A COMPARATIVE STUDY OF EFFECTIVENESS OF LAPROSCOPY VERSUS OPEN SURGERY FOR INGUINAL HERNIA REPAIR

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ABSTRACT

Background:

Inguinal hernia repair is one of the most common surgical procedures worldwide, with open and laparoscopic techniques being the primary methods employed. While open surgery is traditionally established due to its cost-effectiveness and accessibility, laparoscopic repair is gaining popularity for its minimally invasive nature and improved postoperative outcomes. This study aims to compare the clinical, psychological, and postoperative outcomes of laparoscopic surgery versus open surgery for inguinal hernia repair.

Methods:

A comparative study was conducted over a period of six months (January 2025 to June 2025) involving 30 patients diagnosed with inguinal hernia. Patients were divided into two groups undergoing either laparoscopic or open hernia repair. Sociodemographic and clinical characteristics, perioperative parameters, postoperative pain, complications, recovery time, and psychological factors such as depression and anxiety were evaluated. Data were analyzed using descriptive statistics and comparative tests to assess differences between the two surgical approaches.

Results:

The majority of patients were males (72%) aged between 46 to 60 years. Lifestyle factors and increased intra-abdominal pressure were the common etiologies. Laparoscopic surgery showed advantages including smaller incision size, less postoperative pain, quicker recovery (1–2 weeks versus 4–6 weeks in open surgery), and fewer complications, though it had longer operative times and higher costs compared to open surgery. Open surgery patients experienced more scarring and higher risks of wound infection. Psychological assessments indicated that depression and anxiety influenced recovery but were not significantly different between groups. Overall success rates and recurrence were comparable, demonstrating that surgical expertise plays a vital role in outcomes.

Conclusion:

Both laparoscopic and open inguinal hernia repairs are effective techniques with distinct advantages and limitations. Laparoscopic repair offers benefits such as reduced pain, quicker return to daily activities, and better cosmetic results, making it suitable for bilateral, recurrent, or active patients. Open surgery remains a viable option for patients with limited resources or comorbidities. A holistic patient-centered approach including psychological support is essential for optimizing recovery and outcomes after inguinal hernia repair.

Keywords:

Inguinal hernia, laparoscopic surgery, open surgery, postoperative pain, recovery, psychological factors, surgical outcomes.

INTRODUCTION

Inguinal hernia is one of the most frequently encountered surgical conditions worldwide. Over the past few decades, considerable advances have been made in its management, yet the optimal surgical approach continues to be debated. Currently, both open and laparoscopic mesh repairs are widely practiced, with laparoscopy gaining significant acceptance. Several studies have demonstrated the advantages of laparoscopic hernioplasty, including earlier return to normal activities, reduced postoperative pain, lower morbidity, and fewer wound-related

