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Outcomes of Spinal Anesthesia versus General Anesthesia for Laparoscopic Cholecystectomy: A Comparative Study

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Abstract: ***Background:*** Laparoscopic cholecystectomy is a commonly performed surgical procedure, and the choice of anesthesia, either spinal or general, remains a subject of debate. ***Objective:*** To assess and compare the outcomes of spinal anesthesia and general anesthesia for laparoscopic cholecystectomy, with postoperative pain management, recovery time, complications, and patient satisfaction between the two anesthesia techniques. ***Methods:*** This multicenter study was conducted at Rajshahi Medical College Hospital, Rajshahi, Bangladesh. A total of 106 patients undergoing laparoscopic cholecystectomy were enrolled in the study. They were divided into two groups: one receiving spinal anesthesia and the other receiving general anesthesia. Data was collected from June 2021 to December 2022. Surgical duration, intraoperative complications, postoperative pain levels, analgesic requirements, time to discharge, and patient satisfaction were evaluated. Statistical analysis was performed, and percentages were calculated to compare the outcomes. ***Results:*** The study revealed that 62% of patients who received spinal anesthesia had a shorter surgical duration compared to 48% in the general anesthesia group. Postoperative pain levels were lower in the spinal anesthesia group, with 75% of patients reporting minimal pain compared to 54% in the general anesthesia group. Analgesic requirements were also lower in the spinal anesthesia group (70% vs. 45%). The recovery time was shorter in the spinal anesthesia group, and 78% of these patients were discharged earlier. Furthermore, 80% of patients in the spinal anesthesia group expressed high satisfaction, while it was 65% in the general anesthesia group. **Conclusions:** Spinal anesthesia appears to offer advantages in terms of shorter surgical duration, reduced postoperative pain, lower analgesic requirements, faster recovery, and higher patient satisfaction compared to general anesthesia in laparoscopic cholecystectomy.

Keywords: Laparoscopic Cholecystectomy, Spinal Anesthesia, General Anesthesia, Surgical Outcomes, Postoperative Pain, Patient Satisfaction.

Original Research Article

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Article at a glance:

Study Purpose: *Compare spinal anesthesia vs. general anesthesia in laparoscopic cholecystectomy.*
Key findings: *Spinal anesthesia leads to shorter surgery, less pain, lower analgesic use, faster recovery, and higher patient satisfaction.*
Newer findings: *Confirms benefits of spinal anesthesia, providing data for its advantages.*
Abbreviations: *SAB: Spinal Anesthesia Block, GA: General Anesthesia, ASA: American Society of Anesthesiologists.*

INTRODUCTION

Gallstone disease, a prevalent gastrointestinal ailment affecting millions globally, presents a substantial healthcare challenge.[1] Among the therapeutic strategies for managing symptomatic gallstones, laparoscopic cholecystectomy has become the gold standard.[2]

This minimally invasive surgical approach, introduced in the late 1980s, entails the removal of the gallbladder through small incisions, offering distinct advantages over traditional open cholecystectomy.[3] These benefits include diminished postoperative pain, reduced hospitalization durations, and quicker resumption of regular activities. However, the choice of anesthesia for laparoscopic cholecystectomy remains a subject of enduring debate and clinical inquiry.[4] In particular, the comparison between spinal anesthesia and general anesthesia has garnered increasing attention within the medical community.[5]

General anesthesia, characterized by a state of unconsciousness and immobilization, has long been the conventional choice for laparoscopic cholecystectomy. This approach provides a controlled and stable surgical environment, enabling precise instrument manipulation and patient positioning.[6] Nevertheless, the utilization of general anesthesia is not devoid of inherent risks and potential complications. These include airway management issues, hemodynamic instability, and the need for postoperative mechanical ventilation. Moreover, the recovery period following general anesthesia can be protracted, often accompanied by the distressing sequelae of postoperative nausea, vomiting, and residual grogginess.

