

Risk of Major Cardiovascular and Cerebrovascular Complications after Elective Surgery in Patients with Sleep Disordered Breathing

Presenting Author: Rabail Chaudhry MD¹

Co-Authors: Rabail Chaudhry MD¹, Colin Suen MD PhD¹, Talha Mubashir MD¹, Jean Wong MD¹, Frances Chung MBBS¹

¹Department of Anesthesia, University Health Network, University of Toronto, Toronto, ON, Canada

Background: Sleep-disordered breathing (SDB) is a common comorbidity in the surgical population and has important perioperative implications. SDB disorders such as obstructive sleep apnea (OSA) are associated with increased incidence of cardiovascular diseases such as coronary artery disease, heart failure, hypertension, atrial fibrillation, pulmonary hypertension, cerebrovascular accidents and sudden death. Current literature suggests that SDB is associated with cardiovascular and respiratory postoperative complications. However, there is limited and conflicting data on mortality with studies reporting an increased¹ or decreased² in-hospital mortality among SDB patients undergoing surgery. The objective of this study was to determine whether SDB is associated with increased risk of post-operative major cardiovascular and cerebrovascular events, mortality and length of hospital stay using a large patient database.

Methods: Data was obtained from the Nationwide Inpatient Sample (NIS) between 2011-2014. We included adult patients who underwent elective abdominal, orthopedic, prostate, gynecologic, thoracic, transplant, vascular, and cardiac surgery. The primary outcome was the incidence of major adverse cardiac and cerebrovascular events (MACCE). Secondary outcomes included respiratory complications, mortality during hospitalization, and mean length of hospital stay (LOS). Linear regression and logistic regression models were constructed to determine the independent association between SDB and MACCE.

Results: The study cohort included 1,813,974 surgical patients of which 185,615 (10.23%) had SDB. In the overall surgical cohort, the incidence of MACCE (25.2% vs 19.9%, OR 1.20; P<0.001) and respiratory complications (11.7% vs 7.95%, OR 1.43; P<0.001) were significantly higher in patients with SDB when compared to non-SDB. More specifically, SDB was associated with higher incidence of atrial fibrillation (14.7% vs 10.8%, P<0.001), other arrhythmias (6.02% vs 5.35%, P<0.001), and congestive heart failure (9.75% vs. 7.05%, P<0.001). However, SDB patients had a lower incidence of myocardial infarction (3.05% vs 3.44%, OR 0.69; P<0.001), mortality (0.61% vs 1.25%, P<0.001), and shorter mean length of stay (4.83 vs 5.14 days, P<0.001).

Conclusion: In conclusion, SDB is associated with increased risk of MACCE and respiratory complications. Interestingly, a diagnosis of SDB was associated with lower incidence of in-hospital mortality and LOS. A lower mortality in the SDB population may result from heightened perioperative monitoring and/or SDB specific treatment. Also, undiagnosed SDB patients within the non-SDB group may influence postoperative outcomes.

References:

1. The Journal of Arthroplasty. 2012; 27:95-8.
2. Chest. 2013;144: 903-14.

Table 1: Regression Models to Estimate Adjusted Risk of Postoperative Complications Associated with Sleep Disordered Breathing.

Variables	Adjusted OR (95% CI)	P value
Primary Outcome		
MACCE^a	1.20 (1.18-1.21)	<0.001
Atrial fibrillation	1.30 (1.28-1.32)	<0.001
Other arrhythmias	1.04 (1.02-1.07)	<0.001
Cardiac arrest	0.71 (0.66-0.76)	<0.001
Myocardial infarction	0.69 (0.67-0.71)	<0.001
Congestive heart failure	1.26 (1.24-1.29)	<0.001
Postoperative stroke	0.74 (0.65-0.84)	<0.001
Secondary Outcomes		
Respiratory complications	1.43 (1.41-1.45)	<0.001
Endotracheal intubation	0.87 (0.63-1.20)	0.394
CPAP/NIV	5.92 (5.73-6.11)	<0.001
Respiratory failure	1.07 (1.05-1.09)	<0.001
Tracheostomy	0.61 (0.56-0.66)	<0.001
Pneumonia	0.83 (0.80-0.85)	<0.001
Vascular complications	0.66 (0.63-0.68)	<0.001
Pulmonary embolism	0.99 (0.92-1.06)	0.722
Deep vein thrombosis	0.73 (0.62-0.87)	<0.001
Other vascular embolism	0.54 (0.51-0.57)	<0.001
End-organ infarct ^b	0.58 (0.52-0.65)	<0.001

Abbreviations: MACCE, Major Adverse Cardiac and Cerebrovascular Events; CPAP, Continuous Positive Airway Pressure; NIV, Noninvasive ventilation; VTE, Venous Thromboembolism

^aMACCE includes any one of the following: atrial fibrillation, other cardiac arrhythmias, cardiac arrest, myocardial infarction, congestive heart failure, stroke.

^bEnd-organ infarct includes any one of the following: hepatic, renal, or mesenteric ischemia.