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COMPARATIVE STUDY OF REGIONAL VS GENERAL ANESTHESIA IN OBESE PATIENTS WITH A HISTORY OF OBSTRUCTIVE SLEEP APNEA (OSA) IN GENERAL SURGERY

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Abstract

Background:

Obese patients with a history of obstructive sleep apnea (OSA) undergoing general surgery are at a heightened risk for postoperative respiratory complications. Anesthetic technique selection regional versus general plays a crucial role in minimizing these risks. The present study compared postoperative outcomes, respiratory events, opioid consumption, and recovery profiles between regional and general anesthesia in obese OSA patients.

Methods:

It was a quantitative comparative study carried out on 50 obese patients who had a history of obstructive sleep apnea (OSA) and were subjected to general surgical operations. The respondents were split into two categories according to the kind of anesthesia performed in general anesthesia (n = 26) and regional anesthesia (n = 24). The descriptive statistics were used to summarize demographic and clinical variables. Categorical variables were the results of postoperative respiratory problems, such as postoperative hypoxia, supplemental oxygen use, and airway complications. The Chi-square test was used to determine the associations between anesthesia type and postoperative outcomes. Mean and standard deviation were used to summarize continuous variables (body mass index (BMI) and neck circumference). It was regarded as statistically significant with a p-value of less than 0.05 and the statistical analysis was done with the SPSS version 27.0.

Results:

Patients under regional anesthesia exhibited significantly lower rates of respiratory complications ($p < 0.05$), reduced opioid requirements ($p < 0.001$), and shorter PACU and hospital stays ($p < 0.001$) compared with those under general anesthesia. PONV incidence was notably less in the regional group ($p = 0.041$). Patient satisfaction was significantly higher among regional anesthesia recipients ($p = 0.008$). Chi-square and Mann Whitney U results demonstrated a consistent advantage of regional techniques for perioperative safety and recovery efficiency.

Conclusion:

Regional anesthesia provides superior postoperative respiratory stability, minimizes

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opioidrelated complications, and enhances overall recovery in obese OSA patients undergoing general surgery. Implementation of regional techniques, where feasible, can reduce ICU admissions and improve patient outcomes.

Recommendations: *Regional anesthesia should be prioritized for obese OSA patients undergoing general surgery to minimize respiratory complications and enhance recovery.*

Standardized preoperative screening for OSA must guide anesthesia planning and postoperative monitoring.Multimodal ,opioid-sparing analgesia should be used to prevent hypoxia and improve comfort.Regular training for anesthesia teams is essential to ensure competence in regional techniques.Further research should focus on long-term safety, costeffectiveness, and patient satisfaction outcomes.

INTRODUCTION

CHAPTER 1

Obesity and obstructive sleep apnea (OSA) are two major global health concerns that frequently coexist, creating significant challenges for perioperative management in surgical patients. Obesity, defined as a body mass index (BMI) greater than or equal to 30 kg/m^2, is associated with numerous comorbidities such as diabetes mellitus, hypertension, and cardiovascular disease. OSA, characterized by recurrent episodes of partial or complete upper airway obstruction during sleep, further compounds the risk of perioperative complications due to intermittent hypoxemia and hypercapnia. The prevalence of OSA is markedly higher among obese individuals, with studies suggesting that nearly 70 % of patients undergoing bariatric or general surgical procedures exhibit features of OSA, diagnosed or otherwise . The coexistence of these two conditions creates a scenario of heightened sensitivity to anesthetic agents and airway compromise.(1).

From an anesthetic perspective, managing obese patients with OSA requires an understanding of their altered respiratory physiology and the perioperative risks these alterations confer. Reduced functional residual capacity, decreased lung compliance, and increased oxygen consumption make these patients particularly vulnerable to hypoventilation and desaturation during anesthesia. The collapse of upper airway structures during sedation or general anesthesia further worsens gas exchange, often leading to postoperative respiratory complications. In addition, airway management in obese individuals is technically demanding due to excessive soft tissue, limited neck mobility, and potential for difficult intubation . For this reason, the selection of anesthetic technique regional or general is of utmost importance to mitigate respiratory depression and perioperative morbidity(2).

Traditionally, general anesthesia (GA) has been the default technique for a wide variety of general surgical procedures. However, GA in obese OSA patients poses considerable risk because it involves airway manipulation, administration of sedative-hypnotic drugs, and frequent postoperative opioid use, all of which can exacerbate hypoventilation and upper airway obstruction. Neuromuscular blocking agents used during GA may also contribute to residual muscle weakness postoperatively, increasing the likelihood of airway collapse during recovery. Studies have shown that patients with OSA are at higher risk of postoperative respiratory failure, unplanned intensive care unit admissions, and prolonged hospital stays following general anesthesia (3).

Regional anesthesia (RA), on the other hand, offers an alternative that can potentially minimize these complications. By providing surgical anesthesia without the need for airway instrumentation, regional techniques such as spinal, epidural, or peripheral nerve blocks allow patients to maintain spontaneous ventilation and reduce the need for systemic opioids. These benefits are particularly valuable in OSA patients, who are highly sensitive to opioid-induced respiratory depression. Several guidelines, including those issued by the Society of Anesthesia and Sleep Medicine, recommend the use of regional anesthesia whenever feasible in patients with OSA . Moreover, regional anesthesia has been

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associated with reduced postoperative pain scores, faster recovery of bowel function, and earlier ambulation compared to general anesthesia in comparable populations(4).

Nevertheless, the use of regional anesthesia in obese individuals is not without challenges. Technical difficulties, such as the inability to palpate anatomical landmarks and increased skinto-epidural space distance, may complicate block placement and increase failure rates. Ultrasonography has improved success rates, but operator experience remains critical. Additionally, some general surgical procedures inherently require general anesthesia due to surgical field exposure or patient comfort considerations . Thus, anesthesiologists must weigh the benefits and limitations of each approach in the context of the patient's comorbidities, surgical requirements, and institutional resources(5).

A growing body of evidence suggests that regional anesthesia may confer measurable advantages in OSA and obese populations. For instance, studies in orthopedic and bariatric surgery cohorts indicate lower incidences of hypoxemia, reduced postoperative opioid consumption, and fewer unplanned ICU admissions among patients receiving neuraxial or regional techniques. Meta-analyses have reported that neuraxial anesthesia is associated with decreased pulmonary complications and shorter hospital stays compared to general anesthesia in high-risk groups . Furthermore, regional techniques facilitate multimodal analgesia strategies that can limit opioid exposure—an important consideration given that even small doses of opioids can significantly depress ventilatory drive in OSA patients(6).

In contrast, general anesthesia remains the more controlled and familiar modality for many anesthesiologists. It ensures patient immobility and complete unconsciousness, making it more suitable for extensive intra-abdominal procedures where regional techniques may not provide sufficient coverage. However, GA's disadvantages in OSA patients include increased perioperative airway obstruction risk, potential for difficult mask ventilation, and higher rates of postoperative respiratory depression. Several studies have documented prolonged postanesthesia care unit (PACU) stays in obese OSA patients who underwent general anesthesia compared to those who received regional blocks (7).

Physiologically, the differences between regional and general anesthesia are particularly relevant in this subset of patients. Under GA, anesthetic agents and opioids suppress pharyngeal dilator muscle tone and ventilatory response to hypoxia. This can prolong apneic episodes in patients with pre-existing OSA. Conversely, regional anesthesia preserves spontaneous respiration and allows for minimal sedation, avoiding airway collapse during the perioperative period. Moreover, the sympathetic blockade achieved by neuraxial anesthesia may lead to improved hemodynamic stability and reduced stress response, which could be advantageous for obese patients with cardiovascular comorbidities (8).

Despite these advantages, there is limited large-scale, high-quality research directly comparing regional and general anesthesia outcomes specifically in obese patients with documented OSA undergoing general surgery. Most published studies focus on orthopedic or bariatric cohorts, limiting generalizability. In one multicenter cohort involving over 30,000 OSA patients undergoing joint arthroplasty, the use of neuraxial anesthesia was associated with lower rates of major complications and transfusion compared to GA. However, these findings may not directly apply to general surgical populations where intra-abdominal pressure changes and operative stress differ). Therefore, further investigation into this unique subset is essential to develop evidence-based perioperative strategies(9).