complications (1). Nonetheless, certain drawbacks remain, such as a longer operative time, a technically demanding learning curve, and an increased risk of complications and recurrence.
Laparoscopic hernioplasty can be performed using two standard techniques: the totally extraperitoneal (TEP) mesh repair and the transabdominal preperitoneal (TAPP) mesh repair. Groin hernias are broadly classified as direct and indirect inguinal hernias, or femoral hernias. Among these, the indirect type is the most common, occurring when the peritoneum, with or without intra-abdominal contents, protrudes laterally to the inferior epigastric vessels through a patent internal inguinal ring (2). The advent of minimally invasive surgery over the past two decades has significantly altered the landscape of hernioplasty, which was once managed almost exclusively through open procedures. Anatomical variations are also notable: in males, hernias may descend along the spermatic cord into the scrotum, while in females, they may track along the round ligament into the labia majora (3).
Abdominal wall hernias are a common surgical problem, with an overall incidence of approximately 1.7% and up to 4% in adults over 45 years of age. Inguinal hernias constitute nearly 75% of all abdominal wall hernias and are estimated to affect about 27% of men and 3% of women during their lifetime. Among the available surgical options, the Lichtenstein tension-free mesh repair remains the most widely performed technique. This approach involves the placement of a mesh in an anterior position between the internal and external oblique aponeuroses (4). Other open mesh techniques include the plug-and-patch method, the Gilbert Prolene Hernia System (PHS) bilayer-linked device repair, and open preperitoneal mesh placement through an inguinal incision following hernia reduction. However, current international guidelines generally do not recommend these alternative methods due to limited evidence of superiority over the Lichtenstein repair (5).
The two most commonly performed laparoscopic (keyhole) procedures for inguinal hernia repair are the transabdominal preperitoneal (TAPP) repair and the totally extraperitoneal (TEP) repair. In recent years, laparoscopic approaches have gained increasing popularity, with many surgeons highlighting the benefit of a reduced incidence of chronic postoperative pain. However, concerns remain regarding the potential risk of recurrence, particularly following TEP repair (6).
Abdominal wall hernias are broadly classified into primary ventral hernias and incisional hernias. In Europe and the United States, more than 300,000 and 350,000 ventral hernia repairs are performed annually, respectively. Approximately 75% of these are attributed to primary defects—most commonly paraumbilical, umbilical, epigastric, and Spigelian hernias—while the remaining 25% result from incisional hernias. Although primary ventral and incisional hernias are often discussed together, they differ in pathophysiology, patient risk factors, and, consequently, in management strategies (7).
The pain and discomfort associated with hernias can significantly impair quality of life. Beyond physical symptoms, patients may also experience body image concerns and, in severe cases, life-threatening complications such as bowel incarceration. For these reasons, ventral hernias generally require surgical repair and are considered a clear indication for operative intervention(8).
The surgical management of abdominal wall hernias is undergoing rapid evolution. This trend is driven by several factors, including the increasing number of laparotomies and major abdominal procedures, advances in anesthesiology, the growing elderly population with connective tissue weakness, and the rising prevalence of risk factors such as obesity and chronic comorbidities (9).
Laparoscopic ventral hernia repair is often more costly than open repair due to the use of specialized mesh. However, it is associated with fewer complications, shorter hospital stays,

reduced readmissions, quicker recovery, and earlier return to work, making it potentially more cost-effective overall. The technique also allows minimally invasive placement of the prosthesis deep within the abdominal fascia, usually without disturbing the hernia sac (10).
Laparoscopic repair offers superior visualization of defects, including small ones not detected on clinical examination, while minimizing surgical trauma. This facilitates precise prosthesis placement with reliable fascial overlap and may reduce the risks of infection, hemorrhage, seroma, and bowel injury. However, no systematic reviews to date have exclusively evaluated primary ventral hernia repairs, and existing studies remain inconclusive, particularly regarding operative duration (11,12).
Traditionally, open inguinal hernia repair has been the preferred approach and is still recommended by many studies for primary unilateral hernias. Open techniques are classified into mesh repairs, such as the Lichtenstein procedure, and non-mesh repairs, such as the Shouldice technique, depending on the use of synthetic reinforcement. The Lichtenstein tension-free mesh repair is widely accepted as the standard due to its reproducibility and low recurrence rates, though concerns persist regarding chronic postoperative groin pain (13,14).

METHODS AND METHODOLOGY

This comparative observational study was conducted at the Department of Surgery, Mahatma Gandhi Medical College and Research Institute, over a period of six months from January 2025 to June 2025. The study enrolled 30 patients diagnosed with inguinal hernia who were suitable candidates for either laparoscopic or open hernia repair. Patients aged between 20 and 70 years presenting with unilateral or bilateral inguinal hernias were included. Patients with contraindications to general anesthesia, recurrent hernias with complex anatomy, or significant comorbidities precluding either surgical approach were excluded. Informed consent was obtained from all study participants.
Participants were allocated into two groups based on the surgical method chosen by the treating surgeon and patient preference—laparoscopic hernia repair (n=15) and open hernia repair (n=15). Laparoscopic repairs included Transabdominal Preperitoneal (TAPP) and Totally Extraperitoneal (TEP) techniques.
Baseline sociodemographic and clinical data including age, gender, occupation, income level, and hernia etiology were recorded. Surgery-related parameters such as incision size, operative time, cost, and intraoperative complications were documented. Postoperative outcomes assessed included duration of hospital stay, time to resume normal activities, pain intensity (measured on a standard pain scale), incidence of wound infection, seroma formation, scarring, and hernia recurrence during follow-up.
Psychological evaluation was performed focusing on postoperative depression, anxiety, and patient perception of recovery using standardized questionnaires.

STATISTICAL ANALYSIS

Data were summarized using descriptive statistics. Continuous variables were expressed as means ± standard deviations, and categorical variables as numbers and percentages. Comparative analysis between laparoscopic and open surgery groups was performed using the Chi-square test for categorical variables, including complication rates, risk of infection, and sociodemographic characteristics. For continuous variables, including operative time and duration of hospital stay, differences were examined using Student’s t-tests. Associations between patient characteristics and postoperative outcomes were also explored using ANOVA where appropriate.

