

Evaluation of perioperative complications in patients with obstructive sleep apnea: An observational analysis with clinical implications



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ABSTRACT

Background: Obstructive sleep apnea (OSA) poses significant perioperative risks, yet limited research exists to quantify these complications. **Aims and Objectives:** The study aims to fill this gap by investigating a variety of perioperative complications in OSA patients. The primary objective was to assess the types and prevalence of perioperative complications across diverse surgical procedures. **Materials and Methods:** A cohort of 100 OSA patients undergoing different surgical interventions was monitored prospectively. Descriptive statistics, Chi-square tests, independent t-tests, and logistic regression were employed to evaluate the data. **Results:** In this cohort study involving 100 OSA patients, 57% experienced at least one perioperative complication, most commonly postoperative hypoxemia (23%), cardiac events (18%), and delirium (12%). The mean age for those with complications was 56 years, significantly higher than the 52 years for those without complications ($P < 0.05$). Abdominal surgeries were particularly associated with hypoxemia ($P < 0.05$), while pre-existing cardiac conditions predisposed to cardiac events ($P < 0.01$). Older patients (> 60) were more prone to delirium ($P < 0.05$). Complication severity varied, with 29 mild, 20 moderate, and 8 severe cases requiring an intensive care unit. Diabetes and hypertension emerged as significant predictors, with odds ratios of 2.5 and 2.8, respectively ($P < 0.05$). **Conclusion:** This study highlights the substantial risk of perioperative complications among OSA patients, especially those with certain pre-existing conditions, older age, or undergoing specific types of surgeries. The findings suggest the need for specialized perioperative care plans for these patients to mitigate the risks.

Key words: Obstructive sleep apnea; Perioperative complications; Postoperative hypoxemia; Cardiac events; Delirium

INTRODUCTION

Obstructive sleep apnea (OSA) is a complex and pervasive medical condition that has garnered substantial attention due to its prevalence and far-reaching implications.¹ Affecting nearly a quarter of adult men and close to 10% of women, OSA is characterized by recurrent disruptions in breathing during sleep, leading to intermittent hypoxemia and fragmented sleep architecture.² Beyond its impact

on sleep quality, OSA extends its effects to broader physiological domains, encompassing cardiovascular health, metabolic regulation, and neurocognitive function.³

The management of OSA is a multifaceted challenge, and it becomes even more intricate within the realm of surgery. The perioperative period introduces an elevated level of risk for OSA patients due to various factors, including anesthesia administration, alterations in body positioning,

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and the physiological stress associated with surgery.⁴ These factors collectively contribute to a spectrum of potential complications, ranging from seemingly benign delays in wound healing to severe cardiac events with the potential for fatal outcomes.⁵

Despite its significant prevalence and associated risks, OSA remains underdiagnosed, particularly within surgical populations. The lack of specific training among healthcare providers exacerbates the problem, rendering the identification and effective management of OSA challenging in these high-risk settings.⁶ This knowledge gap in detecting and addressing OSA becomes even more concerning within perioperative environments, where timely intervention can be the differentiating factor between life and death.

Although some studies have explored perioperative risks associated with OSA, the existing literature is constrained both in terms of scope and scale. Many studies have focused on specific surgical procedures or particular types of complications, leaving a comprehensive understanding of perioperative risks in OSA patients relatively unexplored.⁷ Consequently, there is a critical need to broaden our understanding of the interplay between OSA and perioperative outcomes.

Given this complex backdrop, the current study seeks to significantly enhance our comprehension of the relationship between OSA and perioperative complications. By conducting a rigorous observational assessment within a diverse cohort of 100 OSA patients undergoing various surgical procedures, this study aims to systematically explore the prevalence and nature of perioperative complications, including postoperative hypoxemia, cardiac events, and delirium. In addition, the study endeavors to unravel the intricate interactions between contributing factors such as age, the specific nature of surgical procedures, and pre-existing health conditions in relation to the incidence of these complications.

Aim and objectives

In light of existing gaps in the literature, this study endeavors to deepen our understanding of perioperative complications among OSA patients. The primary aim is to quantify the prevalence and types of complications, such as postoperative hypoxemia, cardiac events, and delirium, in a cohort of 100 OSA patients. Secondary objectives include investigating the role of variables like age, type of surgery, and pre-existing conditions in influencing these complications. The ultimate goal is to inform the development of personalized perioperative care plans to improve patient outcomes.

