

Perioperative Management of Patients with Obstructive Sleep Apnea: A Narrative Review

Rama Aditya Baihaqi^{1*}, I Putu Reza Wedangga², Salman Fawwaz Wahid³

^{1,2,3}Medical Student, Faculty of Medicine and Health Sciences, University of Mataram, Indonesia

(*) Corresponding Author: ramabaihaqi25@gmail.com

Article info

Keywords:

obstructive sleep apnea, perioperative management, anesthesia, airway management, postoperative complications

Abstract

This narrative review aimed to examine current evidence on the perioperative management of patients with OSA, focusing on preoperative screening and risk assessment, airway and anesthetic management, analgesic strategies, postoperative respiratory care, positive airway pressure (PAP) therapy, and perioperative complications. Literature searches were conducted through PubMed/MEDLINE and Google Scholar using combinations of terms related to obstructive sleep apnea, perioperative management, preoperative screening, anesthesia, airway management, analgesia, postoperative respiratory complications, PAP therapy, and ambulatory surgery. Original studies, observational studies, systematic reviews, meta-analyses, clinical guidelines, and relevant narrative reviews were considered, with greater emphasis on publications from 2023 to 2026. The reviewed evidence indicated that preoperative identification of OSA, assessment of disease severity, airway characteristics, comorbidities, and surgical risk are important for perioperative planning. OSA was associated with increased respiratory adverse events and airway interventions during procedural sedation and higher odds of same-day hospital admission following ambulatory surgery. Regional or neuraxial anesthesia, opioid-sparing analgesia, neuromuscular blockade monitoring, postoperative respiratory surveillance, and appropriate use of PAP therapy were identified as important components of perioperative care. Overall, perioperative management should be individualized according to OSA characteristics, surgical procedure, anesthetic technique, opioid requirements, and postoperative monitoring needs.

Kata kunci:

obstructive sleep apnea, manajemen perioperatif, anestesi, jalan napas, komplikasi pascaoperasi

Abstrak

Tinjauan naratif ini bertujuan untuk mengkaji bukti terkini mengenai manajemen perioperatif pada pasien dengan OSA, dengan fokus pada skrining dan penilaian risiko praoperatif, pengelolaan jalan napas dan anestesi, strategi analgesia, perawatan respirasi pascaoperasi, terapi positive airway pressure (PAP), serta komplikasi perioperatif. Penelusuran literatur dilakukan melalui PubMed/MEDLINE dan Google Scholar menggunakan kombinasi kata kunci terkait obstructive sleep apnea, manajemen perioperatif, skrining praoperatif, anestesi, pengelolaan jalan napas, analgesia, komplikasi respirasi pascaoperasi, terapi PAP, dan bedah rawat jalan. Artikel penelitian asli, studi observasional, systematic review, meta-analysis, pedoman klinis, dan tinjauan naratif yang relevan dipertimbangkan, dengan penekanan lebih besar pada publikasi tahun 2023–2026. Bukti yang ditinjau menunjukkan bahwa identifikasi OSA sebelum operasi, penilaian derajat penyakit, karakteristik jalan napas, komorbiditas, dan risiko pembedahan penting dalam menentukan rencana

perioperatif. OSA berhubungan dengan peningkatan kejadian respirasi dan intervensi jalan napas selama sedasi prosedural serta peningkatan kemungkinan rawat inap pada hari yang sama setelah pembedahan rawat jalan. Anestesi regional atau neuraksial, analgesia opioid-sparing, pemantauan blok neuromuskular, pemantauan respirasi pascaoperasi, dan penggunaan terapi PAP yang sesuai merupakan bagian penting dalam perawatan perioperatif. Secara keseluruhan, manajemen perioperatif perlu disesuaikan dengan karakteristik OSA, jenis pembedahan, teknik anestesi, kebutuhan opioid, dan kebutuhan pemantauan setelah operasi.

INTRODUCTION

Obstructive sleep apnea (OSA) is a common sleep-related breathing disorder characterized by recurrent upper-airway obstruction during sleep, resulting in intermittent hypoxemia, sleep fragmentation, and fluctuations in sympathetic activity. Its clinical relevance extends beyond sleep-related symptoms because OSA frequently coexists with obesity, cardiovascular disease, metabolic disorders, and other conditions that may influence perioperative risk. During the perioperative period, sedative and anesthetic agents, opioids, and postoperative sleep may further impair upper-airway patency and ventilatory responses, increasing the potential for respiratory and airway-related complications (Bae *et al.*, 2023). Recognition of OSA before surgery is therefore important for identifying patients who may require additional airway precautions, modification of anesthetic and analgesic strategies, and closer postoperative observation (Chambers *et al.*, 2023).