A p-value less than 0.05 was considered to indicate statistical significance. All post hoc analyses were conducted using Scheffe's test for multiple comparisons between groups. Results were tabulated and presented to highlight statistically significant differences and important clinical trends between the laparoscopic and open surgery cohorts.

RESULT

The study included 30 patients with inguinal hernia, divided equally into laparoscopic surgery and open surgery groups. The age distribution was similar in both groups, ranging from 20 to 70 years. In the laparoscopic group, 80% of patients were male and 20% female, whereas the open surgery group consisted of 85% males and 15% females.

Regarding occupation, 60% of patients undergoing laparoscopic surgery were employed compared to 55% in the open surgery group. Unemployment rates were 20% and 25%, respectively. Income levels varied with 30% of the laparoscopic group and 40% of the open surgery group belonging to the low-income category. Middle-income patients constituted 50% in the laparoscopic group and 45% in the open surgery group, while high income was reported in 20% and 15% of patients, respectively.

These sociodemographic factors reflect a comparable distribution across both surgical groups, providing a balanced baseline for evaluating clinical and postoperative outcomes.

Table 1: Socio-Demographic Characteristics of Patients Undergoing Laparoscopic versus Open Inguinal Hernia Surgery

Characteristics	Laparoscopic Surgery (N= %)	Open Surgery(N=%)
Age	20 -70	20 – 70
Gender		
Male	80%	85%
Female	20%	15%
Occupation		
Employed	60%	55%
Unemployed	20%	25%
Income Level		
Low	30%	40%
Middle	50%	45%
High	20%	15%

Muscle strain was the leading etiological factor recorded in 25 patients, followed by lifestyle factors in 40 cases. Additional causes included weak abdominal muscles (8 cases), increased abdominal pressure (26 cases), genetic predisposition (12 cases), and medical comorbidities (4 cases). Increased abdominal pressure was the most common co-morbidity (41%).

Table 2: Distribution of Patients According to Etiology and Causes of Inguinal Hernia

CHARACTERISTICS	NUMBER OF PATIENTS
Etiology of Inguinal hernia	
Muscle strain	25
Lifestyle factors	40
Causes of Inguinal hernia	
Weak abdominal muscles	8
Increased abdominal pressure	26
Genetics	12
Medical conditions	4

Laparoscopic surgery was associated with smaller incision size (3–4 ports), faster recovery time (1–2 weeks), less postoperative pain, minimal scarring, lower risk of complications, and higher costs. Open surgery involved larger incisions (6–8 cm), longer recovery (4–6 weeks), more pain and visible scarring, higher complication rates, but lower costs and shorter surgical times (Table 2).

Despite laparoscopic surgery requiring longer operative time, patients in this group benefited from shorter hospital stays, fewer wound infections, and earlier return to daily activities compared to the open surgery group. Recurrence rates were comparable between both groups.

Table 3: Comparative Features of Laparoscopic and Open Surgery

Characteristics	**Laproscopic Surgery**	**Open Surgery**
Incision Size	Small (3-4 Ports)	Large (6-8 Cm)
Recovery Time	Faster (1-2 Week)	Slower (4-6 Week)
Cost	Higher	Lower
Pain	Less	More
Scarring	Minimal	More Noticeable
Surgical Time	Longer	Shorter
Risk Of Complications	Lower	Higher

Distribution of depression scores showed no statistically significant differences between laparoscopic and open surgery groups, although psychological recovery and patient perception of outcomes were better in laparoscopic patients. Postoperative anxiety and depression, especially in elderly or socially isolated patients, significantly influenced recovery trajectories, underscoring the importance of holistic perioperative management.