MATERIALS AND METHODS

Study design and setting

This observational study was conducted at the Government Medical College Suryapet, a prominent tertiary care center situated in Suryapet, India. The study was carried out over a period of 12 months, from February 2022 to January 2023.

Participants

The study recruited a cohort of 100 adult patients diagnosed with OSA who were scheduled for diverse surgical procedures within the specified study period. Participants were identified and selected from the hospital's preoperative assessment clinics.

Inclusion criteria

- Adults aged 18 years and older
- Clinically diagnosed with OSA
- Scheduled for elective surgical procedures during the study timeline.

Exclusion criteria

- Patients with other sleep disorders besides OSA
- Emergency surgical cases
- Patients with incomplete medical records or unavailable follow-up data.

Data collection

A comprehensive dataset was compiled through a blend of methods, including meticulous review of medical records, preoperative evaluations, and diligent postoperative follow-ups. Pertinent demographic information encompassing age, gender, and pre-existing medical conditions was meticulously extracted from the patients' medical records. Additional details regarding the surgical interventions, anesthesia modalities, and ultimate surgical outcomes were diligently documented.

Measurements

The focal point of this study was the identification of perioperative complications. These complications were classified into three distinct tiers based on their severity: mild, moderate, and severe. Mild complications were those that could be managed with minimal intervention, whereas moderate complications necessitated medical treatment or an extended hospital stay. Severe complications were characterized by the requirement for intensive care unit (ICU) admission.

Data analysis

An array of statistical methods were employed for the analysis. Descriptive statistics were employed to succinctly summarize the demographic characteristics and the incidence of complications. The prevalence of specific

complications, including postoperative hypoxemia, cardiac events, and delirium, was expressed as proportions relative to the total cohort. To discern associations between categorical variables such as the type of surgery and complication occurrence, Chi-square tests were applied. Furthermore, independent t-tests were utilized to compare the average age between patients who experienced complications and those who did not. Logistic regression analysis was subsequently executed to quantify the odds ratios of encountering complications. Variables, including age, the type of surgical procedure, and pre-existing medical conditions, were considered in this analysis.

Ethical considerations

The study was approved by the Institutional Ethics Committee, Government Medical College and General Hospital, Suryapet, Telangana. Informed consent was conscientiously acquired from all participating patients before their enrollment in the study, emphasizing the significance of voluntary participation and understanding of the study’s objectives and procedures.

RESULTS

Out of the 100 patients who participated in the study, 57 experienced at least one type of perioperative complication. The complications varied in nature and severity, with postoperative hypoxemia, cardiac events, and delirium being the most prevalent.

Demographics and complications

Out of the 100 patients, 57 experienced perioperative complications. Among these 57 patients, 35 were males and 22 were females. The average age of patients with complications was 56 years, compared to 52 years for those without complications. A statistical test (t-test) showed that age was a significant predictor of complications (P<0.05), indicating that older patients were more likely to experience complications (Table 1).

Types of complications

Postoperative hypoxemia

This complication was observed in 23 patients (23%). A Chi-square test demonstrated that it was more prevalent in patients who underwent abdominal surgeries, with a statistically significant P<0.05 (60% of cases).

Cardiac events

Cardiac complications, such as arrhythmias or myocardial infarction, occurred in 18 patients (18%). A Chi-square test revealed that having a pre-existing cardiac history was a significant predictor of cardiac complications (P<0.01, 72% of cases).

Delirium

Postoperative delirium was experienced by 12 patients (12%). A Chi-square test indicated that age >60 was a significant factor in predicting delirium (P<0.05, 83% of cases) (Table 2).

Severity of complications

Among the 57 patients who experienced complications, 29 had mild complications that required minimal intervention. 20 had moderate complications necessitating medication or an extended hospital stay. 8 had severe complications, requiring admission to the ICU. A Chi-square test showed a significant association between the severity of complications and pre-existing conditions (P<0.05), indicating that patients with pre-existing conditions were more likely to experience severe complications (Table 3).

Type of surgery and complications

The study found that the type of surgery was statistically significant in predicting complications (P<0.05): 38% of patients who underwent abdominal surgeries experienced complications. 25% of those who had orthopedic surgeries faced complications. 17% of patients undergoing cardiovascular surgeries faced complications (Table 4).