The perioperative implications of OSA are determined by the interaction between patient characteristics, anesthetic exposure, procedure-related factors, and postoperative care rather than by the diagnosis alone. Upper-airway collapsibility may increase the difficulty of airway management, while sedatives and opioids can worsen airway obstruction and respiratory depression. These concerns are particularly relevant during procedural sedation, when spontaneous ventilation and protective airway responses may be compromised. A recent systematic review and meta-analysis involving 19 studies and 27,973 patients found that OSA was associated with higher odds of respiratory adverse events during ambulatory procedural sedation (OR 1.65, 95% CI 1.03–2.66) and greater odds of requiring airway maneuvers or interventions (OR 3.28, 95% CI 1.43–7.51) (Ceban *et al.*, 2025). These findings support the importance of preprocedural risk assessment and appropriate respiratory and airway monitoring, particularly when sedation is planned.

The expansion of ambulatory surgery has added another important consideration to perioperative decision-making in patients with OSA. A systematic review and meta-analysis found that adults with OSA undergoing ambulatory surgery had approximately two-fold higher odds of same-day hospital admission than patients without OSA, with an even greater association reported in orthopedic procedures (Ceban *et al.*, 2024). However, the risk is not uniform across all ambulatory populations. A systematic review of non-upper-airway surgery in ambulatory surgical centers reported that severe complications were uncommon and generally occurred within the first four postoperative hours, while appropriately selected patients with mild or controlled comorbidities could undergo ambulatory surgery safely (Asghar *et al.*, 2025). Thus, the presence of OSA alone should not automatically preclude ambulatory surgery, rather, decisions regarding suitability for outpatient care should incorporate patient comorbidities, OSA-related risk, procedural characteristics, expected opioid requirements, and the capacity for postoperative monitoring (Asghar *et al.*, 2025).

Positive airway pressure (PAP) therapy represents another important component of perioperative care, particularly for patients who already use PAP as part of their established OSA treatment. However, its perioperative role should be considered within the broader clinical context rather than as a universal intervention for all patients with OSA. Recent clinical evidence supports maintaining established PAP therapy when appropriate, while the magnitude of its effect on postoperative outcomes remains variable across patient populations and clinical settings (Berezin & Chung, 2024). Similarly, postoperative monitoring requirements cannot be determined solely from the presence of OSA because the need for surveillance depends on factors such as OSA severity, comorbidities, anesthetic and analgesic exposure, procedure type, and the occurrence of respiratory events during recovery (Tracy *et al.*, 2025).

Although existing clinical guidelines and recent reviews provide important recommendations for the perioperative management of patients with OSA, recent quantitative evidence has expanded across several specific procedural settings. Systematic reviews and meta-analyses have provided more precise estimates of respiratory adverse events, airway interventions, same-day admission, and other postoperative outcomes, but their findings remain heterogeneous according to patient characteristics, OSA definitions and severity, surgical procedures, anesthetic techniques, and postoperative settings (Ceban *et al.*, 2024). In addition, evidence concerning PAP therapy, postoperative surveillance, and the selection of patients for ambulatory surgery does not establish a single management strategy applicable to all patients. This creates a need for an updated synthesis that brings these findings together and places quantitative outcome data within their clinical context (Asghar *et al.*, 2025).

This narrative review focuses on adult patients with known or suspected OSA undergoing perioperative care, with particular attention to ambulatory surgery, procedural sedation, and other surgical settings represented in the recent literature. The review aims to synthesize current evidence on risk stratification, airway and anesthetic management, opioid-sparing analgesia, postoperative respiratory monitoring, PAP therapy, and ambulatory discharge planning. By integrating findings from recent systematic reviews, meta-analyses, clinical reviews, and relevant primary studies, this review seeks to distinguish relatively consistent evidence from areas of uncertainty and to identify important gaps that may guide individualized perioperative decision-making for patients with OSA.

METHODS

This article was prepared as a narrative review to synthesize current evidence on the perioperative management of adult patients with obstructive sleep apnea (OSA). The review focused on patients aged ≥ 18 years with diagnosed or suspected OSA who underwent surgical or procedural care requiring anesthesia, sedation, or perioperative monitoring. Both elective and emergency procedures were considered, including inpatient and ambulatory surgery as well as procedural sedation. The review addressed major aspects of perioperative care, including preoperative identification and risk assessment, airway evaluation, anesthetic considerations, intraoperative management, analgesic strategies, postoperative respiratory monitoring, positive airway pressure (PAP) therapy, and perioperative complications. Particular attention was given to OSA severity, screening tools, difficult airway risk, obesity and relevant comorbidities, general and regional or neuraxial anesthesia, sedative and opioid exposure, opioid-sparing analgesia, neuromuscular blockade, postoperative hypoxemia, respiratory depression, airway

obstruction, PAP therapy, hospital admission, and factors influencing postoperative observation and ambulatory discharge. Studies conducted exclusively in pediatric populations were excluded because perioperative risk profiles and airway and anesthetic considerations differ from those of adults.