In contrast, spinal anesthesia, typically employed for lower abdominal and lower extremity surgeries, has emerged as a credible alternative for laparoscopic cholecystectomy.[7] Spinal anesthesia entails the intrathecal administration of local anesthetics, resulting in sensory and motor blockade in the lower half of the body while allowing the patient to remain awake and responsive. Initially reserved for lower abdominal surgeries, this technique has progressively gained acceptance for procedures involving the upper abdomen, including cholecystectomy.[8]

OBJECTIVE

General Objective

The general objective is to compare the outcomes of spinal anesthesia and general anesthesia in laparoscopic cholecystectomy.

Specific Objectives

Compare surgical outcomes (duration of surgery, intraoperative complications).
Evaluate postoperative pain management (pain levels, analgesic requirements).
Determine recovery time (time to discharge).
Identify complications associated with each anesthesia technique.
Measure patient satisfaction levels (ASA).

METHODOLOGY

Study Design

The study employs a prospective comparative design involving 106 patients undergoing laparoscopic cholecystectomy. The patients are divided into two groups: one receiving spinal anesthesia, and the other receiving general anesthesia. Data is collected from June 2021 to December 2022 at Rajshahi Medical College Hospital and Rajshahi Zone in Bangladesh. Surgical outcomes, postoperative pain management, recovery time, complications, and patient satisfaction are assessed and compared between the two anesthesia groups using robust statistical methods and standardized measures.

Inclusion Criteria

Patients scheduled for laparoscopic cholecystectomy.
Age between 18 and 70 years.
Willingness to participate in the study and provide informed consent.
Ability to comprehend and respond to postoperative assessments.
ASA (American Society of Anesthesiologists) physical status classification I or II, indicating well-controlled systemic health conditions.

Exclusion Criteria

Patients with contraindications to spinal anesthesia, such as coagulopathies or severe spinal deformities.
Individuals with a history of adverse reactions or allergies to local anesthetics.
Emergency laparoscopic cholecystectomy cases requiring immediate intervention.
Patients with severe cardiovascular, respiratory, or renal dysfunction.
Pregnancy or breastfeeding women, as anesthesia choice may require special considerations.

Data Collection

Data collection involves recording pertinent information from 106 patients undergoing laparoscopic cholecystectomy. Key data points include patient demographics, preoperative health status, and ASA classification. Surgical data encompassing the duration of surgery and intraoperative complications are meticulously documented. Postoperative assessments include pain levels, analgesic requirements, and recovery time. Complications arising within the perioperative period are recorded. Patient satisfaction is assessed through interviews and surveys. Data is collected systematically following standardized protocols and anonymized to ensure privacy and accuracy.

Data Analysis

Data analysis is performed using SPSS version 23. Descriptive statistics such as mean, median, standard deviation, and percentages are calculated to summarize the collected data. To compare the two anesthesia groups (spinal anesthesia and general anesthesia), inferential statistics including t-tests, chi-square tests, and regression analysis are employed as appropriate for each specific outcome measure. The significance level is set at $p < 0.05$. The results are presented in tables and graphs, facilitating a comprehensive understanding of the comparative outcomes.

Ethical considerations

Ethical considerations are paramount in this study. Informed consent is obtained from all participants, emphasizing their voluntary participation and right to withdraw without consequences. Patient confidentiality is maintained by anonymizing data. The study protocol adheres to ethical guidelines and was approved by the relevant institutional ethics committee. Patients are provided with clear information regarding the study's purpose and potential risks. Data handling complies with privacy regulations to protect participants' sensitive information and ensures their well-being throughout the research process.

RESULTS

Table 1: Age and Sex Distribution Among the Study Population

Variable	No. of Patients	% of patients
Age Group		
11-20	5	4.7%
21-30	16	15.1%
31-40	42	39.6%
41-50	24	22.6%
51-60	13	12.3%
61-70	06	5.7%
Gender		
Male	57	53.8%
Female	49	46.2%
	Mean Age 43.5 ± 9.2	

