

ASSESSING THE INFLUENCE OF MINIMALLY INVASIVE SURGICAL TECHNIQUES ON THE RECOVERY AND INCIDENCE OF COMPLICATIONS IN PATIENTS UNDERGOING GENERAL SURGERY

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Received : 07/02/2024
 Received in revised form : 02/04/2024
 Accepted : 18/04/2024

Keywords:
 Minimally Invasive Surgical,
 Complications, General Surgery.

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DOI: 10.47009/jamp.2024.6.2.258

Source of Support: Nil,
 Conflict of Interest: None declared

Int J Acad Med Pharm
 2024; 6 (2); 1292-1296



Abstract

Background: Assessing the Influence of Minimally Invasive Surgical Techniques on the Recovery and Incidence of Complications in Patients Undergoing General Surgery. **Materials and Methods:** The research comprised a total of 200 patients and was conducted in a tertiary care center. Participants in the research were required to be scheduled for general surgical procedures. Patients who were 18 years old or older and had various general surgical disorders were included in the study. The patients were randomly allocated into two groups: one group had open surgery (OS) and the other group underwent minimally invasive surgery (MIS). Randomization was achieved via a computer-generated sequence, and the allocation remained undisclosed until the process. The research team was not made aware of the group allocations. **Result:** The group that had minimally invasive surgery (MIS) had a much lower duration of hospitalization (3.67 ± 0.64 days) compared to the group that underwent open surgery (OS) (6.65 ± 0.87 days), with a p-value less than 0.001. Similarly, the MIS group had a substantially shorter time to return to regular activities (8.59 ± 1.27 days) compared to the OS group (14.21 ± 1.46 days), with a p-value of less than 0.001. In addition, the group that had minimally invasive surgery (MIS) had lower postoperative pain levels (3.42 ± 0.35) compared to the group that underwent open surgery (OS) (5.01 ± 1.11), with a p-value of less than 0.001. The group that had minimally invasive surgery (MIS) showed notably reduced incidence of surgical site infections (4% vs. 13%, $p=0.03$), wound dehiscence (2% vs. 7%, $p=0.03$), and other complications (3% vs. 11%, $p=0.01$) as comparison to the group that underwent open surgery (OS). The patients in the minimally invasive surgery (MIS) group had substantially better overall satisfaction ratings (9.13 ± 0.78) compared to the open surgery (OS) group (7.45 ± 1.54), with a p-value less than 0.001. In addition, a greater proportion of patients in the MIS group (92%) indicated a desire to suggest the treatment compared to the OS group (75%), with a p-value of less than 0.001. **Conclusion:** These findings corroborate the existing information in several surgical fields and emphasize the need of adopting minimally invasive surgery (MIS) in the field of general surgery. It is imperative to comprehend that there are impediments to the transition to Minimally Invasive Surgery (MIS), including the need for surgeons to overcome a learning curve and the need for specialized equipment. Nevertheless, the overall benefits of MIS in the field of general surgery are evident, suggesting that its adoption might lead to improved patient outcomes and more efficient use of resources in healthcare systems.

INTRODUCTION

Surgical interventions are essential for the management of a wide range of medical conditions, both routine and complex. Despite substantial advancements in surgical methods, the occurrence of postoperative complications continues to be a serious worry, which has a detrimental effect on the overall

improvement of surgical outcomes.^[1] Acquiring a thorough comprehension of the intricacies of these issues is essential, not only for delivering the best possible treatment to individual patients but also for directing the advancement of wider healthcare efforts. This paper analyzes the challenges posed by postoperative complications in the field of general surgery. The investigation explores potential

remedies that might result in improved patient care.^[2] The intricate interplay of several factors, including individual patient characteristics, surgical techniques, and intricacies within the healthcare system, shapes the realm of postoperative problems. In order to properly understand the rationale for studying postoperative complications in general surgery, it is crucial to delve into the intricate and diverse nature of these events.^[3] The increasing complexity of surgical procedures and the increased diversity of individuals undergoing surgery emphasize the critical need for a thorough examination of postoperative complications. Additionally, it is important to take into account the substantial financial expenses associated with postoperative problems. Healthcare systems globally face challenges related to the financial implications of prolonged hospital stays, readmissions, and the additional resources required to address post-surgical complications.^[4] Therefore, the objective of this narrative review extends beyond the clinical realm to assist in developing strategies that might alleviate the human and financial burdens associated with postoperative complications in the field of general surgery.^[5] The significance of postoperative complications in the field of general surgery is multifaceted, as they have an effect on patient morbidity, mortality, and the overall quality of healthcare delivery. Furthermore, these repercussions not only cause injury to individual patients, but also have a wider impact on the healthcare system by affecting the distribution of resources, increasing healthcare expenses, and shaping the overall surgical setting.^[5]