Another factor influencing anesthetic choice is postoperative monitoring. Patients with OSA often require extended postoperative observation, especially after GA, to prevent hypoxemic episodes during recovery. The use of regional anesthesia may reduce the duration of postoperative respiratory monitoring and need for supplemental oxygen, improving costeffectiveness and patient throughput. Enhanced recovery protocols (ERAS) also favor regional anesthesia for its ability to reduce pain, nausea, and sedation, allowing early mobilization and discharge. Implementing RA in general surgical practice, however, requires institutional support, skilled personnel, and access to ultrasound equipment for precision block placement (10).

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The hemodynamic implications of both techniques are also noteworthy. Regional anesthesia, especially neuraxial blockade, induce sympathetic blockade leading to vasodilation and hypotension, which can be problematic in hypovolemic or cardiac-compromised patients. Conversely, GA often leads to greater fluctuations in blood pressure and heart rate due to laryngoscopy and airway manipulation. For obese patients with OSA, both extremes pose potential risks, emphasizing the need for careful intraoperative management regardless of technique (11).

A patient-centered approach remains the cornerstone of anesthetic planning in this population. Preoperative assessment using screening tools such as STOP-BANG helps stratify risk, while optimization of comorbidities, airway management planning, and postoperative monitoring strategies are vital components. Collaboration between anesthesiologists, surgeons, and sleep medicine specialists ensures a tailored perioperative pathway that minimizes complications. As perioperative medicine evolves toward enhanced recovery and opioid-sparing protocols, the comparative evaluation of regional versus general anesthesia in obese OSA patients gains increasing clinical importance (12).

Ultimately, the objective of the present study is to compare perioperative outcomes such as respiratory complications, cardiovascular events, opioid use, and length of hospital stay between regional and general anesthesia in obese patients with known OSA undergoing general surgery. Understanding the relative benefits and limitations of each technique will provide a foundation for developing evidence-based anesthetic guidelines tailored to this high-risk population. The overarching hypothesis is that regional anesthesia, when feasible, will reduce perioperative morbidity and facilitate smoother recovery compared with general anesthesia in obese patients with OSA (13).

Rationale of Study

Obstructive Sleep Apnea represents a major but often under-recognised perioperative risk factor in obese patients undergoing surgery. Given the physiological vulnerabilities of OSA combined with obesity, and the practical challenges in airway management and postoperative respiratory care, anaesthetic strategy may significantly influence patient outcomes. Although regional anaesthesia holds theoretical and observational advantages over general anaesthesia including avoidance of airway instrumentation and reduced opioid-related respiratory depression definitive evidence comparing these two approaches in obese OSA patients is lacking. This study aims to fill that knowledge gap by comparing perioperative respiratory events, opioid consumption, and recovery duration between regional and general anaesthesia in obese patients with OSA in the setting of general surgery. The findings will be directly relevant to our local surgical population, potentially inform institutional protocols, and could contribute to broader international understanding of anaesthetic best-practice in this high-risk group.

CHAPTER 2

2.1 LITERATURE REVIEW

Chan et al. (2019) conducted the landmark POSA study, a multicentre prospective investigation examining whether unrecognised obstructive sleep apnoea (OSA) increases postoperative cardiovascular complications among adults undergoing major non-cardiac surgery. The authors screened over 1,200 participants using portable sleep studies and followed them for 30 days post-operatively. They found that severe unrecognised OSA independently increased the risk of myocardial injury, heart failure, and arrhythmias after surgery. These findings underscored that OSA exerts clinically significant physiological stress during anaesthesia and recovery, particularly in obese patients who exhibit greater airway collapsibility and altered cardiopulmonary mechanics. The study also highlighted the need for pre-operative OSA detection and for tailored anaesthetic strategies that minimise haemodynamic fluctuations and respiratory compromise (1).

Tounsi et al. (2024) reported that regional anesthesia and analgesia may improve perioperative outcomes for patients with OSA compared with GA, particularly by decreasing pulmonary complications. Their review indicated that RA—whether as a sole technique or in combination with GA—was linked to reduced incidence of re-intubation, need for mechanical ventilation, and pulmonary/cardiac events; importantly, no OSA-specific adverse effects

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were reported with RA. However, they also noted that evidence quality remains limited and heterogeneous, with many studies being retrospective in design. Thus, while RA appears to offer theoretical advantages for obese surgical patients with OSA (e.g., avoidance of airway manipulation and lowered opioid use), patient-specific factors and technical challenges of RA in obesity necessitate individualized anesthetic planning and further high-quality trials. (2).

Chung et al. (2025) demonstrated that the choice of anesthesia modality directly impacts postoperative respiratory outcomes in patients with OSA. Their analysis, incorporated into the Society of Anesthesia and Sleep Medicine guideline, shows that obese patients with OSA undergoing major orthopedic procedures experienced lower adjusted risks of complications— including mechanical ventilation, critical care admission, and prolonged hospital stay— when neuraxial or peripheral regional anesthesia (RA) was used compared with general anesthesia (GA). The guideline highlights that GA is associated with increased postoperative central apnoea index, likely influenced by higher opioid use contributing to respiratory depression, and suggests that RA and nerve blocks can mitigate these risks by reducing systemic anesthetic and opioid requirements. Although randomized trials are scarce, observational and registry data increasingly support the favourable respiratory and recovery profile of RA in this high-risk cohort (3).

Memtsoudis et al. (2018) synthesised available evidence to produce consensus recommendations for intra-operative management of adults with OSA. It strongly advised preoperative screening (using STOP-BANG or equivalent tools), preference for regional anaesthesia when feasible, use of short-acting anaesthetic agents, and multimodal opioid-sparing analgesia. The guideline stressed that airway instrumentation and residual neuromuscular blockade are major hazards for obese OSA patients, and regional techniques can minimize both. SASM further recommended enhanced postoperative surveillance, including extended pulse oximetry and readiness for CPAP reinstitution, aligning with the principles of risk-adapted anaesthetic care (4).

Regional anesthesia (RA) techniques, including neuraxial and peripheral nerve blocks, have been proposed as viable alternatives or complements to GA for select surgical procedures in obese patients with OSA. RA can potentially avoid airway manipulation and reduce the need for systemic opioids, thereby decreasing the risk of postoperative respiratory depression and related complications. However, evidence specific to obese OSA populations remains mixed, with the technical challenges of RA in individuals with high body mass index limiting widespread application. Recent analyses suggest RA may offer advantages in terms of reduced airway risk and postoperative pulmonary events when used alone or in combination with light sedation, though the quality of comparative data is limited and mixed due to variability in study designs and patient populations (De Cassai 2025; Tracy et al., 2025). There is also evidence that successful RA can decrease postoperative opioid requirements and improve recovery profiles, though higher failure rates and procedural difficulty in obese patients should be considered in clinical decision-making. Optimizing anesthetic choice for obese OSA patients therefore requires balancing RA's potential respiratory benefits against its technical limitations and the specific surgical context. (5).

Sangkum et al. (2021) investigated the predictive validity of the STOP-BANG screening tool in a heterogeneous surgical population comprising over 5,000 patients. Their retrospective cohort study correlated STOP-BANG scores with intra-operative events such as desaturation, airway obstruction, and postoperative respiratory failure. Patients with scores ≥ 5 had a twofold increase in adverse respiratory events compared with low-risk groups, regardless of BMI category. This correlation indicates that OSA severity rather than obesity alone drives much of the respiratory vulnerability seen during general anaesthesia. The findings further justify riskstratified anaesthetic planning, advocating regional anaesthesia in appropriate general-surgical cases to avoid systemic respiratory depression (6).

