Original Article

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A Retrospective study on Sedation and Anesthesia Practice in Ambulatory Surgery: Impact on Patient Comfort, Safety, and Recovery Time

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Author`s Contribution

[1]Substantial contributions to the conception or design of the work; or the acquisition, [3]analysis, or interpretation of data for the work, [2,4]Drafting the work or revising it critically for important intellectual content, [1]Final approval

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ABSTRACT

Objective: To evaluate the impact of sedation and anesthesia practices on patient comfort, intraoperative safety, and postoperative recovery time in ambulatory surgeries.

Methodology: This retrospective observational study was conducted at Ayub Teaching Hospital, Abbottabad, over a 12-month period from February 2023 to January 2024. Two hundred and ten patients included if they were 18 years of age or older, underwent ambulatory (same-day discharge) surgical procedures under any form of sedation or anesthesia, and had complete perioperative documentation, including anesthesia and PACU records.. Statistical analysis was performed using SPSS version 25. Chi-square test and one-way ANOVA were applied where appropriate.

Results: General anesthesia was associated with longer procedure durations (62.8 ± 15.1 minutes), higher rates of hypotension (12.5%) and oxygen desaturation (8.0%), and longer recovery time (73.4 ± 16.7 minutes). In contrast, local anesthesia with sedation had the shortest recovery (42.5 ± 10.4 minutes) and highest patient satisfaction (90.6%). Statistically significant differences were found between anesthesia type and safety events, recovery duration, and satisfaction scores ($p < 0.05$).

Conclusion: Sedation and regional techniques are safer and more efficient than general anesthesia for ambulatory surgeries, offering enhanced recovery and patient comfort. These findings support individualized and standardized anesthetic approaches in outpatient surgical care.

Keywords: Ambulatory surgery, anesthesia, sedation, patient comfort, recovery time, intraoperative safety, resource-limited settings.

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Introduction

Same-day surgery, or ambulatory surgery is another term used; this treatment method has become a critical paradigm in healthcare practices today because it leads to the advantage of patients, including low-impact forms of surgery, reduced hospitalization, and cost-effective medical care.[1] This model has become widespread due to a considerable enhancement of the surgical procedures, perioperative services, and primarily sales of the anesthetics and sedation.[2] These developments have made it possible to have more and more procedures carried out safely and using fewer resources within the time-honored inpatient environment, improving the output and effectiveness and not reducing the quality of healthcare.[3]

At the core of the success of ambulatory surgery lies the selection and the application of the anesthesia. Of outpatient procedures, goals of anesthesia are broader than pain and surgical conditions, as they include patient comfort, intraoperative safety, and speed of recovery, with no complications.[4] Using available short-acting anesthesia and advanced monitoring machinery, clinicians can now customize the level of sedation according to the patient requirements meaning that the patient can be safely released after it met the criteria as soon as possible.[5] The local anesthesia with monitored anesthesia care (MAC), region-blocking, light general anesthesia methods are common, depending on the type of the procedure and on characteristics of the patient.[6]

This notwithstanding, the anesthetic practice in ambulatory surgery remains different throughout the global arena depending on institutional standards and practices, available resources, and preferences of providers.[7.] In high income states, there are resilient systems which play a supporting role to the standardized

anesthesia care in the ambulatory contexts, whereas in low and middle income countries (LMICs) such as Pakistan, variation is still common, owing to the shortage of infrastructure, training and monitoring.[8] These differences can influence patient outcomes, especially, comfort, satisfaction, intra-operative safety and post anesthesia recovery time.[9] In addition, there is a small number of data on the practice of anesthesia in ambulatory settings in Pakistan, and it is difficult to finetune the care pathways and evidence-based guidelines.[10]

Understanding how different sedation and anesthesia techniques influence key patient outcomes such as comfort during procedures, safety indicators (e.g., oxygen desaturation, hypotension), and time to recovery and discharge is essential for improving the quality and efficiency of ambulatory surgical services.[11] Evaluating current practices can help identify strengths, gaps, and opportunities for standardization, especially in settings where resources are constrained and evidence-based local protocols are lacking.[12] By conducting a retrospective analysis in an ambulatory surgical environment, this study can provide actionable insights for clinicians, hospital administrators, and policymakers.

Despite the growing role of ambulatory surgery in Pakistan, there is limited data evaluating how specific sedation and anesthesia strategies impact patient comfort, safety, and recovery; therefore, this study aims to assess the effect of different anesthesia practices on these key outcomes in an ambulatory surgical setting.