The literature search was conducted primarily through PubMed/MEDLINE, with Google Scholar used as a secondary source to identify additional relevant publications. The final search was performed on 5 August 2026. The search emphasized publications published between 2023 and 2026, while older publications were retained when they provided established evidence, validated screening instruments, clinical practice guidelines, or fundamental perioperative recommendations that remained relevant to current practice. Only publications in English were considered. The PubMed/MEDLINE search used combinations of controlled vocabulary and free-text terms with Boolean operators, including ("Obstructive Sleep Apnea" OR "obstructive sleep apnea" OR OSA OR "sleep apnea") AND ("Perioperative Care" OR perioperative OR "perioperative management" OR "preoperative assessment" OR "preoperative screening") AND (anesthesia OR anaesthesia OR "airway management" OR "general anesthesia" OR "regional anesthesia" OR "neuraxial anesthesia" OR opioids OR "opioid-sparing analgesia" OR "postoperative respiratory complications" OR hypoxemia OR "positive airway pressure" OR CPAP OR "continuous positive airway pressure" OR "ambulatory surgery" OR "procedural sedation"). Additional searches were performed using combinations of OSA with STOP-BANG, difficult airway, neuromuscular blockade, postoperative respiratory depression, PAP therapy, opioid-sparing analgesia, ambulatory surgery, and postoperative monitoring. Google Scholar was searched using combinations of "obstructive sleep apnea" AND perioperative management, "obstructive sleep apnea" AND anesthesia, "OSA" AND airway management, "OSA" AND postoperative complications, "OSA" AND opioid-sparing analgesia, "OSA" AND CPAP, "OSA" AND procedural sedation, and "OSA" AND ambulatory surgery. Reference lists of relevant systematic reviews, meta-analyses, clinical guidelines, and clinical or narrative reviews were also examined to identify additional relevant publications.

Publications were considered eligible when they involved adult patients with diagnosed or suspected OSA undergoing surgical or procedural care and provided information relevant to perioperative management or clinical outcomes. Eligible evidence included original research studies, prospective and retrospective observational studies, systematic reviews, meta-analyses, clinical practice guidelines, consensus statements, and relevant clinical or narrative reviews. Studies were considered regardless of surgical specialty when their findings were applicable to the perioperative care of adults with OSA. Evidence from elective and emergency procedures, inpatient and ambulatory surgery, and procedural sedation was considered. Relevant outcomes included respiratory complications, hypoxemia, respiratory depression, airway obstruction or airway interventions, postoperative monitoring requirements, prolonged recovery, hospital admission, intensive care utilization, PAP use, and other clinically relevant postoperative outcomes. Studies were excluded when they focused exclusively on pediatric populations, addressed OSA diagnosis or long-term treatment without a meaningful perioperative component, or did not provide information relevant to anesthesia, surgery, perioperative monitoring, respiratory complications, PAP therapy, or postoperative outcomes. Editorials, letters, conference abstracts, and case reports without sufficient clinical information were excluded from the main synthesis. Duplicate records were removed before screening, and publications reporting overlapping data from the same study population were assessed to avoid counting the same evidence more than once.

The search yielded 260 records, comprising 186 records from PubMed/MEDLINE and 74 records from Google Scholar. After removal of 38 duplicate records, 222 records remained for title and abstract screening. Of these, 180 records were excluded because they did not meet the predefined eligibility criteria, primarily because they were not directly related to perioperative OSA management, involved non-adult populations, or did not report relevant perioperative outcomes. Forty-two publications were subsequently assessed in full text, and 32 were excluded because of insufficient perioperative relevance, inappropriate population, lack of clinically relevant outcomes, or inadequate information for the objectives of the review. A total of 10 publications were included in the final narrative synthesis. The selected evidence comprised systematic reviews and meta-analyses, narrative reviews, a clinical review, and an evidence review. The relevance and methodological quality of the literature were considered qualitatively according to study design, clarity of methods, study population, consistency of findings, and applicability to adult perioperative care. Systematic reviews and meta-analyses were given greater weight when they directly addressed the relevant perioperative outcomes and provided consistent evidence across multiple studies. Clinical guidelines and consensus-based recommendations were used to support established management principles, while individual clinical and observational studies were considered for direct evidence regarding perioperative risks and outcomes. Narrative and clinical reviews were primarily used to provide clinical context and synthesize established management principles. Formal quantitative quality scoring and statistical pooling were not performed because of the heterogeneity of study designs, populations, perioperative settings, interventions, and outcome definitions.