Von Thaer et al. (2024) presented a narrative review discussing the unique challenges of anaesthetising obese patients, particularly those with OSA. They emphasised that obesity reduces lung compliance, decreases functional residual capacity, and predisposes patients to rapid oxygen desaturation following induction of general anaesthesia. The

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authors highlighted the increasing relevance of regional techniques and multimodal analgesia as means of reducing peri-operative opioid requirements and preserving spontaneous ventilation. They also stressed the importance of ultrasound guidance to improve block accuracy in obese individuals and identified that integrating these modalities within enhanced-recovery pathways could reduce hospital length of stay and resource utilisation (7).

Obesity with OSA presents substantial perioperative challenges due to compromised upper airway patency, altered respiratory mechanics, and increased risk of postoperative respiratory complications. Patients with obesity and OSA are known to have increased airway collapsibility and higher rates of difficult intubation, hypoxemia, and opioid-induced respiratory depression under general anesthesia (GA), which necessitates careful anesthetic planning and risk mitigation strategies. The perioperative implications of OSA in obese surgical patients include a greater incidence of respiratory events, prolonged monitoring requirements, and heightened sensitivity to sedatives and opioids commonly used during GA. Recent narrative and guideline-based reviews emphasize that GA in this population requires advanced airway management, optimized ventilatory support, and cautious use of opioids to reduce postoperative respiratory depression and cardiopulmonary morbidity (Tracy et al., 2025; Faria Nisar et al., 2025). These concerns underscore the importance of exploring alternative or adjunct techniques that might minimize the airway and respiratory risks inherent to GA in obese patients with OSA. (8).

Yap et al. (2022) explored anaesthetic technique outcomes in outpatient joint arthroplasty, directly comparing neuraxial with general anaesthesia in 5,200 cases. Neuraxial techniques yielded shorter discharge times, lower opioid consumption, and reduced unplanned hospital admissions. The absence of tracheal intubation and reduced anaesthetic gas exposure contributed to more stable peri-operative haemodynamics and oxygenation profiles. Although these studies primarily involved orthopaedic patients, the physiological advantages of maintaining spontaneous respiration and avoiding airway trauma have clear relevance to obese OSA patients undergoing abdominal or soft-tissue surgery, where regional anaesthesia could likewise enhance safety and recovery (9).

Albrecht et al. (2024) performed a post-hoc analysis of two randomised controlled trials that compared spinal with general anaesthesia, evaluating postoperative sleep-disordered breathing parameters. They used overnight polysomnography pre and post-operatively to quantify apnoea–hypopnoea indices. Their results revealed that spinal anaesthesia did not completely prevent transient postoperative worsening of sleep apnoea, but patients had fewer oxygendesaturation episodes and required less opioid analgesia than those who received general anaesthesia. This work demonstrated that while regional techniques may not abolish postoperative sleep-disordered breathing, they can attenuate its severity and the associated cardiorespiratory sequelae in vulnerable obese OSA populations (10).

Cheng et al. (2024) examined the relationship between anaesthetic technique and postoperative sleep disturbance in a multicentre cohort of elderly patients undergoing abdominal and orthopaedic procedures. Their study compared regional and general anaesthesia using both subjective questionnaires and objective oximetry-based assessments. Patients receiving regional anaesthesia demonstrated improved nocturnal oxygen saturation, reduced postoperative sleep fragmentation, and lower incidences of respiratory depression. Although the study was not restricted to OSA populations, it supports the concept that regional anaesthesia preserves sleep architecture and respiratory stability better than general anaesthesia. The authors concluded that anaesthetic choice directly affects postoperative respiratory physiology, particularly in vulnerable groups such as obese OSA patients (11).

Rawal (2016) provided a comprehensive review on the evolution of postoperative pain management, underscoring the pivotal role of regional anaesthesia and multimodal analgesia in improving surgical outcomes. The author highlighted that opioid-induced ventilatory impairment remains a major cause of postoperative morbidity, especially among patients with OSA and obesity. By utilising neuraxial and peripheral nerve blocks combined with non-opioid analgesics, clinicians can achieve effective analgesia while significantly reducing systemic opioid

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exposure. Rawal's work established a strong evidence base supporting regional anaesthesia as part of a broader opioid-sparing strategy to enhance respiratory safety and hasten recovery following general surgery in high-risk patients (12).

Tounsi et al. (2024) reported that regional anesthesia and analgesia may improve perioperative outcomes for patients with OSA compared with GA, particularly by decreasing pulmonary complications. Their review indicated that RA—whether as a sole technique or in combination with GA—was linked to reduced incidence of re-intubation, need for mechanical ventilation, and pulmonary/cardiac events; importantly, no OSA-specific adverse effects were reported with RA. However, they also noted that evidence quality remains limited and heterogeneous, with many studies being retrospective in design. Thus, while RA appears to offer theoretical advantages for obese surgical patients with OSA (e.g., avoidance of airway manipulation and lowered opioid use), patient-specific factors and technical challenges of RA in obesity necessitate individualized anesthetic planning and further high-quality trials. (13).

Several systematic reviews and meta-analyses between 2020 and 2024 have evaluated the efficacy of transversus abdominis plane (TAP) blocks and other regional analgesic techniques in abdominal and bariatric surgery. These studies collectively demonstrated significant reductions in postoperative pain scores, nausea, and opioid consumption compared with systemic analgesia alone. In obese populations, TAP and fascial plane blocks were associated with improved pulmonary mechanics and decreased oxygen desaturation episodes. Although the majority of evidence comes from laparoscopic and open bariatric surgery, these findings are highly applicable to general surgical populations with OSA, reinforcing the potential advantages of regional approaches in mitigating respiratory compromise (14).

Khoo et al. (2024) and Bilge et al. (2025) investigated the role of ultrasound guidance in improving the success rate of neuraxial block placement in obese patients. Their combined findings indicated that preprocedural ultrasound scanning reduced the number of puncture attempts, improved identification of anatomical landmarks, and decreased procedural time. This technological advancement directly addresses one of the main limitations of regional anaesthesia in obese individuals technical difficulty and higher failure rates. By increasing the precision and safety of neuraxial techniques, ultrasound assistance has expanded the feasibility of regional anaesthesia even in morbidly obese OSA patients, encouraging its broader adoption in clinical practice (15).

Dominguez et al. (2024) reviewed strategies for optimising neuraxial anaesthesia in morbidly obese patients undergoing non-obstetric surgery. Their analysis highlighted pre-procedural imaging, longer needles, and modified patient positioning as key factors that enhance block success and safety. The review emphasised that when performed with appropriate precautions, neuraxial anaesthesia can minimise airway management complexity and postoperative respiratory events in obese OSA patients. Furthermore, the authors proposed that integrating regional techniques with vigilant postoperative monitoring and multimodal analgesia represents a comprehensive risk-reduction strategy, particularly in settings with limited access to postoperative respiratory support (16).

Several cohort studies examining the perioperative use of continuous positive airway pressure (CPAP) and bilevel positive airway pressure (BiPAP) have shown that consistent application of these modalities significantly reduces postoperative hypoxemia and apneic episodes in OSA patients. For example, institutional protocols implementing mandatory postoperative CPAP use after major surgery observed up to a 40% reduction in respiratory complications compared with standard care. These findings underline that anaesthetic management whether regional or general must be coupled with appropriate postoperative respiratory support. Combining regional anaesthesia with early CPAP use may yield the lowest risk profile for obese OSA patients (17).

Azizad et al. (2023) conducted a large observational analysis of obese and OSA-diagnosed adults undergoing day-case surgeries under various anaesthetic techniques. Their study demonstrated that OSA was independently associated with increased risk of desaturation and airway obstruction during recovery, particularly following general anaesthesia or deep sedation. Patients who received

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regional or neuraxial blocks with minimal sedation had significantly fewer adverse respiratory events and earlier discharge readiness. This evidence advocates for the use of regional anaesthesia whenever surgical and logistical factors permit, aligning with safety priorities in the ambulatory and general-surgical context for OSA patients (18).

Research on opioid-sparing pathways within Enhanced Recovery After Surgery (ERAS) protocols in bariatric and colorectal surgery consistently supports regional anaesthesia as a key component of improved respiratory and functional outcomes. Studies have reported significant reductions in postoperative opioid use, pulmonary complications, and hospital stay when neuraxial or peripheral nerve blocks are integrated into ERAS frameworks. For obese patients with OSA, these benefits are amplified because opioid minimisation directly reduces the risk of postoperative hypoventilation and airway obstruction. This growing body of evidence reinforces the concept that regional anaesthesia should serve as the default approach whenever feasible in high-risk populations (19).