Methodology

This retrospective observational study was conducted at the Department of Anesthesia and Surgical Services, Ayub Teaching Hospital a tertiary care teaching facility located in Abbottabad, Pakistan over a 12-month period from February 2023 to February 2024. The study focused on evaluating sedation and anesthesia practices used in ambulatory surgeries and their impact on patient comfort, intraoperative safety, and postoperative recovery time. Ethical approval for the study was obtained from the Institutional Review Board Approval code/Ref. No RC-EA-2023/245 dated 24-1-23 of the Hospital prior to the initiation of data collection. Patient confidentiality was ensured by anonymizing all identifying information and data were accessed solely for academic and research purposes

A consecutive non-probability sampling technique was employed to select patient records that met the defined inclusion criteria. The sample size was calculated using OpenEpi version 3.01, based on the following parameters: a 95% confidence level, 5% margin of error, and an expected proportion of 50% for key outcomes such as the incidence of intraoperative adverse events and postoperative recovery delays. The 50% proportion was used as a conservative estimate in the absence of prior large-scale local studies on anesthesia practices in ambulatory surgery settings in Pakistan. This approach is commonly recommended when the actual prevalence is unknown, as it yields the maximum required sample size.

Based on these inputs, the minimum required sample size was calculated to be 196 patients. To account for potential exclusions due to incomplete or missing data, the final sample was increased to 210 patient records. A similar methodology was applied in previous research assessing anesthesia-related outcomes in low-resource settings. [13]

Patients were included if they were 18 years of age or older, underwent ambulatory (same-day discharge) surgical procedures under any form of sedation or anesthesia, and had complete perioperative documentation, including anesthesia and PACU records. Patients were excluded if they required unplanned postoperative hospital admission, had incomplete or missing anesthetic documentation, or were diagnosed with psychiatric illness or cognitive impairment that could compromise the assessment of comfort and satisfaction.

Data were extracted retrospectively using a standardized data collection form. Information gathered included demographic details such as age, sex, and ASA (American Society of Anesthesiologists) physical status classification. Clinical and surgical data such as the type and duration of the surgical procedure were recorded. Anesthetic information included the type of anesthesia used categorized as local anesthesia with sedation, regional block, or general anesthesia as well as the agents administered and intraoperative monitoring details. Safety indicators such as the occurrence of hypotension, bradycardia, and oxygen desaturation during the procedure were documented. Postoperative outcomes included time to full recovery, time to discharge, and the presence of complications like postoperative nausea and vomiting (PONV).

Patient comfort and satisfaction were assessed using standardized 5-point Likert scales, as documented by trained nursing staff in the post-anesthesia care unit

(PACU) after the patient had achieved stable vital signs and was deemed alert (typically within 30–60 minutes post-procedure). Comfort was measured by asking patients to rate their overall physical and emotional comfort during the perioperative period, while satisfaction was based on their perception of anesthesia care quality. The Likert scale ranged from 1 (very poor) to 5 (excellent). Scores of 4 or 5 were considered indicative of high comfort or satisfaction, whereas scores of 1 to 3 represented moderate to low ratings. These scores were recorded as part of routine PACU documentation and were retrieved from patient charts for analysis in the study.

The acquired data were entered and analyzed using IBM SPSS version 25. Continuous variables such as age, duration of surgery, and recovery time were summarized using means and standard deviations, while categorical variables including type of anesthesia, occurrence of intraoperative events (e.g., hypotension, bradycardia, oxygen desaturation), postoperative complications (e.g., nausea, delayed discharge), and patient comfort and satisfaction ratings were presented as frequencies and percentages. To assess relationships between the type of anesthesia (local with sedation, regional, or general) and categorical outcomes such as intraoperative adverse events, postoperative nausea and vomiting (PONV), delayed discharge, and comfort/satisfaction levels, the Chi-square test was applied. Differences in continuous outcomes such as surgical duration and recovery time among the three anesthesia groups were analyzed using one-way Analysis of Variance (ANOVA). For the evaluation of patient comfort and satisfaction, Likert scale responses (1 to 5) were categorized into high (scores 4–5) and low-to-moderate (scores 1–3) groups. These categorical outcomes were then compared across anesthesia types using the Chi-square test. A p-value of less than 0.05 was considered statistically significant for all analyses.

Results

The investigation comprised 210 individuals who had ambulatory surgical procedures performed. The patients' average age was 41.6 ± 13.5 years, and there were somewhat more men (53.3%) than women (46.7%). The majority of patients had relatively low preoperative risk, as shown by their ASA I (49.5%) and ASA II (37.1%) classifications. A minority (13.3%) were ASA III. The most common procedures were in general surgery (37.1%), followed by ENT (21.9%), gynecology (21.4%), and urology (19.5%). These findings reflect the broad range of ambulatory surgical services provided at the hospital. As shown in table I.

