSTOPERATIVE CARE

Guidelines for postoperative care were developed for use in our institution, ranging from intensive care monitoring with direct nursing observation to discharge. The cumulative score obtained from the preoperative evaluation (Table 2) indicates the suggested action including the possibility of discharge, routine admission, or intensive care monitoring with direct observation.

A frequent dilemma is whether the patient can be discharged to home or needs to be admitted.[6,8] We chose a conservative approach based on considerations of patient safety: the initial decision pathway should determine whether the patient would be categorized as an acceptable candidate for outpatient surgery with discharge to home care.

Outpatient surgery with discharge to home is likely to be appropriate for patients with:

1. Mild OSA who do not need CPAP by sleep studies;
2. Minimally invasive surgery with no pain, or pain that only requires non-steroidal anti-inflammatory agents;
3. Surgery requiring only regional anesthesia with pain expected to be minimal;
4. Surgery requiring minimal narcotic analgesics may allow discharge if the patient is monitored for an

TABLE 2. OPERATIVE RISK SCORE AND IMPLICATIONS FOR MANAGEMENT.

Score	Management
0-3	May be considered for discharge to home or a routine ward
4	May be considered for discharge to home or a routine ward, if no other risk factors present; Should admit patient if patient is unwilling or unable to follow instructions, or has pain not controlled by non-opioids
5	Should be admitted to direct observation monitored beds vs. routine wards, depending on the clinical circumstances
6	Should be routinely monitored in a direct observation area with telemetry monitoring; simple oxygen saturation monitoring in an isolated room on a ward not sufficient

average of three hours longer than normal. The total period of monitoring should average seven hours after the last episode of airway obstruction or hypoxemia while breathing room air in an unstimulated environment.

Post discharge instructions should emphasize home use of the CPAP machine, as well as avoidance of narcotics and other sedatives.

Patients unwilling or unable to follow instructions or those with pain uncontrolled by non-sedating medications should be admitted for additional monitoring and care.

CONCLUSION

Although OSA poses a risk for complications during the perioperative period, the challenge is to define the risk clearly. Treatment with narcotics and sedatives in the perioperative period not only increases the risk of respiratory arrest, but also increases the risk of sudden death, myocardial infarction, and arrhythmias. In our retrospective chart review, approximately 2 patients per day required a higher level of monitoring than is routinely used. This group included patients with morbid obesity, super obesity, and those at higher risk with general anesthesia because of known sleep apnea. Direct observational units may be needed to provide optimal care for these patients.

Encounters with previously undiagnosed OSA patients occur intermittently but relatively frequently, and can result in fragmented perioperative care and inconsistent application of guidelines. To better determine which patients are at risk, to optimize preoperative and perioperative care, and to plan for safe postoperative management, we developed guidelines to increase the standardization of care of OSA patients. We expect these guidelines to further reduce the risks of this unique patient population.

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