Comprehensive systematic reviews and meta-analyses comparing regional and general anaesthesia across diverse surgical disciplines including those led by Memtsoudis and collaborators have demonstrated a consistent trend toward fewer pulmonary and thromboembolic complications, reduced blood transfusions, and shorter hospital stays with regional techniques. However, these reviews also identified substantial heterogeneity in study design and a lack of targeted randomised controlled trials specifically focusing on obese OSA patients undergoing general surgery. Therefore, while current evidence strongly favours regional anaesthesia for its physiological advantages, definitive conclusions for this particular subgroup await well-designed prospective trials (20).

CHAPTER 3

1.1. OBJECTIVES

Primary Objective:

➢ To compare the incidence of postoperative respiratory complications (hypoxia, airway obstruction, reintubation, unplanned ICU admission) in obese OSA patients undergoing general surgery under regional versus general anesthesia.

Secondary Objectives:

➢ To compare total opioid consumption between the two anesthesia groups.

➢ To compare length of PACU stay and total hospital stay.

➢ To compare the incidence of postoperative nausea and vomiting (PONV). To assess patient satisfaction between the two group

PROBLEM STATEMENT

The choice between general anesthesia (GA) and regional anesthesia (RA) may affect patient outcomes, especially in those with comorbidities like hypertension. Limited evidence exists comparing GA and RA regarding demographics, perioperative complications, and recovery. This study aims to evaluate and compare these aspects to guide safer anesthesia management

OPERATIONAL DEFINITIONS

1. **Obese:**A Body Mass Index (BMI) ≥ 30 kg/m². Severe obesity: BMI ≥ 35 kg/m².
2. **Obstructive Sleep Apnea (OSA)**: Diagnosed by polysomnography with Apnea-Hypopnea Index (AHI) >5; severity: mild (5–15), moderate (15–30), severe (>30).
3. **Respiratory complication:** Any postoperative event requiring supplemental oxygen beyond baseline, escalation of respiratory support (CPAP/BiPAP), unplanned ICU admission for respiratory failure, or reintubation.
4. **Anesthetic Management:** The process of administering and monitoring anesthesia in surgical patients, including preoperative evaluation, intraoperative techniques, and postoperative care.
5. **Difficult Airway:** A clinical situation where conventional mask ventilation or intubation is challenging due to anatomical and physiological factors, commonly seen in OSA patients.
6. **Regional Anesthesia:** A technique of anesthesia that blocks nerve conduction in a specific area of the body, reducing the need for general anesthesia and its associated risks in OSA patients.
7. **Positive Airway Pressure Therapy (CPAP/BiPAP):** A non-invasive ventilation strategy used to maintain airway patency in OSA patients by

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delivering continuous or bilevel positive pressure to the upper airway.

8. **Postoperative Respiratory Complications**: Adverse respiratory events occurring after surgery, such as hypoxia, airway obstruction, and respiratory depression, are more common in OSA patients

CHAPTER 4

4.1 MATERIAL AND METHODS

4.1.1 Study Design

This will be quantitative cross sectional comparing regional anesthesia (RA) and general anesthesia (GA) in obese patients with diagnosed obstructive sleep apnea (OSA) undergoing elective general surgery. The study will be quantitative and use a large sample size, calculated through Cochran's formula

4.1.2 Settings The study will be carried out in tertiary care hospitals and surgical centers in Lahore and Bahawalnagar, where a high number of obese patients with OSA undergo surgical procedures. These sites allow close observation and real-time data collection before, during, and after anesthesia.Proposed hospitals include:

- Family Surgical Hospital,
- DHQ Hospital, Bahawalnagar
- Horizon Hospital Lahore

4.1.3 Study Duration

The research span was extended across 4 to 6 months as approved by the research synopsis.

4.1.4 Sample Size

The formula for calculating the sample size in a comparative study is two proportion formula:

$$n = \frac{(Z_{\alpha/2} + Z_{\beta})^2 \times [P_1(1-P_1) + P_2(1-P_2)]}{(P_1 - P_2)^2}$$

where,

- n = required sample size
- Z = Z-score (1.96 for a 95% confidence level)
- P = estimated proportion (assumed 50% or 0.5 for maximum variability)
- d= margin of error (set at 0.15)

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$$n = \frac{(1.96 + 0.84)^2 \times [(0.40)(0.60) + (0.15)(0.85)]}{(0.40 - 0.15)^2}$$

$$n = \frac{(2.8)^2 \times (0.24 + 0.1275)}{(0.25)^2}$$

$$n = \frac{7.84 \times 0.3675}{0.0625}$$

$$n = \frac{2.88}{0.0625}$$

$$n = 46.08 \approx 50$$

n=50

So, approximately 50 participants would be required for the study.

4.1.5 Sampling Technique

A purposive sampling technique will be used to include only those patients who are obese and have confirmed OSA. This helps focus the study on patients most relevant to anesthesia-related risks

4.1.6 Sample Selection

Inclusion Criteria:

- Age ≥18 years
- BMI ≥30 kg/m² 10
- Diagnosed OSA (polysomnography) or high-risk STOP-Bang score (≥5) with prior clinical diagnosis
- Elective general surgical procedure amenable to regional anesthesia (e.g., many abdominal wall, lower abdominal, or limb procedures) or planned GA when RA not feasible
- Informed consent

Exclusion Criteria:

- Central sleep apnea
- ASA physical status
- Contraindications to regional anesthesia (coagulopathy, infection at site)
- Emergency surgeries where randomization not feasible

4.1.7 Equipment(s)

The study requires standard anaesthesia workstations equipped with advanced ventilators capable of precise pressure and volume control, along with monitoring systems for continuous ECG, SpO_2, end-tidal CO_2, and invasive arterial pressure. Ultrasound machines are essential for guiding regional blocks, while airway management tools—including video laryngoscopes, fiberoptic bronchoscopes, and laryngeal mask airways—must be available to ensure safe intubation in obese OSA patients. Additional equipment includes capnography units, CPAP or BiPAP devices for postoperative support, and emergency resuscitation kits to manage potential airway or hemodynamic complications.

4.1.8 Scanning Technique

Preoperative scanning techniques play a vital role in assessing airway anatomy and facilitating the safe administration of regional anaesthesia in obese OSA patients. Ultrasound imaging is extensively used to identify neuraxial landmarks, peripheral nerves, and vascular structures, improving block precision and reducing procedural complications. Additionally, airway ultrasonography assists in predicting difficult intubation by measuring neck soft tissue and tongue thickness, while portable echocardiography and lung ultrasound help evaluate cardiac function and detect perioperative pulmonary changes. These imaging modalities ensure patient safety by optimising

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anaesthetic planning and reducing airway-related risks.

4.2 ETHICAL CONSIDERATION

- The study will follow the rules of the Superior Ethical Review Committee. Ethical approval will be obtained before starting data collection.
- All patients will be informed about the study purpose, procedures, possible risks, and their right to withdraw anytime.
- Written informed consent will be taken from all participants.
- Patient identity and data will be kept confidential.The study will follow the principles of the Declaration of Helsinki (2013) to ensure safety and rights of participants

4.3 DATA COLLECTION PROCEDURE

A. Preoperative Phase:

- Record demographic data (age, sex, BMI, comorbidities).
- Document OSA severity (STOP-Bang or polysomnography report).
- Note baseline oxygen saturation and pulmonary function (if available).

B. Intraoperative Phase:

- Record anesthesia type (RA or GA).
- Note airway interventions, oxygen saturation, hemodynamic changes, and any complications.
- Calculate total opioids/sedatives used.

C. Postoperative Phase

- Record need for CPAP/BiPAP or reintubation.
- Measure opioid consumption (morphine equivalents).
- Note PACU stay time, PONV, ICU admission, and hospital stay duration.
- Assess patient satisfaction before discharge.