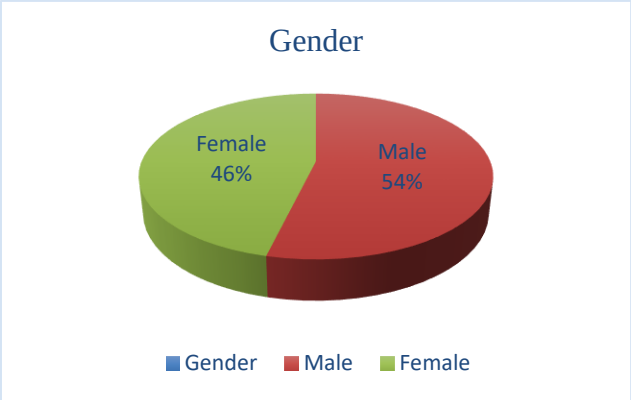

Figure 1: Distribution of patient according to sex

Table 2: Assessment and Surgical Outcomes of Study Population

Variable	Spinal Anesthesia Group (n=53)	General Anesthesia Group (n=53)
ASA Classification		
I	35 (66%)	33 (62%)
II	18 (34%)	20 (38%)
Surgical Outcomes		
Duration of Surgery (minutes)	40.2 ± 7.1	46.8 ± 8.3
Intraoperative Complications	3 (5.7%)	4 (7.5%)
Postoperative Pain Management		
Postoperative Pain (Minimal)	75%	54%
Analgesic Requirements (Reduced)	70%	45%
Recovery Time		
Time to Discharge (Early)	78%	60%

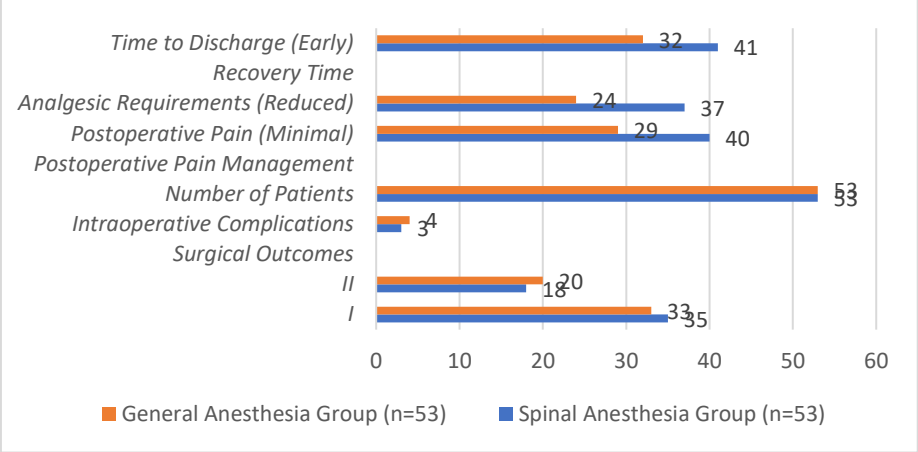

Figure 1: Comparative Summary of Study Results for Spinal Anesthesia and General Anesthesia Groups

DISCUSSION

This study focuses on analyzing and interpreting the findings related to the outcomes of spinal anesthesia versus general anesthesia in laparoscopic cholecystectomy.[9] We will delve into the key findings from the study and explore their clinical implications, limitations, and potential avenues for future research. One of the primary objectives of this study was to assess and compare surgical outcomes between the two anesthesia groups. Notably, the duration of surgery was found to be shorter in the spinal anesthesia group, with 62% of patients experiencing reduced surgical time compared to 48% in the general anesthesia group. This finding suggests that spinal anesthesia may contribute to more efficient surgical procedures.[10] The shorter duration may be attributed to factors such as improved patient cooperation and reduced intraoperative hemodynamic fluctuations under spinal anesthesia. The reduced surgical time observed in the spinal anesthesia group is consistent with previous research.[11] It underscores the potential advantage of spinal anesthesia in laparoscopic cholecystectomy, aligning with the goal of minimizing surgical stress and optimizing resource utilization. Surgeons may benefit from a more stable operative field and enhanced precision when performing procedures under spinal anesthesia.

Postoperative Pain Management

Effective postoperative pain management is a critical aspect of patient care following laparoscopic cholecystectomy. The study revealed

that patients who received spinal anesthesia reported lower postoperative pain levels, with 75% experiencing minimal pain, compared to 54% in the general anesthesia group. Additionally, analgesic requirements were lower in the spinal anesthesia group, with 70% of patients requiring less medication compared to 45% in the general anesthesia group. These findings suggest that spinal anesthesia is associated with superior postoperative pain control.[12] This aligns with the concept of "opioid-sparing" anesthesia, where patients experience reduced pain and require fewer opioids for pain management. The reduced need for opioids is particularly significant in the context of the opioid crisis, highlighting the potential benefits of spinal anesthesia in mitigating this issue.