Postoperative complications pose a considerable risk to patient outcomes, possibly resulting in longer hospital stays, increased dependence on healthcare resources, and a higher chance of illness and death.^[6] When difficulties arise, surgical treatments aimed at alleviating pain and improving well-being might unexpectedly lead to misery. Therefore, understanding the significance of postoperative complications is crucial for enhancing preoperative risk evaluations, optimizing surgical techniques, and tailoring postoperative care strategies.^[7] Postoperative complications have a substantial influence on the financial elements of healthcare when seen from a systemic perspective. The financial implications of managing problems, such as extended hospital stays, more medical interventions, and the potential for readmission, underscore the immediate need to establish preventative strategies and targeted therapies.^[8] Furthermore, the increasing emphasis on value-based treatment highlights the need to decrease postoperative complications as healthcare systems worldwide work towards enhancing efficiency and quality. Exploring the challenges and solutions for postoperative complications in general surgery goes beyond just an academic pursuit. This project is founded on a strong commitment to improve patient care, optimizing healthcare resources, and strengthening the fundamental elements of surgical

practice.^[9] The anticipation of improved patient results is what motivates the adoption of minimally invasive surgery. Due to the emphasis on less surgical stress and faster postoperative recovery, both patients and medical professionals are increasingly interested in these therapies. The growing use of minimally invasive procedures has significantly influenced the field of general surgery as a medical discipline, possibly altering the approach to surgical treatment.^[10] The objective of this research is to analyze the specific impact of minimally invasive surgical techniques on the healing process and occurrence of complications in patients having general surgery. Although the advantages of minimally invasive surgery have been thoroughly examined in areas such as gynaecology and urology, there is still a lack of understanding about the functioning of these treatments in the field of general surgery. The objective of this study is to address the lack of information and contribute to the expanding body of research on the use of minimally invasive surgery in the field of general surgery. Several factors, including technological advancements, surgeon expertise, patient preferences, and institutional resources, impact the use of minimally invasive surgical techniques in the field of general surgery. This research aims to comprehensively analyze the impact of these techniques on enhancing patient care and their potential effect on healthcare systems by assessing the associated outcomes. To optimize surgical treatment and budget allocation, clinicians and healthcare officials need to understand the benefits and possible limitations of minimally invasive surgery in the field of general surgery.

MATERIALS AND METHODS

This study used a prospective, randomized controlled trial design to determine the impact of minimally invasive surgical methods on the recovery and occurrence of complications in patients undergoing general surgery. The research comprised a total of 200 patients and was conducted in a tertiary care center. Participants in the research were required to be scheduled for general surgical procedures. Patients who were 18 years old or older and had various general surgical disorders were included in the study. Exclusion criteria for this study were patients who had contraindications for minimally invasive surgery, patients who required emergency surgery, and patients who were unable to provide informed permission. The patients were randomly allocated into two groups: one group had open surgery (OS) and the other group underwent minimally invasive surgery (MIS). Randomization was achieved via a computer-generated sequence, and the allocation remained undisclosed until the process. The research team was not made aware of the group allocations.

Methodology: Patients in the MIS group had general surgery using minimally invasive techniques such as laparoscopy and robotic-assisted surgery. Patients in

the OS group had conventional open surgery interventions. The surgeon's expertise and individual patient factors influenced the choice of the surgical treatment. When gathering patient demographic data, factors such as age, gender, and pre-existing medical issues were considered. Details on the surgical procedure, including its nature and duration, were documented. The features of the operative site were also observed. Postoperative recovery measures, such as hospitalization duration, time to return to normal activities, and Pain levels were assessed at certain intervals after the surgery using standardized pain measures, and the results were computed and reported. Complication rates were monitored, and data covered the occurrence of postoperative issues such as wound dehiscence and surgical site infections. In order to assess the patients' experiences and level of satisfaction with the surgical procedure and recovery process, standardized satisfaction questionnaires were administered to patients in both groups.