Potential selection bias was addressed through predefined eligibility criteria, use of PubMed/MEDLINE as the primary database, supplementary searching of Google Scholar, and examination of reference lists of relevant publications. Duplicate records were removed before the final selection, and overlapping publications were assessed to minimize double counting of evidence. Potential publication bias was considered qualitatively during interpretation because studies reporting significant perioperative complications or associations may be more likely to be published than studies with neutral findings. Differences in patient characteristics, OSA severity, comorbidities, surgical procedures, anesthetic techniques, monitoring practices, and outcome definitions were considered when interpreting findings across publications. The selected evidence was subsequently organized according to the major stages of perioperative management, including preoperative screening and risk stratification, airway and anesthetic management, intraoperative analgesia and opioid-sparing strategies, postoperative respiratory monitoring, PAP therapy, ambulatory surgery, and perioperative complications and clinical outcomes. Findings were synthesized narratively by considering their clinical relevance, consistency, and relative strength of supporting evidence, with greater emphasis placed on findings supported by higher-level evidence or multiple independent publications.

RESULTS AND DISCUSSION

Results

The quantitative evidence indicated that patients with obstructive sleep apnea (OSA) had higher risks of several perioperative adverse outcomes, particularly respiratory events, airway interventions, and unplanned hospital admission. In ambulatory surgery, Ceban *et al.* (2024) reported that OSA was associated with increased odds of same-day

hospital admission (OR 1.94, 95% CI 1.46–2.59). The same review also identified associations between OSA and prolonged post-anesthesia care unit (PACU) recovery and respiratory complications. Among patients undergoing total joint arthroplasty, Thomas *et al.* (2024) found increased odds of overall medical, pulmonary, thromboembolic, and delirium complications in patients with OSA. These findings indicate that the perioperative impact of OSA involves both respiratory morbidity and broader postoperative complications.

The risk of respiratory events was particularly evident during procedural sedation. Ceban *et al.* (2025) found that patients with OSA had higher odds of respiratory adverse events (OR 1.65, 95% CI 1.03–2.66) and airway maneuvers or interventions (OR 3.28, 95% CI 1.43–7.51). The greater magnitude of association for airway interventions suggests that airway obstruction or compromised ventilation may occur more frequently in patients with OSA during sedated procedures. However, the absolute frequency of severe complications in ambulatory settings appeared relatively low. Asghar *et al.* (2025), in a systematic review of ambulatory non-upper-airway surgery, reported that severe complications were uncommon and were generally observed within the first four postoperative hours. Taken together, these findings suggest that although severe events may be infrequent, patients with OSA remain more likely to require additional respiratory or airway support during the early perioperative period.

The management-focused literature showed consistent findings regarding factors associated with perioperative risk and recovery. Preoperative identification of known or previously unrecognized OSA, assessment of airway characteristics, and anesthetic planning were repeatedly emphasized because of the increased potential for airway difficulty and respiratory compromise (Bae, 2023; Chambers *et al.*, 2023). Opioid exposure was also identified as an important consideration, with recent clinical reviews emphasizing opioid-sparing analgesia and the use of regional or neuraxial techniques when appropriate (Pappu & Singh, 2024; Nisar *et al.*, 2025). These strategies were accompanied by recommendations for careful neuromuscular blockade management and postoperative respiratory observation. Thus, the evidence consistently linked perioperative risk reduction with limiting respiratory depressant exposure and maintaining adequate respiratory monitoring.

Evidence concerning positive airway pressure (PAP) therapy was generally supportive of its continued perioperative use, although the magnitude of its effect on postoperative outcomes was less consistent. Berezin and Chung (2024) reported heterogeneous evidence regarding whether perioperative PAP use directly improves postoperative outcomes, while other reviews continued to identify PAP therapy as an important component of perioperative care for patients with established OSA. Postoperative monitoring and discharge assessment were also consistently emphasized, particularly in ambulatory settings where early discharge may limit the duration of observation (Tracy *et al.*, 2025). Overall, the reviewed evidence supports a pattern of increased perioperative vulnerability in patients with OSA, with the clearest quantitative associations involving respiratory adverse events, airway interventions, and same-day hospital admission.

Table 1. Selected Studies Evaluating Perioperative Management and Outcomes in Patients With Obstructive Sleep Apnea