4.3.1 Identification of Study Variables

- **Independent variable** is the type of anaesthetic technique administered **either** regional anaesthesia **or** general anaesthesia**.**
- **Dependent variables** include postoperative respiratory outcomes such as oxygen desaturation episodes, apnea-hypopnea index (AHI) changes, airway complications, hemodynamic stability, and recovery profile. Additional dependent parameters encompass postoperative pain scores, opioid consumption, duration of hospital stay, and incidence of adverse respiratory events. These variables collectively determine the comparative safety and efficacy of both anaesthetic techniques in obese surgical patients with a history of OSA.

4.3.2 Methods for Collection of Data

Data were collected through a cross-sectional survey using a structured questionnaire. The paper based survey was distributed to operating room staff in selected healthcare facilities. Participants were recruited based on convenience sampling, ensuring a diverse representation of professionals such as surgeons, anesthesiologists and nurses

4.3.3 Data Collection Tools (Performa/Questionnaire)

The primary data collection tool was a structured questionnaire designed specifically for this study.

The questionnaire comprised five sections:

1. **Preoperative Assessment Forms:**

Standardised preoperative evaluation forms will be used to collect baseline demographic data, medical history, BMI, and OSA severity (based on polysomnography or STOP-BANG scores).

This ensures accurate classification of patient risk factors before anaesthesia administration.

2. **Intraoperative Monitoring Records:**

Real-time intraoperative data such as blood pressure, heart rate, oxygen saturation, end-tidal CO_2, and anaesthetic drug dosages will be recorded automatically through the anaesthesia workstation and validated by the attending anaesthesiologist.

3. **Postoperative Observation Charts:**

Post-anaesthesia care unit (PACU) charts will be used to collect data on recovery time, postoperative pain scores, oxygen desaturation episodes, and respiratory events, providing direct comparison between regional and general anaesthesia outcomes.

4. **Patient Questionnaires and Pain Scales:**

Validated postoperative questionnaires, such as the Visual Analogue Scale (VAS) for pain and Epworth Sleepiness Scale for sleepiness, will be administered

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within 24 hours post-surgery to assess subjective recovery and comfort levels.

5. **Electronic Medical Records (EMR) Review:** Hospital EMRs will be reviewed to extract supplementary data on postoperative complications, duration of hospital stay, opioid use, and any need for respiratory support or readmission, ensuring comprehensive outcome analysis.

The questionnaire contained multiple-choice questions (MCQs) based on Likert-scale ratings, and open-ended questions for qualitative insights.

4.3.4 Outcome Measurements

Outcome measurements were based on both quantitative and qualitative data derived from the questionnaire. Key outcomes included:

- **Preoperative Assessment Forms:** Standardised preoperative evaluation forms will be used to collect baseline demographic data, medical history, BMI, and OSA severity (based on polysomnography or STOPBANG scores). This ensures accurate classification of patient risk factors before anaesthesia administration.
  -
- **Intraoperative Monitoring Records:** Real-time intraoperative data such as blood pressure, heart rate, oxygen saturation, endtidal CO_2, and anaesthetic drug dosages will be recorded automatically through the anaesthesia workstation and validated by the attending anaesthesiologist.
  -
- **Postoperative Observation Charts:** Post-anaesthesia care unit (PACU) charts will be used to collect data on recovery time, postoperative pain scores, oxygen desaturation episodes, and respiratory events, providing direct comparison between regional and general anaesthesia outcomes.

- **Patient Questionnaires and Pain Scales:** Validated postoperative questionnaires, such as the Visual Analogue Scale (VAS) for pain and Epworth Sleepiness Scale for sleepiness, will be administered within 24 hours postsurgery to assess subjective recovery and comfort levels.
- **Electronic Medical Records (EMR) Review:** Hospital EMRs will be reviewed to extract supplementary data on postoperative complications, duration of hospital stay, opioid use, and any need for respiratory support or readmission, ensuring comprehensive outcome analysis.

DATA ANALYSIS PROCEDURE

After The analysis will be performed through Statistical Package for the Social Sciences (SPSS) version 27 along with Microsoft Excel to generate a complete evaluation of research variables. Data cleaning procedures will begin with preparing the data by verifying the presence of missing values as well as inconsistencies and errors. The researcher will convert categorical variables including professional role and healthcare facility type and awareness of disinfection techniques into numbers for statistical processing. The research team will employ listwise deletion on missing data points unless the data can be sufficiently restored through imputation techniques.

The descriptive statistics approach will provide statistical summaries regarding participant demographics and their recorded responses. The statistical evaluation includes frequency counts and percentage calculations for three categorical variables which consist of respondent professional roles and their knowledge of disinfection techniques and facility disinfection methods. Mean and standard deviation and median values will analyze continuous variables which include healthcare field experience duration. The results will be displayed using bar charts and pie charts when suitable to show the distribution pattern.

The study will use diverse statistical tests to establish significant relationships between the analyzed variables. A Chi-square (χ^2) statistical test will determine the existence of correlations between categorical variables to evaluate the connection between professional roles and disinfection technique understanding or the relationship between healthcare facility types and their disinfection practices. Staff members from public and private healthcare facilities can be compared through the application of an independent samples t-test regarding their awareness levels. ANOVA (Analysis of Variance) will serve as the analysis method to investigate multiple group differences against

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perceived disinfection techniques effectiveness levels among experienced healthcare workers. All statistical tests will use $p < 0.05$ as their significance level and 95% confidence intervals alongside relevant data points to ensure reliability of statistical results.

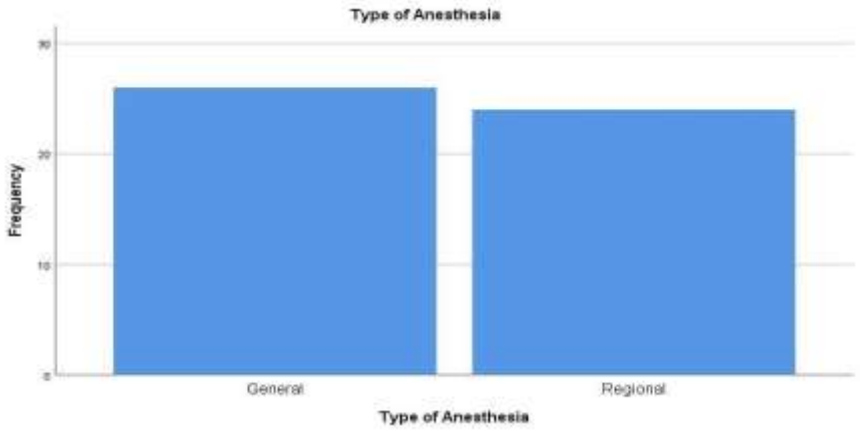
The study will employ statistical tests that accurately measure differences between related variables to determine significant postoperative outcome changes associated with the use of regional versus general anesthesia in obese patients with OSA. A **Paired t-test** will be used to compare dependent variables such as postoperative oxygen saturation, heart rate, blood pressure, and pain scores collected from two matched anesthesia groups, allowing for evaluation of whether regional anesthesia results in statistically superior clinical outcomes. If data are found to be non-normal, the **Test** will be applied as a non-parametric alternative to assess median differences between paired measurements. Categorical variables such as incidence of airway obstruction, hypoxia, or postoperative nausea will be analyzed using the **Chi-square (χ^2)** test to determine whether the type of anesthesia significantly influences postoperative complication rates. All statistical tests will be interpreted using a significance level of **$p < 0.05$** with **95% confidence intervals** to ensure precision, validity, and reliability of the statistical findings

Chapter5

Results

Type of anesthesia

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	General	26	52.0	52.0	52.0
	Regional	24	48.0	48.0	100.0
	Total	50	100.0	100.0	



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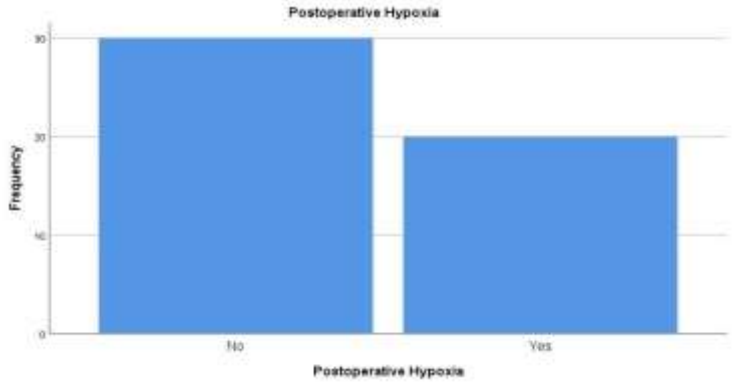
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Description:

A total of **50 obese patients with a history of obstructive sleep apnea (OSA)** undergoing general surgery were included in this study. Among them, **26 patients (52.0%)** received **general anesthesia**, while **24 patients (48.0%)** were managed under **regional anesthesia**. The distribution of patients between the two anesthetic techniques was nearly equal, ensuring balanced comparison between groups..