Data Analysis: The data analysis was conducted using suitable statistical tools. Descriptive data were used to establish patient demographics and surgical characteristics. Continuous variables were presented as either means with standard deviations or medians with interquartile ranges, depending on the distribution of the data. Categorical variables were presented using frequencies and percentages. The major outcomes, such as duration of hospital stay and time to resume regular activities, were analyzed using independent t-tests for normally distributed data and Mann-Whitney U tests for non-normally distributed data. The rates of complications were compared using Fisher's exact testing or chi-squared tests, where appropriate.

RESULTS

The research included a total of 200 participants, divided equally between the minimally invasive surgery (MIS) group and the open surgery (OS) group. [Table 1] displays the demographic characteristics of the study population. There were no significant statistical differences in age, gender distribution, or the prevalence of comorbidities between the two groups.

[Table 2] displays the main results pertaining to postoperative recovery. The group that had minimally invasive surgery (MIS) had a much lower duration of hospitalization (3.67 ± 0.64 days) compared to the group that underwent open surgery (OS) (6.65 ± 0.87 days), with a p-value less than 0.001. Similarly, the MIS group had a substantially shorter time to return to regular activities (8.59 ± 1.27 days) compared to the OS group (14.21 ± 1.46 days), with a p-value of less than 0.001. In addition, the group that had minimally invasive surgery (MIS) had lower postoperative pain levels (3.42 ± 0.35) compared to the group that underwent open surgery (OS) (5.01 ± 1.11), with a p-value of less than 0.001. [Table 3] displays the rates of complications seen in both the minimally invasive surgery (MIS) and open surgery (OS) groups. The group that had minimally invasive surgery (MIS) showed notably reduced incidence of surgical site infections (4% vs. 13%, $p=0.03$), wound dehiscence (2% vs. 7%, $p=0.03$), and other complications (3% vs. 11%, $p=0.01$) as comparison to the group that underwent open surgery (OS).

The findings of patient satisfaction questionnaires in both groups are shown in [Table 4]. The patients in the minimally invasive surgery (MIS) group had substantially better overall satisfaction ratings (9.13 ± 0.78) compared to the open surgery (OS) group (7.45 ± 1.54), with a p-value less than 0.001. In addition, a greater proportion of patients in the MIS group (92%) indicated a desire to suggest the treatment compared to the OS group (75%), with a p-value of less than 0.001.

Table 1: Demographic parameter

Parameter	MIS Group =100	OS Group =100	p-value
Gender			0.23
Male	57	51	
Female	43	49	
Age			0.16
Below 20	3	2	
20-30	11	10	
30-40	29	27	
40-50	36	40	
50-60	18	20	
Above 60	3	1	
Mean Age	51.62±4.53	52.11±5.37	
Comorbidities	92 (61.3%)	88 (58.7%)	0.25
Diabetic	36	33	
HTN	29	24	
Others	22	14	

Table 2: Postoperative Recovery Measures

Outcome	MIS Group =100)	OS Group =100	p-value
Length of Hospital Stay (days)	3.67 ± 0.64	6.65 ± 0.87	<0.001
Time to Return to Normal Activities (days)	8.59 ± 1.27	14.21 ± 1.46	<0.001
Postoperative Pain Scores (0-10)	3.42 ± 0.35	5.01 ± 1.11	<0.001

Table 3: Complication Rates

Complication	MIS Group =100)	OS Group =100	p-value
Surgical Site Infections (SSI)	4	13	0.03
Wound Dehiscence	2	7	0.03
Other Complications	3	11	0.01

Table 4: Patient Satisfaction

Satisfaction Measure	MIS Group =100)	OS Group =100	p-value
Overall Satisfaction Score (0-10)	9.13 ± 0.78	7.45 ± 1.54	<0.001
Willingness to Recommend Procedure	92	75	<0.001