Table 1: Participant demographics and incidence of perioperative complications

Demographics	Patients with complications	Patients without complications
Total participants	57	43
Gender (male/female)	35/22	28/15
Average age (years)	56	52
Statistically significant age difference	Yes (P<0.05)	-

Table 2: Types of perioperative complications and associated factors

Complication	Number of patients (%)	Statistically significant factors
Postoperative hypoxemia	23 (23)	Abdominal surgeries (P<0.05)
Cardiac events	18 (18)	Preexisting cardiac history (P<0.01)
Delirium	12 (12)	Age >60 (P<0.05)

Table 3: Severity levels and association with preexisting conditions

Severity level	Number of patients
Mild	29
Moderate	20
Severe (ICU admission)	8
Significant association with preexisting conditions	Yes (P<0.05)

ICU: Intensive care unit

Pre-existing conditions and complications

Patients with pre-existing conditions were more susceptible to complications; 70% of patients with diabetes (14 out of 20) faced complications. 73% of hypertensive patients (22 out of 30) experienced complications (Table 5).

Logistic regression analysis showed that both diabetes and hypertension were significant predictors of complications, with odds ratios of 2.5 and 2.8, respectively (P<0.05) (Table 6).

DISCUSSION

The findings of this study contribute to the growing body of research that emphasizes the importance of understanding perioperative complications in patients with OSA. Comparing our results to previous studies provides valuable insights into the consistency and broader implications of our findings.

Kaw et al.,⁸ conducted a meta-analysis and highlighted a significant association between OSA and postoperative outcomes. Their findings echoed our study’s observation of increased complications among OSA patients, aligning with our primary aim. Peppard et al.,⁹ and Young et al.,¹⁰ underscored the widespread prevalence of sleep-disordered breathing, which resonates with our recruitment of OSA patients from a diverse cohort undergoing various surgeries.

These studies collectively emphasize the relevance of addressing OSA in perioperative care to enhance patient safety.

Our study’s identification of postoperative hypoxemia, cardiac events, and delirium as prevalent complications correlates with the observations of Liao et al.,¹¹ and Memtsoudis et al.,¹² Both studies recognized the impact of OSA on perioperative outcomes, with Liao et al. specifically noting the association between OSA and complications in a matched-cohort study. Our results corroborate these findings, substantiating the notion that OSA amplifies the risk of perioperative complications.

In line with the work of Seet and Chung,¹³ our study acknowledges the multifaceted challenges posed by managing OSA in the perioperative period. Their functional algorithms underscore the importance of tailored care for OSA patients during surgery, aligning with our objective to formulate patient-specific perioperative care plans. In addition, our findings align with Finkel et al.,¹⁴ and Chung et al.,¹⁵ which highlighted the underdiagnosis of OSA among surgical patients and emphasized the need for comprehensive preoperative assessments.

Opperer et al.,¹⁶ conducted a qualitative systematic review on the influence of OSA on perioperative outcomes, aligning with our study’s objective to explore the impact of various factors on complications. Their study laid the groundwork for our investigation into the associations between age, type of surgery, and pre-existing conditions with complications. Furthermore, our study extends their work by presenting a comprehensive analysis of specific complications and their severity levels.

Limitations of the study

Limitations include a single-center design, a sample size of 100 participants, potential selection bias from recruitment at preoperative clinics, reliance on retrospective data, variable OSA diagnostic criteria, short postoperative follow-up, unaccounted external factors, treatment variations, missing data, and potential ethnic and cultural influences. These factors might impact the generalizability, statistical power, and accuracy of findings.

CONCLUSION

Our study establishes a firm link between OSA and perioperative complications, reinforcing the critical significance of proactive management strategies for this high-risk patient group. By providing concrete evidence of the association between OSA and complications such as postoperative hypoxemia, cardiac events, and

Table 4: Relationship between type of surgery and perioperative complications

Type of surgery	Percentage of patients with complications
Abdominal surgeries	38
Orthopedic surgeries	25
Cardiovascular surgeries	17
Statistically significant	Yes (P<0.05)

Table 5: Association of preexisting conditions with perioperative complications

Preexisting condition	Percentage of patients with complications
Diabetes	70
Hypertension	73
Significant predictors	Yes (diabetes: P<0.05, hypertension: P<0.05)

Table 6: Logistic regression results for predictors of perioperative complications

Predictor	OR	P-value
Diabetes	2.5	<0.05
Hypertension	2.8	<0.05

OR: Odds ratio

delirium, our study underscores the pressing need for tailored perioperative approaches. These strategies hold the potential to significantly optimize patient outcomes by reducing the occurrence and severity of complications. As our findings manifest, personalized care plans can not only mitigate risks but also enhance patient safety throughout the perioperative journey.

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