Table I: Demographic and Clinical Characteristics of Patients. (n = 210)

Variable	**Mean ± SD**
Age (years)	41.6 ± 13.5
Gender	**n (%)**
Male	112 (53.3%)
Female	98 (46.7%)
ASA Physical Status	
ASA I	104 (49.5%)
ASA II	78 (37.1%)
ASA III	28 (13.3%)
Type of Procedure	
General surgery	78 (37.1%)
ENT	46 (21.9%)
Urology	41 (19.5%)
Gynecology	45 (21.4%)

Out of the 210 patients, 41.9% underwent procedures under general anesthesia, followed by 30.5% with local anesthesia plus sedation, and 27.6% under regional blocks. The average duration of surgery varied significantly across groups: patients receiving general anesthesia had the longest mean duration (62.8 ± 15.1 minutes), while those under local with sedation had the shortest (34.2 ± 11.3 minutes). ANOVA analysis showed a statistically significant difference ($p < 0.001$) in procedure duration based on the type of anesthesia used. As shown in table II.

Table II: Distribution of Anesthesia Type and Duration of Surgery.

Type of Anesthesia	**n**	**%**	**Mean Duration (minutes) ± SD**
Local with Sedation	64	30.5%	34.2 ± 11.3
Regional Anesthesia	58	27.6%	48.6 ± 12.9
General Anesthesia	88	41.9%	62.8 ± 15.1
p-value (ANOVA)	**< 0.001**		

The incidence of intraoperative adverse events was shown to be statistically significantly correlated with the type of anesthesia used, as determined by the Chi-square test. Hypotension occurred in 12.5% of patients undergoing general anesthesia, compared to 6.9% in the regional group and 3.1% in the local with sedation group ($p = 0.027$). Bradycardia was also more common under general anesthesia (10.2%) than in other groups ($p = 0.021$). Notably, oxygen desaturation was observed in 8.0% of general anesthesia cases but was almost negligible in other groups, showing significant association ($p = 0.009$). These findings suggest that general anesthesia carries a higher intraoperative risk profile. As illustrated in Figure 1.

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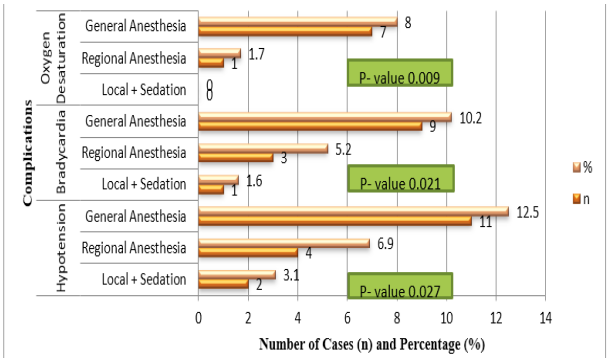

Figure 1. Intraoperative Safety Outcomes by Type of Anesthesia.

Recovery time was significantly longer in patients who received general anesthesia (73.4 ± 16.7 minutes) compared to those who had regional anesthesia (56.3 ± 12.1 minutes) and local with sedation (42.5 ± 10.4 minutes) ($p < 0.001$). Postoperative nausea and vomiting (PONV) was most frequent in the general anesthesia group (18.2%) compared to 8.6% and 4.7% in regional and local groups respectively ($p = 0.004$). Similarly, delayed discharge was significantly more common in the general anesthesia group (15.9%) than others ($p = 0.006$). These findings demonstrate the efficiency and safety advantages of sedation and regional techniques in the outpatient setting. As shown in table III.

Table III: Postoperative Recovery Time and Complications.

Anesthesia Type	Mean Recovery Time (min) ± SD	PONV n (%)	Delayed Discharge n (%)
Local with Sedation	42.5 ± 10.4	3 (4.7%)	2 (3.1%)
Regional Anesthesia	56.3 ± 12.1	5 (8.6%)	4 (6.9%)
General Anesthesia	73.4 ± 16.7	16 (18.2%)	14 (15.9%)
p-value	**< 0.001**	**0.004**	**0.006**

Patient-reported outcomes revealed that comfort and satisfaction were highest among those who received local anesthesia with sedation, with 87.5% and 90.6% of patients rating their comfort and satisfaction as high (Likert scores of 4–5), respectively. This was followed by regional anesthesia (82.8% and 84.5%), while general anesthesia had the lowest scores in both domains (65.9% comfort and 61.4% satisfaction). The differences were statistically significant ($p = 0.002$ for comfort and $p = 0.001$ for satisfaction), indicating that lighter sedation techniques may be more favorable in enhancing the overall patient experience during ambulatory surgeries. As illustrated in figure 2.