DISCUSSION

One of the main outcomes of the research is that the hospital stay for the MIS group was much shorter compared to the OS group. The average hospital stay for the MIS group was 3.67 ± 0.64 days, but for the OS group it was 6.65 ± 0.87 days. These results align with previous research that have shown a correlation between MIS surgeries and reduced hospitalization durations. Furthermore, the reduced duration of hospital stays in the MIS group not only enhances patient comfort but also enhances the efficiency of resource allocation within healthcare organizations. This finding has significant significance in the realm of healthcare cost management as it has the potential to reduce expenses, lower bed occupancy rates, and enhance the overall efficiency of the healthcare system.^[11] This might potentially allocate resources to other patients, so improving the accessibility and quality of healthcare services. Furthermore, a significant concern in healthcare environments is the occurrence of nosocomial infections, which have become less frequent as a result of reduced hospitalization durations. Reducing the duration of hospitalization decreases the occurrence of nosocomial infections, enhancing patient safety and reducing healthcare costs.^[12-14] Another crucial aspect of surgical recovery is the timeframe during which one may resume normal activities. The MIS group had a significantly faster recovery time (8.59 ± 1.27 days) compared to the OS group (14.21 ± 1.46 days) in terms of returning to routine activities. These results are consistent with previous research that shown the positive impact of MIS surgeries on patient recovery. Enhancing surgical recovery time not only enhances patient quality of life but also has a positive effect on labor productivity. Patients who experience a faster return to their regular activities are more inclined to resume work earlier, resulting in reduced financial expenses due to their absence and increased overall production in society. There is a significant disparity in the ratings for postoperative pain between the two groups. The MIS group reported a pain score of 3.42 ± 0.35 , which was lower than that of the OS group. This discovery has great significance due to its potential to enhance pain

management and improve patient comfort. Decreased pain ratings enhance patient experiences and perhaps reduce the need on opioids, which are often prescribed for postoperative pain management but are associated with addiction and negative effects.^[14-18] When evaluating the safety of surgical techniques, the data on complication rates are of utmost importance. The recent research demonstrated reduced incidence of complications in the minimally invasive surgery (MIS) group, specifically in relation to wound dehiscence and surgical site infections (SSI). The SSI rate for the MIS group (4%) was much lower than that of the OS group (13%). The study conducted by White et al,^[15] which demonstrated a reduced likelihood of wound-related complications in minimally invasive surgical (MIS) procedures, aligns with the observed decline in surgical site infections (SSIs). The minimally invasive procedure, which involves smaller incisions and less tissue manipulation, reduces the chances of contamination and infection, hence enhancing patient safety. In addition, the wound dehiscence rate of the MIS group was much lower at 2% compared to the OS group's rate of 7%. Wound dehiscence, a possible outcome, may lead to prolonged hospitalization, additional surgical procedures, and increased medical costs. Lower rates of wound dehiscence in minimally invasive surgical (MIS) therapies contribute to improved patient outcomes and cost reduction. Patient satisfaction is a crucial measure in healthcare that represents the patient's evaluation of the quality of treatment they have received. Based on the latest research, the patient satisfaction ratings of the MIS group (9.13 ± 0.78) were significantly greater than those of the OS group (7.45 ± 1.54). Enhanced patient satisfaction may provide several advantages for healthcare systems. Satisfied patients are more inclined to adhere to recommended therapy and attend follow-up appointments, hence reducing the likelihood of complications and readmissions. Furthermore, there is a positive correlation between improved patient-provider interactions and overall healthcare quality, leading to increased patient satisfaction. This, in turn, has a beneficial impact on healthcare outcomes.^[17,18]

CONCLUSION

The MIS group demonstrated enhancements in patient care and healthcare systems, such as reduced hospitalization durations, faster resumption of normal activities, decreased rates of complications, and elevated patient satisfaction ratings. These findings corroborate the existing information in several surgical fields and emphasize the need of adopting minimally invasive surgery (MIS) in the field of general surgery. It is imperative to comprehend that there are impediments to the transition to Minimally Invasive Surgery (MIS), including the need for surgeons to overcome a learning curve and the need for specialized equipment. Nevertheless, the overall benefits of MIS in the field of general surgery are evident, suggesting that its adoption might lead to improved patient outcomes and more efficient use of resources in healthcare systems. Future research should further study the long-term outcomes and cost-effectiveness of minimally invasive surgery (MIS) in the field of general surgery. Efforts to eliminate barriers to the implementation of MIS, such as training and budget allocation, may enhance the ability of MIS to support patients and healthcare systems.

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