Author, year	Study design	Population/sample	Main focus	Principal findings
Bae (2023)	Narrative review	Patients with known or suspected OSA	Preoperative assessment and perioperative management	Screening, airway assessment, anesthetic planning, and postoperative monitoring were identified as key perioperative considerations.
Chambers <i>et al.</i> (2023)	Narrative review	Patients with OSA undergoing surgery	Perioperative management	The review addressed preoperative screening, airway management, anesthesia, postoperative care, and PAP therapy.
Ceban <i>et al.</i> (2024)	Systematic review and meta-analysis	17 studies; 375,389 patients	Ambulatory surgery	OSA was associated with increased odds of same-day hospital admission (OR 1.94, 95% CI 1.46–2.59), with reported associations with prolonged PACU stay and respiratory complications.
Thomas <i>et al.</i> (2024)	Systematic review and meta-analysis	7 studies; 20,977 patients undergoing total joint arthroplasty	Postoperative complications	OSA was associated with increased odds of overall medical, pulmonary, thromboembolic, and delirium complications.
Berezin & Chung (2024)	Evidence review	Surgical patients with sleep apnea	PAP therapy	Perioperative PAP therapy was evaluated as a strategy for managing patients with OSA, although evidence for postoperative outcome improvement was heterogeneous.
Pappu & Singh (2024)	Clinical review	Patients with OSA undergoing ambulatory surgery	Perioperative practices	Screening, regional anesthesia, neuromuscular blockade monitoring, opioid-sparing analgesia, and postoperative monitoring were addressed.
Ceban <i>et al.</i> (2025)	Systematic review and meta-analysis	19 studies; 27,973 patients	Procedural sedation	OSA was associated with respiratory adverse events (OR 1.65, 95% CI 1.03–2.66) and airway maneuvers/interventions (OR 3.28, 95% CI 1.43–7.51).
Asghar <i>et al.</i> (2025)	Systematic review	13 studies; 31,200 OSA and 318,709 non-OSA patients	Ambulatory non-upper-airway surgery	Severe complications were uncommon and were generally reported within the first 4 postoperative hours.
Nisar <i>et al.</i> (2025)	Narrative review	Patients with obesity and OSA	Ambulatory surgery and opioid safety	The review addressed preoperative screening, opioid-sparing strategies, respiratory monitoring, and PAP therapy in ambulatory care.
Tracy <i>et al.</i> (2025)	Narrative review	Patients with known or suspected OSA	Perioperative implications	Screening, difficult-airway considerations, opioid-sparing analgesia, PAP therapy,

Author, year	Study design	Population/sample	Main focus	Principal findings
				monitoring, and discharge were reviewed.

Overall, the evidence demonstrated a consistent association between OSA and increased perioperative risk, although the magnitude and clinical expression of this risk varied according to the procedure and perioperative exposure. The strongest quantitative associations were observed for airway interventions during procedural sedation, respiratory adverse events, and same-day hospital admission, while severe complications after ambulatory non-upper-airway surgery remained uncommon. The findings across the reviewed literature therefore indicate that OSA is most strongly associated with early respiratory and airway-related vulnerability, with additional risks extending to broader postoperative complications.

Discussion

The findings of this review indicate that perioperative risk in patients with obstructive sleep apnea (OSA) is influenced by the interaction between OSA-related respiratory vulnerability, patient comorbidities, type of procedure, anesthetic exposure, and postoperative management. OSA should therefore not be regarded as an isolated risk factor because its clinical impact may vary according to disease severity and the characteristics of the surgical setting (Bae, 2023). Recent evidence supports this interpretation, particularly for respiratory and airway-related outcomes during procedures involving sedation (Ceban *et al.*, 2025). However, the magnitude of risk is not uniform across surgical populations, and differences in patient characteristics, procedure type, and perioperative management complicate direct comparison between studies (Berezin & Chung, 2024).

Preoperative screening remains an important component of perioperative risk assessment because many patients with OSA may undergo surgery without a previously established diagnosis. Screening tools can help identify patients who require further evaluation and additional perioperative precautions, particularly when polysomnography is not feasible before surgery (Chambers *et al.*, 2023). However, a positive screening result should not be interpreted as a direct measure of perioperative risk because screening instruments primarily estimate the probability of OSA rather than objectively defining disease severity (Tracy *et al.*, 2025). The clinical value of screening therefore lies in identifying patients who may require modification of anesthetic planning, postoperative monitoring, and discharge decisions (Pappu & Singh, 2024).

The quantitative evidence is strongest for respiratory and airway-related outcomes. In a systematic review and meta-analysis of 19 studies involving 27,973 patients undergoing procedural sedation, OSA was associated with higher odds of respiratory adverse events (OR 1.65, 95% CI 1.03–2.66) (Ceban *et al.*, 2025). The same analysis found a stronger association with the need for airway maneuvers or interventions (OR 3.28, 95% CI 1.43–7.51), suggesting that airway vulnerability may be more clinically apparent than other peri-procedural complications in this setting (Ceban *et al.*, 2025). Cardiovascular adverse events were not significantly increased in that analysis, indicating that the perioperative effect of OSA may be more consistently expressed through respiratory and

airway outcomes rather than through a uniform increase across all complication categories (Ceban *et al.*, 2025).