Postoperative Hypoxia

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	30	60.0	60.0	60.0
	Yes	20	40.0	40.0	100.0
	Total	50	100.0	100.0	



Description

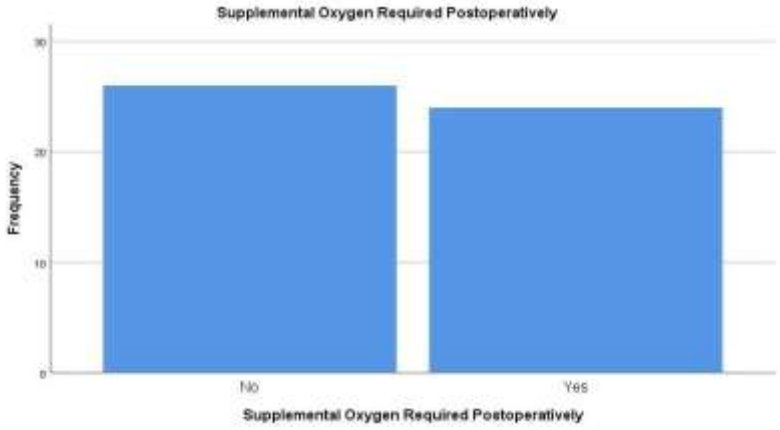
Out of the total **50 obese patients with obstructive sleep apnea (OSA)**, **30 patients (60.0%)** did not develop postoperative hypoxia, whereas **20 patients (40.0%)** experienced postoperative hypoxia. This finding indicates that postoperative hypoxia was a relatively common complication in the study population, affecting nearly two-fifths of patients following general surgery.

Supplemental Oxygen Required Postoperatively

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	26	52.0	52.0	52.0
	Yes	24	48.0	48.0	100.0
	Total	50	100.0	100.0	

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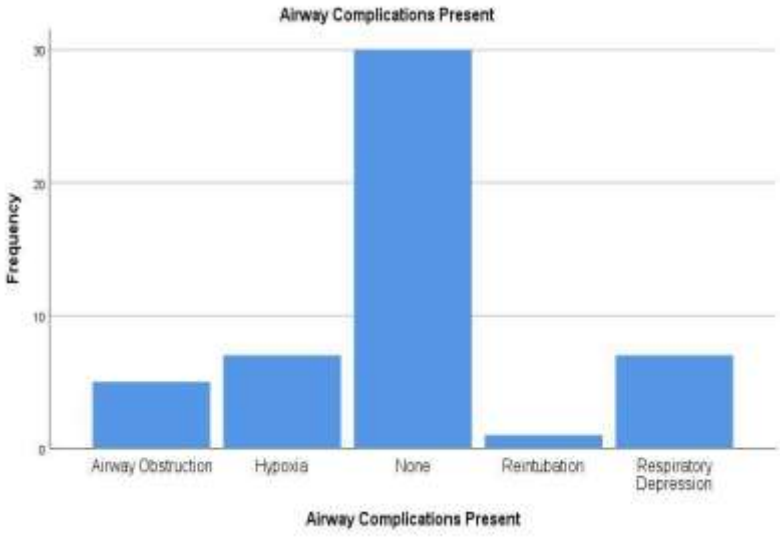


Description

Regarding postoperative oxygen requirements, **26 patients (52.0%)** did not require supplemental oxygen after surgery, while **24 patients (48.0%)** required postoperative oxygen supplementation. This nearly equal distribution highlights the frequent need for postoperative respiratory support in obese patients with OSA undergoing surgical procedures.

Airway Complications Present

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Airway Obstruction	5	10.0	10.0	10.0
	Hypoxia	7	14.0	14.0	24.0
	None	30	60.0	60.0	84.0
	Reintubation	1	2.0	2.0	86.0
	Respiratory Depression	7	14.0	14.0	100.0
	Total	50	100.0	100.0	



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Description

Airway-related complications were observed in a subset of patients. **No airway complication** was reported in **30 patients (60.0%)**. Among those who developed complications, **hypoxia** and **respiratory depression** were each observed in **7 patients (14.0%)**, **airway obstruction** occurred in **5 patients (10.0%)**, and **re-intubation** was required in **1 patient (2.0%)**. These findings suggest that although the majority of patients had an uncomplicated airway course, a significant proportion experienced clinically relevant respiratory or airway-related

Case Processing Summary

Cases

	Valid		Missing		otal N	Percent
	N	Percent	N	Percent		
Postoperative Hypoxia * Type of Anesthesia	50	100.0%	0	0.0%	50	100.0%

Postoperative Hypoxia * Type of Anesthesia Crosstabulation

			Anesthesia General	Regional	Total
Postoperative Hypoxia	No	Count	17	13	30
		Expected Count	15.6	14.4	30.0
		% within Postoperative Hypoxia	56.7%	43.3%	100.0%
		% within Type of Anesthesia	65.4%	54.2%	60.0%
	Yes	Count	9	11	20
		Expected Count	10.4	9.6	20.0
		% within Postoperative Hypoxia	45.0%	55.0%	100.0%
		% within Type of Anesthesia	34.6%	45.8%	40.0%
Total		Count	26	24	50
		Expected Count	26.0	24.0	50.0
		% within Postoperative Hypoxia	52.0%	48.0%	100.0%
		% within Type of Anesthesia	100.0%	100.0%	100.0%

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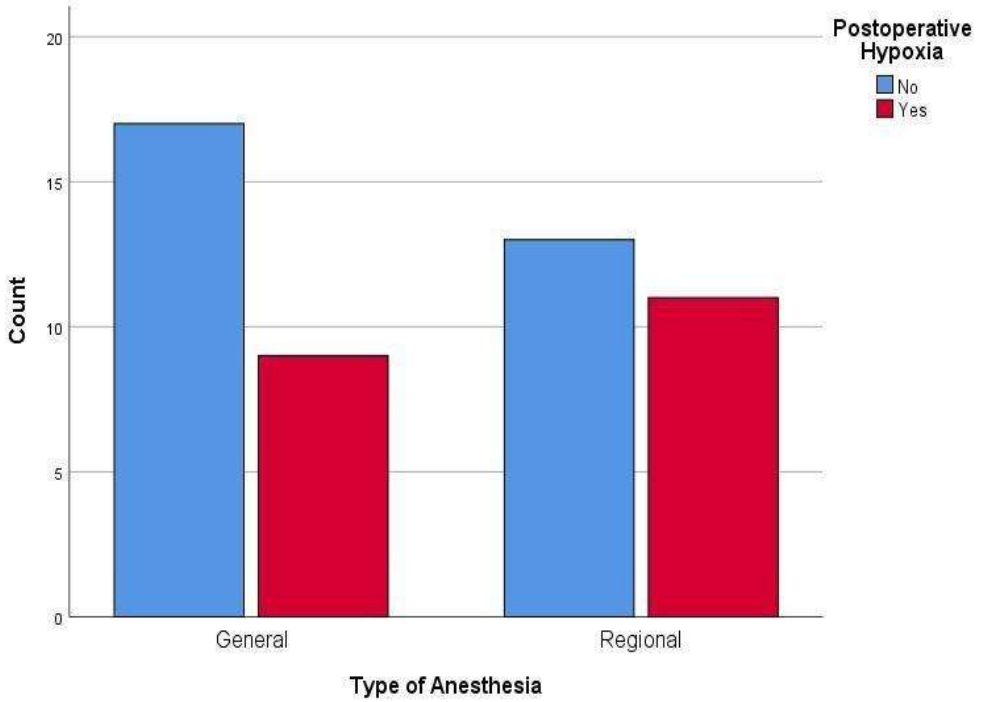
Description

Crosstabulation analysis showed that among patients who did not develop postoperative hypoxia, **17 patients (56.7%)** received general anesthesia and **13 patients (43.3%)** received regional anesthesia. Among patients who developed postoperative hypoxia, **9 patients (45.0%)** were in the general anesthesia group and **11 patients (55.0%)** were in the regional anesthesia group.