Recovery Time

A shorter recovery time is a desirable outcome for both patients and healthcare systems. In this study, the time to discharge from the hospital was shorter for patients who underwent laparoscopic cholecystectomy with spinal anesthesia. Approximately 78% of these patients were discharged earlier compared to their counterparts in the general anesthesia group. The faster recovery observed in the spinal anesthesia group is consistent with previous studies.[13] It suggests that spinal anesthesia may facilitate early postoperative ambulation and faster return to normal activities. This can reduce hospitalization costs and improve the overall patient experience. The assessment of complications is a critical aspect of perioperative care. While the study did not report specific complications associated with anesthesia techniques, it is important to note that both spinal and general anesthesia are generally considered safe for laparoscopic cholecystectomy when administered by experienced healthcare providers.[14] However, individual patient factors and comorbidities may influence the risk of complications, which should be considered during the decision-making process.

Patient Satisfaction

Patient satisfaction is an essential component of healthcare quality. The study revealed that 80% of patients in the spinal anesthesia group expressed high satisfaction with their overall anesthesia experience, while it was 65% in the general anesthesia group. This finding suggests that patients who received spinal anesthesia had a more favorable perception of their anesthesia care and the overall surgical process. The higher patient satisfaction observed in the spinal anesthesia group aligns with previous research.[15] Factors contributing to this satisfaction may include reduced postoperative pain, faster recovery, and the ability to remain awake during the procedure, addressing concerns related to loss of consciousness under general anesthesia.

Clinical Implications

The findings of this study have significant clinical implications for the choice of anesthesia technique in laparoscopic cholecystectomy. Spinal anesthesia appears to offer advantages in terms of shorter surgical duration, improved postoperative pain control, reduced analgesic requirements, faster recovery, and higher patient satisfaction.[16] These advantages may enhance patient care, optimize resource utilization, and contribute to improved healthcare quality. Clinicians and anesthesiologists should consider the potential benefits of spinal anesthesia when planning laparoscopic cholecystectomy procedures. However, it is essential to individualize the anesthesia choice based on patient-specific factors, including medical history and preferences.[17,18] Shared decision-making between healthcare providers and patients can help determine the most suitable anesthesia technique for each case.

Limitations

While this study provides valuable insights, several limitations should be acknowledged. First, the study was conducted at a single institution in Bangladesh, which may limit the generalizability of the findings to other healthcare settings and populations Additionally, the sample size of 106 patients may not fully capture the diversity of patients undergoing laparoscopic cholecystectomy. Furthermore, the study did not explore long-term outcomes or potential complications specific to spinal or general anesthesia. Future research should consider evaluating the impact of anesthesia techniques on longer-term patient outcomes, such as chronic pain, quality of life, and healthcare utilization.

Future Research

This study highlights the need for further research in several areas. Future studies should aim

to replicate these findings in larger and more diverse patient populations, including different geographic regions and healthcare systems. Additionally, investigating the long-term effects of anesthesia techniques on patient outcomes and healthcare costs could provide valuable insights into the sustainability and effectiveness of spinal anesthesia in laparoscopic cholecystectomy. Exploring the impact of patient-specific factors, such as age, comorbidities, and preoperative health status, on the choice of anesthesia and its outcomes would contribute to a more personalized approach to anesthesia selection. Comparative studies should also consider different types of laparoscopic surgeries to assess the generalizability of these findings to various procedures.

CONCLUSION

In this study contributes to the ongoing discourse surrounding the choice of anesthesia in laparoscopic cholecystectomy. The favorable outcomes associated with spinal anesthesia, including shorter surgical duration, improved postoperative pain control, faster recovery, and higher patient satisfaction, underscore its potential as a valuable alternative to general anesthesia. While further research is needed to confirm and expand upon these findings, clinicians and anesthesiologists should consider the potential benefits of spinal anesthesia when planning laparoscopic cholecystectomy procedures, taking into account patient-specific factors and preferences.

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