These findings highlight the importance of airway assessment beyond the diagnosis of OSA itself. Anatomical characteristics associated with difficult mask ventilation or intubation may coexist with OSA and obesity, increasing the technical complexity of airway management (Chambers *et al.*, 2023). Nevertheless, OSA alone should not be considered synonymous with a difficult airway because airway difficulty is determined by multiple anatomical and patient-related characteristics (Bae, 2023). Preoperative airway evaluation should therefore incorporate factors such as craniofacial anatomy, neck characteristics, previous airway difficulties, and the anticipated requirements of the procedure rather than relying solely on the presence of OSA (Tracy *et al.*, 2025).

The choice of anesthetic technique is another important determinant of perioperative respiratory risk. Regional or neuraxial anesthesia may reduce exposure to airway instrumentation and systemic anesthetic or opioid medications in selected patients, but the available evidence does not support assuming that these techniques are universally superior for every patient with OSA (Pappu & Singh, 2024). Their potential benefit depends on the surgical procedure, patient characteristics, feasibility of the block, and the need for additional sedation (Tracy *et al.*, 2025). Anesthetic planning should therefore prioritize minimizing avoidable respiratory depression while maintaining adequate conditions for safe surgery rather than selecting a particular technique solely because the patient has OSA (Bae, 2023).

Opioid exposure is particularly relevant because OSA-related upper-airway collapsibility may coexist with increased vulnerability to the respiratory depressant effects of sedative and analgesic medications. Opioid-sparing strategies, including regional anesthesia, multimodal analgesia, and appropriate use of non-opioid analgesics, may reduce potentially avoidable respiratory depression in selected patients (Pappu & Singh, 2024). However, opioid reduction should not be interpreted as complete avoidance in every case because analgesic requirements differ according to surgical invasiveness and individual pain responses (Tracy *et al.*, 2025). The more appropriate principle is to use the lowest effective exposure to respiratory-depressant medications while maintaining adequate analgesia and facilitating postoperative recovery (Nisar *et al.*, 2025).

Evidence from specific surgical populations further demonstrates that the magnitude of risk can differ according to procedure type. In total joint arthroplasty, a meta-analysis of seven studies involving 20,977 patients found that OSA was associated with higher odds of overall medical complications (OR 4.23, 95% CI 2.97–6.04), pulmonary complications (OR 4.31, 95% CI 2.82–6.60), thromboembolic complications (OR 1.92, 95% CI 1.22–3.03), and delirium (OR 3.94, 95% CI 1.72–9.04) (Thomas *et al.*, 2024). These findings suggest that the consequences of OSA may extend beyond immediate respiratory events in major orthopedic surgery. However, because the underlying evidence was derived from observational studies, residual confounding by obesity, age, cardiovascular disease, surgical complexity, and perioperative medication exposure cannot be completely excluded (Thomas *et al.*, 2024).

The evidence in ambulatory surgery is more heterogeneous and illustrates the difference between relative risk and absolute clinical risk. Ceban *et al.* (2024) reported higher odds of same-day admission among ambulatory surgical patients with OSA, with an OR of 1.94 (95% CI 1.46–2.59). In contrast, a systematic review of ambulatory non-upper-airway surgery found that severe complications were uncommon and generally occurred

within the first several postoperative hours (Asghar *et al.*, 2025). These findings are not necessarily contradictory because a higher relative risk does not imply that severe complications are frequent in appropriately selected patients. Instead, the evidence supports careful patient selection, adequate postoperative observation, and individualized discharge criteria for ambulatory procedures (Ceban *et al.*, 2024).

The heterogeneity across studies is an important limitation when interpreting the overall evidence. Studies differ in how OSA is diagnosed, whether disease severity is objectively measured, which surgical populations are included, and how respiratory complications are defined (Berezin & Chung, 2024). Differences in anesthesia techniques, postoperative monitoring, opioid exposure, and the use of positive airway pressure may further contribute to variation between studies (Pappu & Singh, 2024). Consequently, pooled estimates should be interpreted primarily as evidence of association rather than as universally applicable estimates of individual patient risk (Thomas *et al.*, 2024).

The evidence supporting postoperative positive airway pressure (PAP) therapy also remains heterogeneous. PAP can help maintain upper-airway patency and may reduce postoperative obstructive events in patients who are able and willing to use therapy, particularly when OSA has already been established (Berezin & Chung, 2024). However, evidence that perioperative PAP consistently improves major postoperative outcomes across different surgical populations remains less robust. Differences in adherence, timing of initiation, baseline OSA severity, type of PAP therapy, and postoperative monitoring make direct comparison between studies difficult (Berezin & Chung, 2024). PAP should therefore be incorporated into perioperative planning according to the patient's established treatment, clinical status, and postoperative respiratory risk rather than applied as a uniform intervention to every patient with suspected OSA (Tracy *et al.*, 2025).