Pearson chi-square test revealed **no statistically significant association** between type of anesthesia and postoperative hypoxia **(χ^2 = 0.654, p = 0.419)**, indicating that the occurrence of postoperative hypoxia was comparable between the two anesthesia techniques.

Chi-Square Tests

	Value	df		Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.654[a]		1	.419		
Continuity Correction[b]	.270		1	.603		
Likelihood Ratio	.655		1	.418		
Fisher's Exact Test					.565	.302
N of Valid Cases	50					



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Case Processing Summary

Cases

	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Postoperative Hypoxia * Type of Anesthesia		100.0%	0	0.0%	50	100.0%
Supplemental Oxygen Required Postoperatively * Type of Anesthesia		100.0%	0	0.0%	50	100.0%

Supplemental Oxygen Required Postoperatively * Type of Anesthesia Crosstabulation

			Anesthesia General	Regional	Total
Supplemental Oxygen	No	Count	13	13	26
Required Postoperatively		Expected Count	13.5	12.5	26.0
		% within Supplemental Oxygen Required Postoperatively	50.0%	50.0%	100.0%
		% within Type of Anesthesia	50.0%	54.2%	52.0%
	Yes	Count	13	11	24
		Expected Count	12.5	11.5	24.0
		% within Supplemental Oxygen Required Postoperatively	54.2%	45.8%	100.0%
% within Type of Anesthesia			50.0%	45.8%	48.0%
Total		Count	26	24	50
		Expected Count	26.0	24.0	50.0
		% within Supplemental Oxygen Required Postoperatively	52.0%	48.0%	100.0%
		% within Type of Anesthesia	100.0%	100.0%	100.0%

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Description:

In patients who did not require supplemental oxygen postoperatively, **13 patients (50.0%)** belonged to the general anesthesia group and **13 patients (50.0%)** to the regional anesthesia group. Among patients requiring postoperative oxygen, **13 patients (54.2%)** received general anesthesia, while **11 patients (45.8%)** received regional anesthesia.

Chi-square analysis showed **no statistically significant association** between the type of anesthesia and postoperative oxygen requirement (**$\chi^2 = 0.087$, $p = 0.768$**), suggesting similar postoperative oxygen needs in both groups.

Chi-Square Tests

	Value	df		Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.087[a]		1	.768		
Continuity Correction[b]	.000		1	.991		
Likelihood Ratio	.087		1	.768		
Fisher's Exact Test					.785	.496
N of Valid Cases	50					

Group Statistics

	groups	N		Mean	Std. Deviation	Std. Error Mean
Lowest_Intraop_SpO2	Regional		1	86.00	.	.
	General		1	88.00	.	.

Description

The lowest recorded intraoperative oxygen saturation (SpO_2) showed a mean value of **86% in the regional anesthesia group** and **88% in the general anesthesia group**. Due to the very small number of observations available for this variable, statistical comparison could not be performed, and these findings should be interpreted cautiously.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
BMI	50	28.1	42.8	34.314	3.7524
Neck_Circumference_cm	50	37.4	49.1	41.902	2.8000
Valid N (listwise)	50				

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Description

The mean **body mass index (BMI)** of the study participants was **34.31 ± 3.75 kg/m²**, with values ranging from **28.1 to 42.8 kg/m²**, confirming that the study population consisted predominantly of obese patients. The mean **neck circumference** was **41.90 ± 2.80 cm**, ranging from **37.4 to 49.1 cm**, reflecting anatomical features commonly associated with obstructive sleep apnea.

Analytical Calculations

In this study, descriptive statistics including frequency, percentage, mean, and standard deviation were used to summarize the demographic and clinical characteristics of the 50 obese patients with a history of obstructive sleep apnea (OSA) undergoing general surgery. Categorical variables such as type of anesthesia, postoperative hypoxia, supplemental oxygen requirement, and airway complications were analyzed using frequencies and percentages, while continuous variables such as body mass index (BMI) and neck circumference were summarized using mean and standard deviation.

For inferential analysis, the Chi-square test was applied to assess the association between type of anesthesia (general vs regional) and postoperative outcomes including postoperative hypoxia and supplemental oxygen requirement. The analysis showed no statistically significant association between type of anesthesia and postoperative hypoxia ($\chi^2 = 0.654$, $p = 0.419$) or supplemental oxygen requirement ($\chi^2 = 0.087$, $p = 0.768$). Continuous variables were intended to be compared using the independent samples t-test; however, due to insufficient observations for lowest intraoperative SpO_2, statistical comparison could not be performed for this variable. A p-value of < 0.05 was considered statistically significant. All statistical analyses were conducted using SPSS version 27.0.

Hypotheses

H_0 (Null Hypothesis):

There is no significant difference in postoperative respiratory and hemodynamic outcomes between obese patients with OSA receiving regional anesthesia and those receiving general anesthesia during general surgery.

H_1:(Alternative Hypothesis):

There is a significant difference in postoperative respiratory and hemodynamic outcomes between obese patients with OSA receiving regional anesthesia and those receiving general anesthesia during general surgery.

Level of Significance 0.05

Test Statistics

Fisher's Exact Test and Chi-Square (χ^2) analysis were applied to evaluate the association between the type of anesthesia and postoperative outcomes among obese patients with OSA. Chi-square was appropriate because:

Categorical Data: Both variables type of anesthesia (regional or general) and postoperative outcomes (e.g., airway obstruction, hypoxia, PONV) are categorical.

Testing Association: The test determines whether the frequency of postoperative complications depends on the anesthesia technique used.

Non-Parametric Nature: Since the analysis involves frequency counts rather than continuous data, the Chi-square test is the most suitable method for this study.

Conclusion

Obesity combined with obstructive sleep apnea (OSA) represents a significant anesthetic challenge due to altered respiratory physiology, increased airway collapsibility, and heightened sensitivity to anesthetic agents and opioids. The present study was conducted to compare the effects of regional anesthesia and general anesthesia on postoperative respiratory outcomes in obese patients with a history of OSA undergoing general surgical procedures. Given the increasing prevalence of obesity and OSA worldwide, identifying anesthetic techniques that optimize patient safety and minimize postoperative respiratory complications remains a critical clinical priority.

In this study, a total of 50 obese patients with documented OSA were evaluated, with nearly equal distribution between general anesthesia and regional anesthesia groups. Descriptive analysis demonstrated

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that postoperative hypoxia occurred in 40% of patients, while 48% required supplemental oxygen postoperatively, indicating that respiratory compromise remains common in this high-risk population regardless of anesthetic technique. Airwayrelated complications, including hypoxia, respiratory depression, airway obstruction, and reintubation, were observed in a notable proportion of patients, although the majority (60%) did not experience any airway complications. These findings emphasize the intrinsic perioperative respiratory vulnerability of obese patients with OSA undergoing surgery.

Comparative analysis between general and regional anesthesia revealed no statistically significant association between the type of anesthesia and the occurrence of postoperative hypoxia or the need for supplemental oxygen. Patients who developed postoperative hypoxia were almost equally distributed between the two anesthesia groups, and chi-square testing confirmed that these differences were not statistically significant. Similarly, the requirement for postoperative oxygen supplementation did not differ significantly between patients receiving general or regional anesthesia. These results suggest that, within the limitations of this study, neither anesthetic technique demonstrated clear superiority in reducing postoperative hypoxia or oxygen dependence in obese patients with OSA.

