

## Patient Safety Tip of the Week

September 24, 2013

# Perioperative Use of CPAP in OSA

We've long recognized the risks associated with obstructive sleep apnea (OSA) in patients undergoing surgery (see the list of prior columns at the end of today's column). Many, if not most, patients with OSA are undiagnosed before their surgery. We've discussed that use of excellent tools, such as the STOP-Bang questionnaire, to screen patients preoperatively for OSA risk may be valuable but these remain underutilized.

However, we also lamented in our November 22, 2011 Patient Safety Tip of the Week "[Perioperative Management of Sleep Apnea Disappointing](#)" that there has been a striking lack of evidence that interventions for OSA in the perioperative period actually have a beneficial effect. But we expressed hope that ongoing research would soon demonstrate some positive results. Indeed, we finally have such evidence from a randomized controlled trial (RCT). The research group in Toronto headed by Frances Chung, which has done much of the seminal research on OSA in the perioperative period, has just published results of a randomized controlled trial of auto-titrated continuous positive airway pressure (APAP) in the perioperative period for patients with moderate to severe OSA not previously on CPAP who underwent surgery ([Liao 2013](#)).

The intervention group received APAP for 2-3 preoperative and 5 postoperative nights. The control group received usual care. In the APAP group the apnea hypopnea index (AHI) decreased from a baseline of 30.1 events per night to 3.0 events per night on postoperative night 3. In the control group the AHI increased from a baseline of 30.4 events per night to 31.9 events per night on postoperative night 3. Also, compared to the control group, patients in the APAP group had significantly less oxygen desaturation postoperatively. The study was underpowered to demonstrate any impact on complications or other patient outcomes.

The study did, however, demonstrate many of the barriers to interventions with APAP or conventional CPAP in these patients perioperatively. Compliance with APAP for all observed nights in the study group was only 45%. Moreover, the mean usage time for APAP was 2.4 to 4.6 hours per night with over half the patients using it less than 4 hours per night. Major reasons for noncompliance were generalized discomfort and nausea/vomiting.

The study did have some limitations. It was not double blinded and that may have introduced some bias. In fact, more patients in the APAP group received supplemental oxygen (which may have affected the oxygen saturation outcomes but not the AHI outcomes). In addition to the relatively poor APAP compliance noted above, there was also a high dropout rate. However, the beneficial impact of APAP on the apnea hypopnea index held up even on intent-to-treat analysis.

This is really the first RCT to demonstrate the utility of APAP or CPAP in the perioperative period. Admittedly, the AHI and oxygen saturation parameters are somewhat surrogate measures in that we are really more interested in finding out if APAP/CPAP reduces perioperative complications or mortality. Answers to the latter would obviously require studies of much larger populations. Nevertheless, these results are quite compelling and suggest that similar interventions in patients with moderate to severe OSA undergoing surgery may be beneficial.

As per our prior columns, several studies have demonstrated that postoperative complications are increased in patients with OSA. A recent retrospective analysis of over 1 million patients in the National Inpatient Sample database showed that there was an increased independent association between sleep-disordered breathing and postoperative cardiopulmonary complications but there was no association with increased rate of hospital death ([Mokhlesi 2013](#)). The impact of sleep-disordered breathing on length of stay (LOS) and hospital costs varied considerably by type of surgery.

We strongly recommend that you incorporate screening for possible OSA into your preoperative evaluations and follow recommendations we've highlighted in our March 26, 2013 Patient Safety Tip of the Week "[Failure to Recognize Sleep Apnea Before Surgery](#)" and the other columns listed below. While we have always recommended continuation of CPAP postoperatively in patients already on CPAP, we now also finally have some evidence base for consideration of perioperative APAP/CPAP in patients with diagnosed OSA who have not previously been treated with CPAP. Note that there are some advantages to use of APAP over CPAP in this population. The pressure used may respond to changes in airway resistance that may be common in the postoperative period. In addition, the usual CPAP titration required after diagnosis of OSA might delay surgery. APAP could be used without that titration study.

### **Our prior columns on obstructive sleep apnea in the perioperative period:**

Patient Safety Tips of the Week:

June 10, 2008	<a href="#">"Monitoring the Postoperative COPD Patient"</a>
August 18, 2009	<a href="#">"Obstructive Sleep Apnea in the Perioperative Period"</a>
August 17, 2010	<a href="#">"Preoperative Consultation – Time to Change"</a>
July 13, 2010	<a href="#">"Postoperative Opioid-Induced Respiratory Depression"</a>
February 22, 2011	<a href="#">"Rethinking Alarms"</a>

November 22, 2011 “[Perioperative Management of Sleep Apnea Disappointing](#)”  
May 22, 2012 “[Update on Preoperative Screening for Sleep Apnea](#)”  
February 12, 2013 “[CDPH: Lessons Learned from PCA Incident](#)”  
February 19, 2013 “[Practical Postoperative Pain Management](#)”  
March 26, 2013 “[Failure to Recognize Sleep Apnea Before Surgery](#)”

What’s New in the Patient Safety World columns:

July 2010 “[Obstructive Sleep Apnea in the General Inpatient Population](#)”  
November 2010 “[More on Preoperative Screening for Obstructive Sleep Apnea](#)”  
March 2012 “[Postoperative Complications with Obstructive Sleep Apnea](#)”  
June 2013 “[Anesthesia Choice for TJR in Sleep Apnea Patients](#)”

## References:

Liao P, Luo Q, Elsaid H, et al. Perioperative Auto-titrated Continuous Positive Airway Pressure Treatment in Surgical Patients with Obstructive Sleep Apnea: A Randomized Controlled Trial. *Anesthesiology* 2013; 119(4): 837-847  
[http://journals.lww.com/anesthesiology/Abstract/2013/10000/Perioperative\\_Auto\\_titrated\\_Continuous\\_Positive.23.aspx](http://journals.lww.com/anesthesiology/Abstract/2013/10000/Perioperative_Auto_titrated_Continuous_Positive.23.aspx)

Mokhlesi B, Hovda MD, Vekhter B, et al. Sleep-Disordered Breathing and Postoperative Outcomes After Elective Surgery: Analysis of the Nationwide Inpatient Sample. *Chest* 2013; 144(3): 903-914  
<http://journal.publications.chestnet.org/article.aspx?articleid=1672183>



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