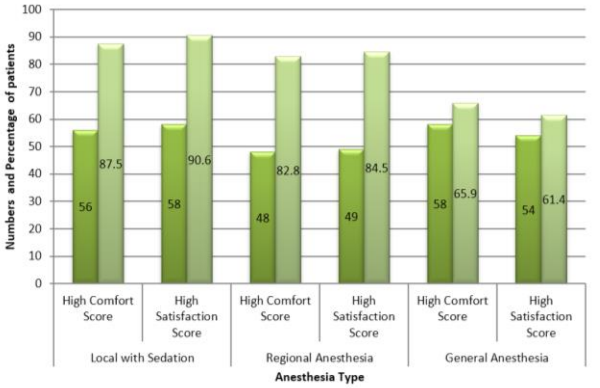

Figure 2. Patient Comfort and Satisfaction Scores by Type of Anesthesia.

Discussion

This retrospective study examined the impact of different sedation and anesthesia techniques on patient comfort, intraoperative safety, and postoperative recovery in ambulatory surgeries at Ayub Teaching Hospital. The findings revealed that general anesthesia was associated with longer surgical durations, higher rates of intraoperative complications, extended recovery times, and increased postoperative nausea and vomiting. In contrast, patients who received local anesthesia with sedation experienced shorter recovery, fewer complications, and reported higher comfort and satisfaction levels.

When compared to existing literature, these results align with global trends in ambulatory care that favor lighter anesthesia techniques for improved efficiency and patient outcomes[14]. Studies have consistently shown that local anesthesia with sedation or regional blocks are associated with better hemodynamic stability, fewer side effects, and quicker discharge times.[15] The longer recovery and higher incidence of postoperative complications observed in general anesthesia cases are similarly documented in prior research, which emphasizes the impact of systemic anesthetics on gastrointestinal function and cardiopulmonary stability.[16] The significant correlation between type of anesthesia and patient satisfaction also reflects the growing emphasis on patient-centered care in outpatient surgery.[17]

Furthermore, the association of general anesthesia with a higher frequency of hypotension, bradycardia, and desaturation reinforces concerns regarding its appropriateness for low-risk, short-duration procedures in ambulatory settings.[18] These findings underscore the value of anesthetic risk stratification and individualized

anesthesia planning to enhance safety and satisfaction.[19] The favorable comfort scores with local sedation reflect that minimal interventions, when appropriately monitored, can deliver both effective analgesia and superior patient experience. Similar findings have been reported in high-income settings where MAC and regional blocks are now standard for minor surgeries, with protocols favoring fast-track recovery models.[20] However, the retrospective design and single-center setting limit the generalizability of findings, highlighting the need for future prospective, multicenter studies using validated patient-reported outcome measures.

In a retrospective study assessing sedation protocols during outpatient urological and gynecological procedures, it was found that patients who underwent conscious sedation reported significantly higher satisfaction and faster discharge readiness than those who received general anesthesia.[21] These findings closely resemble our results, especially regarding recovery time and adverse effects, highlighting that minimal sedation technique can reduce complications such as PONV and delayed discharge.[22] Moreover, sedation-based approaches were found to be cost-effective and logistically advantageous, which is especially relevant for resource-constrained settings like Pakistan where optimizing healthcare efficiency is crucial.[23]

Another comparative analysis of ambulatory breast and ENT surgeries demonstrated that regional anesthesia not only reduced intraoperative hemodynamic fluctuations but also significantly improved postoperative pain control and satisfaction levels compared to general anesthesia.[24] Similar to our findings, the study emphasized that the choice of anesthetic directly influences patient comfort and recovery metrics. The reduced incidence of hypotension and oxygen desaturation in regional and local techniques was also echoed, reinforcing the safety profile of non-general anesthetic options in outpatient care.[25] These correlations suggest that broadening the use of regional and sedation-based anesthesia may standardize safer and more patient-centered care models in ambulatory surgical units.

This retrospective, single-center study relied on routine clinical records, which may limit data accuracy and generalizability. Future multicenter prospective studies using validated patient-reported outcome measures are recommended to strengthen and expand these findings.

Conclusion

This retrospective study highlights the significant impact of anesthesia and sedation practices on patient comfort, safety, and recovery in ambulatory surgical settings. The findings demonstrate that local anesthesia with sedation and regional blocks are associated with fewer intraoperative complications, shorter recovery times, and higher patient satisfaction compared to general anesthesia. These results underscore the importance of selecting appropriate anesthetic techniques to enhance clinical outcomes and optimize resource utilization in outpatient surgery. Standardizing anesthesia protocols and incorporating patient-centered strategies can further improve the quality of ambulatory surgical care, particularly in resource-limited settings like Pakistan.

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