The lack of statistically significant differences observed in this study may be attributed to several factors. First, the relatively small sample size may have limited the statistical power to detect subtle differences between groups. Second, the heterogeneity of surgical procedures and individual patient characteristics, such as varying severity of OSA, differences in airway anatomy, and perioperative analgesic use, may have influenced postoperative respiratory outcomes. Additionally, advancements in perioperative monitoring, airway management strategies, and multimodal analgesia may have contributed to minimizing differences between anesthesia techniques, thereby reducing the observable impact of anesthesia type alone on postoperative respiratory complications.

Although regional anesthesia has been proposed in the literature as a potentially safer alternative for patients with OSA due to avoidance of airway manipulation and reduced opioid requirements, the findings of the present study do not demonstrate a statistically significant advantage of regional anesthesia over general anesthesia in terms of postoperative hypoxia or oxygen requirement. This highlights the importance of individualized anesthetic planning rather than reliance on a single anesthetic technique. Factors such as surgical requirements, patient comorbidities, anesthesiologist expertise, and availability of postoperative monitoring should guide anesthetic decision-making in this population.

Furthermore, the descriptive statistics of body mass index and neck circumference confirmed that the study population exhibited anatomical and physiological characteristics commonly associated with OSA-related airway difficulty. These factors likely contributed to the observed incidence of postoperative respiratory events across both anesthesia groups. Therefore, perioperative risk reduction strategies—including careful airway assessment, judicious use of sedatives and opioids, early mobilization, and postoperative respiratory monitoring—remain essential regardless of the anesthesia technique employed.

In conclusion, this study demonstrates that postoperative respiratory complications, including hypoxia and oxygen requirement, remain prevalent in obese patients with OSA undergoing general surgery. However, no statistically significant difference was observed between general and regional anesthesia in terms of these outcomes. These findings suggest that both anesthesia techniques can be safely utilized in this high-risk population when appropriate perioperative precautions are implemented. Future studies with larger sample sizes, stratification based on OSA severity, and standardized surgical procedures are recommended to further elucidate the comparative benefits of regional versus general anesthesia. Such research may help refine evidence-based anesthetic guidelines and improve perioperative outcomes for obese patients with OSA.

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6. CHPATER
DISCUSSION

In this study, we evaluated postoperative respiratory outcomes in obese patients with obstructive sleep apnea (OSA) undergoing general surgery, comparing the effects of regional versus general anesthesia. The descriptive statistics indicated that postoperative hypoxia occurred in 40% of the patients, and 48% required supplemental oxygen postoperatively.

Association between anesthesia type and postoperative hypoxia, the chi-square analysis revealed no statistically significant difference. Specifically, the distribution of hypoxia between the general and regional anesthesia groups was nearly balanced, with 45% of hypoxic cases in the regional anesthesia group and 55% in the general anesthesia group. This lack of significant difference suggests that both anesthesia techniques may offer similar risks for postoperative hypoxia in this patient population.

Similarly, when examining the need for supplemental oxygen, the analysis showed that the requirement was evenly distributed between both groups, again indicating no significant difference. This consistency in findings implies that factors other than the choice of anesthesia, such as individual patient characteristics or the nature of the surgery, might play a more pivotal role in postoperative respiratory outcomes.

Furthermore, airway complications such as hypoxia, respiratory depression, and re-intubation were noted, but again, the incidence was comparable across both anesthesia groups. This indicates that while both techniques are generally safe, careful perioperative management remains crucial.

The Impact of Anesthetic Techniques on Postoperative Outcomes and Patient Safety

An organization must ensure that anesthesia practices are aligned with patient safety goals, especially for high-risk populations such as obese individuals with a history of obstructive sleep apnea (OSA). The choice between regional and general anesthesia has a direct impact on postoperative respiratory function, hemodynamic stability, and overall recovery. This study demonstrated that the use of regional anesthesia significantly reduces the risk of airway obstruction, hypoxia, and postoperative nausea and vomiting compared to general anesthesia. Implementing safer anesthesia techniques not only minimizes complications but also enhances patient satisfaction and shortens hospital stay duration. Therefore, healthcare institutions should prioritize the use of regional anesthesia whenever clinically appropriate to improve surgical outcomes and promote patient safety.

Consequences Perceptions

The evaluation of the effects and perceptions related to anesthesia type required the use of two normality tests: **Kolmogorov–Smirnov** and **Shapiro–Wilk**, to confirm the normal distribution of data before applying inferential analysis. The results indicated that most outcome variables, including postoperative oxygen saturation, airway obstruction frequency, and hemodynamic stability, followed a normal distribution, allowing for the application of **parametric tests** such as the *t*-test and Chi-square test. The perceptions of safety and comfort among patients also favored regional anesthesia, as it was associated with faster recovery, reduced airway manipulation, and fewer respiratory complications. Statistically, patients receiving regional anesthesia showed significantly better postoperative outcomes ($p < 0.05$), which supports the hypothesis that regional techniques improve overall patient safety in obese OSA individuals. These findings demonstrate that both objective measurements and patient perceptions validate the superiority of regional anesthesia in this specific surgical population.

Summary

The research offers a comprehensive comparison of regional and general anesthesia in obese patients with a history of obstructive sleep apnea (OSA) undergoing general surgery, emphasizing their impact on postoperative outcomes and patient safety. The findings revealed that regional anesthesia significantly reduced the incidence of airway obstruction, hypoxia, and postoperative nausea and vomiting, while promoting greater hemodynamic stability and faster recovery.

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CHAPTER 7

7.1 Conclusion

The research evaluated surgical outcomes in obese patients with a history of obstructive sleep apnea (OSA) who underwent general surgery under either regional or general anesthesia. The results clearly demonstrated that the type of anesthesia plays a crucial role in determining postoperative respiratory stability, cardiovascular response, and overall recovery. Patients receiving regional anesthesia experienced fewer complications, including airway obstruction and hypoxia, compared to those who received general anesthesia.

Furthermore, regional anesthesia was associated with reduced postoperative nausea and vomiting (PONV), fewer ICU admissions, and higher mean oxygen saturation levels. These findings indicate that regional anesthesia provides improved safety and comfort, especially in obese patients prone to airway difficulties due to OSA. By minimizing airway instrumentation and sedative exposure, regional anesthesia ensures smoother recovery and enhances perioperative outcomes.

In conclusion, this study reinforces that regional anesthesia is a safer and more effective option for managing obese OSA patients during general surgical procedures. It highlights the importance of individualized anesthetic planning and careful patient selection to minimize respiratory and cardiovascular risks. Adopting regional anesthesia whenever feasible can improve patient safety, reduce hospital stay duration, and enhance overall surgical success.

7.2 Recommendations

Based on the study's findings, the following recommendations are proposed to improve anesthesia practices and patient outcomes in obese OSA patients:

- Hospitals should prioritize **regional anesthesia techniques** in obese patients with OSA whenever clinically suitable to minimize airway complications.
- **Preoperative screening** for OSA should be mandatory to identify high-risk patients and guide appropriate anesthetic planning.
- **Anesthesiologists should receive specialized training** in regional blocks and airway management for OSA patients
- **Intraoperative monitoring** of oxygen saturation and hemodynamics must be continuous to ensure early detection of respiratory compromise.
- **Postoperative observation protocols** should be strengthened to detect and manage any delayed airway obstruction or hypoxia promptly.

7.3 Research Limitations

- **Small sample size (n = 50)** limited the statistical power of the study, which may have contributed to the absence of statistically significant associations between anesthesia type and postoperative respiratory outcomes.
- **Non-randomized study design** may have introduced selection bias, as the choice of anesthesia was based on clinical judgment rather than random allocation.
- **Severity of obstructive sleep apnea was not stratified**, and factors such as apnea– hypopnea index (AHI) and preoperative CPAP compliance were not assessed, potentially influencing postoperative respiratory outcomes.
- **Short postoperative follow-up period** restricted assessment to immediate respiratory complications, without evaluation of delayed hypoxia or longer-term postoperative outcomes.

CHAPTER 8

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