The quality of evidence also varies substantially across the literature. Recent systematic reviews and meta-analyses provide the strongest quantitative estimates for associations between OSA and specific perioperative outcomes, particularly respiratory adverse events, airway interventions, and postoperative complications in selected surgical populations (Ceban *et al.*, 2025). However, the strength of these estimates remains dependent on the methodological quality, consistency, and clinical comparability of the underlying studies (Thomas *et al.*, 2024). Narrative and clinical reviews are useful for integrating practical perioperative principles, but they provide weaker evidence for determining the effectiveness of individual interventions (Berezin & Chung, 2024). Therefore, recommendations regarding screening, airway management, opioid-sparing strategies, PAP, and postoperative monitoring should not be interpreted as having the same evidentiary strength as the quantitative associations demonstrated in meta-analyses.

Potential confounding further limits the interpretation of associations between OSA and postoperative outcomes. Obesity frequently overlaps with OSA and is independently associated with difficult airway management, respiratory complications, and other perioperative risks (Nisar *et al.*, 2025). Cardiovascular disease, older age, diabetes, procedure duration, emergency status, and postoperative opioid exposure may also influence outcomes independently of OSA (Thomas *et al.*, 2024). Because many available studies are observational, complete adjustment for these factors is not always possible. Therefore, the observed association between OSA and postoperative complications should not automatically be interpreted as evidence that OSA alone is responsible for every adverse outcome.

From a clinical perspective, the evidence supports a risk-based perioperative strategy rather than a single standardized pathway for all patients with OSA. Patients should be assessed according to the likelihood and severity of OSA, comorbidities, airway characteristics, type of surgery, expected anesthetic exposure, analgesic requirements, and available postoperative monitoring resources (Chambers *et al.*, 2023). Patients with greater respiratory vulnerability may require more intensive monitoring and a lower threshold for postoperative respiratory support (Tracy *et al.*, 2025). For ambulatory procedures, these considerations are particularly important because safe discharge depends not only on the occurrence of intraoperative complications but also on the patient's ability to maintain adequate respiratory function after recovery and analgesic administration (Ceban *et al.*, 2024).

Overall, the available evidence supports OSA as an important marker of perioperative vulnerability, particularly for respiratory adverse events and airway interventions. The association is most clearly demonstrated during procedural sedation, while evidence from major surgery suggests that OSA may also be associated with broader postoperative complications (Ceban *et al.*, 2025; Thomas *et al.*, 2024). Nevertheless, the magnitude of risk varies across procedures and patient populations, and the effectiveness of specific interventions remains less certain because of heterogeneity, confounding, and limitations in the underlying evidence (Berezin & Chung, 2024). Perioperative management should therefore combine systematic screening with individualized airway planning, opioid-sparing analgesia when appropriate, continuation or optimization of PAP therapy, postoperative respiratory monitoring, and careful discharge assessment (Pappu & Singh, 2024; Tracy *et al.*, 2025).

CONCLUSION

Obstructive sleep apnea (OSA) should be recognized as an important perioperative risk factor, particularly because of its association with airway and respiratory adverse events. Preoperative screening should be used to identify patients at increased risk, followed by individualized assessment of OSA severity, airway characteristics, comorbidities, and the planned surgical procedure. Anesthetic care should emphasize appropriate airway preparation, cautious use of sedatives and opioids, and opioid-sparing analgesia when clinically appropriate. Postoperative respiratory monitoring should be tailored to the patient's risk profile, while positive airway pressure (PAP) therapy may be continued or considered when clinically indicated, although evidence for its ability to improve major postoperative outcomes remains heterogeneous. OSA alone should not automatically exclude patients from ambulatory surgery; rather, suitability should be determined through individualized risk stratification that considers procedure type, comorbidity burden, anesthetic requirements, postoperative monitoring capacity, and discharge criteria. Important evidence gaps remain regarding standardized risk thresholds for ambulatory surgery, the comparative effectiveness of perioperative interventions, and the clinical benefit of PAP across different surgical populations. Future prospective studies using consistent definitions of OSA severity and perioperative outcomes are needed to better guide individualized perioperative decision-making.

ACKNOWLEDGEMENTS

The authors would like to express their gratitude to the Faculty of Medicine and Health Sciences, University of Mataram, for providing academic support during the preparation of this manuscript. The authors also acknowledge the contributions of colleagues and other individuals who provided assistance and constructive input during the development of this narrative review.

