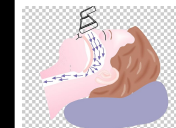




# Anesthetic Management of Obstructive Sleep Apnea and Pulmonary Hypertension

## An Integrated Research Review Involving Perioperative Strategies to Improve Pulmonological Outcomes

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### Research Question

For patients diagnosed with obstructive sleep apnea (OSA) & pulmonary hypertension (PH) undergoing surgery, would an intraoperative protocol incorporated into their perioperative plan of care lead to optimal pulmonological outcomes?

Breathing Infrequent Dyssomnia  
Disorder Abnormal Sleepless  
SLEEP Central Fatigue  
Disruptive Health Insomnia  
Cause APNEA Complex  
Throat Treatment Night  
Snoring Interrupted Sleep  
Symptoms Disturbance  
Obstructive Oxygen Hypopnea



### Introduction

- Studies have found that OSA is the most common undiagnosed co-morbidity in patients presenting for surgery.
- Understanding it's impact toward resulting in PH and the best management for these patients during the perioperative stages is imperative.
- There are no evidence-based pathways or protocols for such.
- Up to 80% of patients that present for general surgery are said to have obstructive sleep apnea accompanied by some form of pulmonary arterial hypertension (Gaddam et al., 2014).
- Additionally, research has indicated that re-intubation and unplanned ICU admission resulted in a 70-fold to 90-fold increase in risk for in-hospital mortality (Shin et al., 2016).
- Obesity is a strong component of OSA & PH; currently one in three adults are classified as obese (Nguyen et al., 2020).
- With the addition and capabilities of stand-alone surgery sites or "off site anesthesia", post-operative considerations and management is critical for this rapidly growing patient population.

### References

- Full reference list is available immediately upon request.

### Review of Literature and Evidence Based Perioperative Strategies

- Continuous positive airway pressure is indicated as the most effective therapy for patients with OSA undergoing surgery (Nagappa et al., 2015).
- Limiting the use of neuromuscular blockade has been shown to decrease the incidence of respiratory failure and hypoxemia in the patient diagnosed with OSA and PH following general surgery (Memsoudis et al., 2018).
- If opioids must be administered for pain control in this patient population, agents that have short half lives such as Remifentanyl should be considered for usage where available (Shin et al., 2016).
- Similar lipophilic options such as Sufenta and Fentanyl can be used in the intrathecal space for regional analgesia as their duration of 2-4 hours is described in the literature as short acting (Shin et al., 2016; Steppan et al., 2018).
- Prostacyclin receptor antagonists mediate effective pulmonary function during surgery and play a key role in optimizing patients diagnosed with pulmonary arterial hypertension (Kruthiventi, 2019).
- Improved patient outcome profiles have been linked with the addition of regional anesthesia to general anesthesia compared to the use of general anesthesia alone (Memsoudis et al., 2018).
- Questionnaires such as the STOP-BANG assessment will serve the clinician better in the pre-operative stage as the polysomnography test is costly and not realistic in the newly suspected OSA & PH patient (Shin et al., 2016).
- Transthoracic echocardiography is a bedside assessment tool that is gaining popularity in determining mechanical heart function prior to patients undergoing general anesthesia (Kholdani et al., 2015).
- The anesthetist must be cognizant of the how poorly this patient population tolerates oversedation as hypoxemia presents rapidly due to a shallow functional residual capacity (Kholdani et al., 2015).

### Methods

- **Search databases:** CINAHL, EBSCO, PubMed, and ScienceDirect.
- **Search terms:** "Anesthesia", "pulmonary outcomes", "pulmonary hypertension", & "obstructive sleep apnea" were all used in different phases of the search process.
- **Inclusion criteria:** Publications from the year 2009-2020; patients diagnosed with obstructive sleep apnea and pulmonary hypertension undergoing surgical procedures with general anesthesia were examined throughout each perioperative phase of surgery.
- **Exclusion Criteria:** All studies that were published before 2009 or that were not published in English.

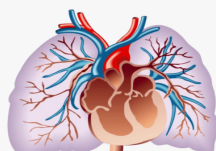
### Conclusion

- Patients diagnosed with OSA & PH undergoing surgery deserve unique considerations during the perioperative phase to mitigate unfavorable pulmonary outcomes.
- Optimal positioning, continuous positive airway pressure, baseline hemodynamic continuity, close monitoring before, during, and after surgery, regional anesthesia (including peripheral nerve blocks), continuous positive airway pressure, and opioid sparing techniques to minimize respiratory depression such as Ketamine and alpha 2 agonists are primary examples for improving pulmonological outcomes.

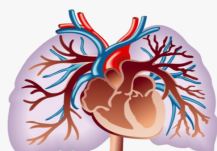
### Future Plans

- Adopt enhanced recovery after surgery protocols for patients who present with suspected or known OSA and/or PH.
- The consensus of sources suggest that uniform pathways and algorithms for are needed to improve the outcomes in this patient population and should center around minimizing respiratory depression.

"And the Lord God formed man of the dust of the ground, and breathed into his nostrils the breath of life; and man became a living soul."  
(Genesis 2:7, KJV)



Pulmonary Hypertension



Normal Heart