REFERENCES

- Asghar, M., Pang, K., Asghar, M., & Rotenberg, B. (2025). Safety of outpatient non-upper airway surgery for patients with obstructive sleep apnea in ambulatory surgical centers: A systematic review. *PLOS ONE*, 20(7), e0326704. <https://doi.org/10.1371/journal.pone.0326704>
- Bae, E. (2023). Preoperative risk evaluation and perioperative management of patients with obstructive sleep apnea: A narrative review. *Journal of Dental Anesthesia and Pain Medicine*, 23(4), 179–192. <https://doi.org/10.17245/jdapm.2023.23.4.179>
- Berezin, L., & Chung, F. (2024). Positive airway pressure in surgical patients with sleep apnea: What is the supporting evidence? *Anesthesia & Analgesia*, 139(1), 107–113. <https://doi.org/10.1213/ANE.0000000000006894>
- Ceban, F., Abayomi, N., Saripella, A., Ariaratnam, J., Katsnelson, G., Yan, E., Englesakis, M., Gan, T. J., Joshi, G. P., & Chung, F. (2025). Adverse events in patients with obstructive sleep apnea undergoing procedural sedation in ambulatory settings: An updated systematic review and meta-analysis. *Sleep Medicine Reviews*, 80, 102029. <https://doi.org/10.1016/j.smrv.2024.102029>
- Ceban, F., Yan, E., Pivetta, B., Saripella, A., Englesakis, M., Gan, T. J., Joshi, G. P., & Chung, F. (2024). Perioperative adverse events in adult patients with obstructive sleep apnea undergoing ambulatory surgery: An updated systematic review and meta-analysis. *Journal of Clinical Anesthesia*, 96, 111464. <https://doi.org/10.1016/j.jclinane.2024.111464>
- Chambers, T., Bamber, H., & Singh, N. (2023). Perioperative management of obstructive sleep apnoea: Present themes and future directions. *Current Opinion in Pulmonary Medicine*, 29(6), 557–566. <https://doi.org/10.1097/MCP.0000000000001012>
- Chaudhry, R. A., Zarmer, L., West, K., & Chung, F. (2024). Obstructive sleep apnea and risk of postoperative complications after non-cardiac surgery. *Journal of Clinical Medicine*, 13(9), 2538. <https://doi.org/10.3390/jcm13092538>
- Chung, F., Abdullah, H. R., & Liao, P. (2016). STOP-Bang questionnaire: A practical approach to screen for obstructive sleep apnea. *Chest*, 149(3), 631–638. <https://doi.org/10.1378/chest.15-0903>
- Cozowicz, C., & Memtsoudis, S. G. (2021). Perioperative management of the patient with obstructive sleep apnea: A narrative review. *Anesthesia & Analgesia*, 132(5), 1231–1243. <https://doi.org/10.1213/ANE.0000000000005444>
- Dantas, A. B. de A., Gonçalves, F. M., Martins, A. A., Alves, G. Â., Stechman-Neto, J., Corrêa, C. de C., Santos, R. S., Nascimento, W. V., de Araujo, C. M., & Taveira, K. V. M. (2023). Worldwide prevalence and associated risk factors of obstructive sleep apnea: A meta-analysis and meta-regression. *Sleep and Breathing*, 27(6), 2083–2109. <https://doi.org/10.1007/s11325-023-02810-7>
- Memtsoudis, S. G., Cozowicz, C., Nagappa, M., Wong, J., Joshi, G. P., Wong, D. T., Doufas, A. G., Yilmaz, M., Stein, M. H., Krajewski, M. L., Singh, M., Pichler, L., Ramachandran, S. K., & Chung, F. (2018). Society of Anesthesia and Sleep Medicine guideline on intraoperative management of adult patients with

- obstructive sleep apnea. *Anesthesia & Analgesia*, 127(4), 967–987. <https://doi.org/10.1213/ANE.0000000000003434>
- Nisar, F., D'Alessandro, N. M. M., Suratkal, J., & Lebak, K. (2025). Navigating ambulatory perioperative care in patients with obesity and obstructive sleep apnea: A narrative review of ambulatory surgery outcomes and opioid safety. *Anesthesia and Pain Medicine*, 20(3), 200–212. <https://doi.org/10.17085/apm.25221>
- Pappu, A., & Singh, M. (2024). Best perioperative practices in the management of obstructive sleep apnea patients undergoing ambulatory surgery. *Current Opinion in Anaesthesiology*, 37(6). <https://doi.org/10.1097/ACO.0000000000001441>
- Thomas, T. L., Rampam, S., Nithagon, P., & Goh, G. S. (2024). Increased risk of postoperative complications in patients who have obstructive sleep apnea undergoing total joint arthroplasty: A systematic review and meta-analysis. *The Journal of Arthroplasty*, 39(12). <https://doi.org/10.1016/j.arth.2024.06.015>
- Tracy, E., Crandall, C., Grajales, A., & Plunkett, A. (2025). The perioperative implications of the patient with obstructive sleep apnea (OSA)—A narrative review. *Future Science OA*, 11(1), 2540744. <https://doi.org/10.1080/20565623.2025.2540744>