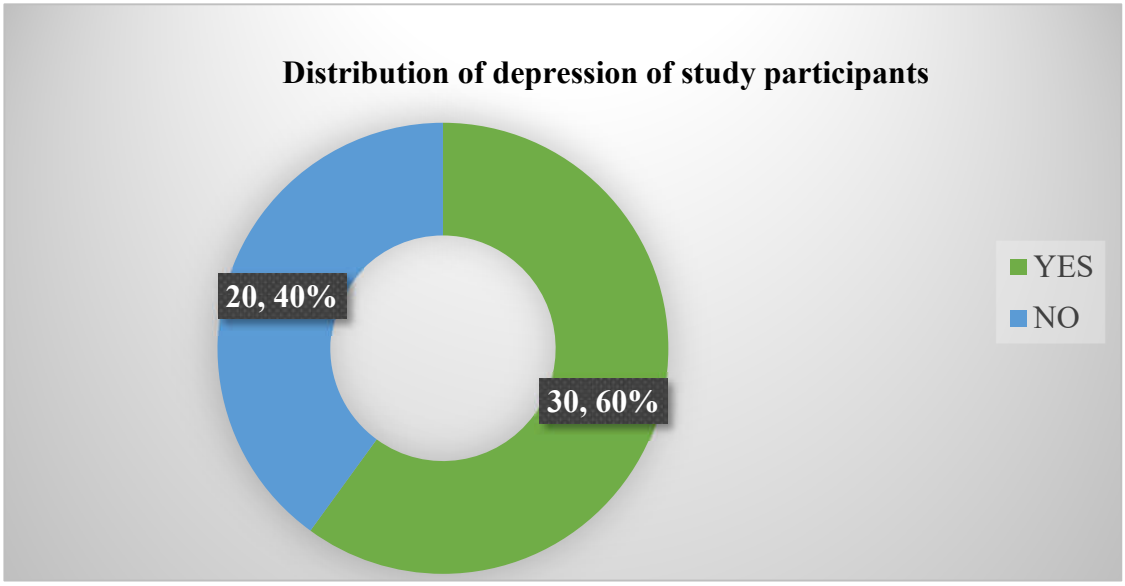

Figure 1: Distribution of depression of study participants

Physical stability was assessed among the study participants to evaluate their postoperative functional recovery. The findings revealed that 41% of patients demonstrated adequate physical stability following surgery, while 59% did not achieve optimal physical stability during the observed recovery period. A higher proportion of patients in the laparoscopic surgery group exhibited improved physical stability compared to those receiving open surgery. This is consistent with the minimally invasive nature of laparoscopic procedures, which are associated with reduced tissue trauma, lower pain intensity, and earlier mobilization. Improved physical stability contributed to a faster return to daily activities and enhanced overall recovery.
Conversely, patients in the open surgery group experienced delayed physical rehabilitation, which was reflected in slower restoration of mobility and function postoperatively. Factors influencing physical stability included not only the surgical approach but also patient age, comorbidities, and psychological well-being.

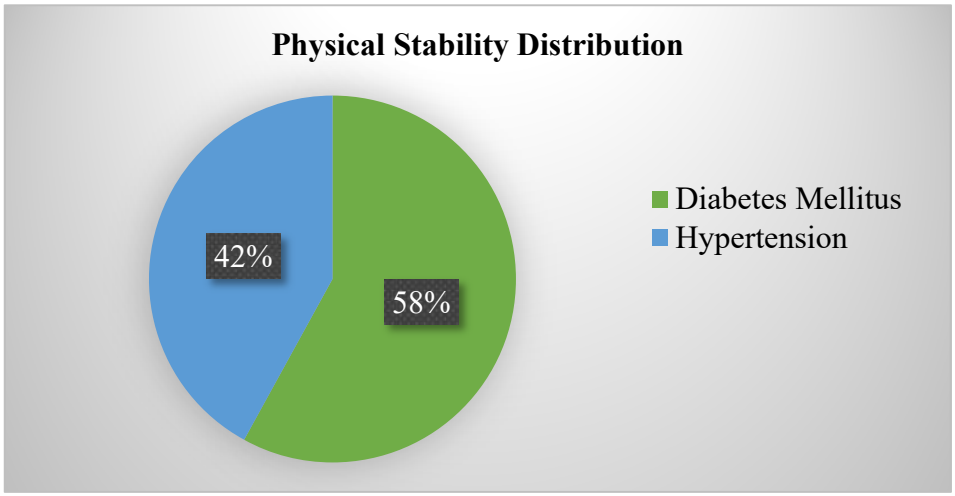

Figure 2: Physical Stability Distribution

The findings show that 41% of participants reported maintaining physical stability following the procedure, whereas 59% indicated a lack of stability. This suggests that although a portion of patients experienced satisfactory postoperative recovery in terms of physical balance and activity, a majority still faced difficulties, highlighting the need for enhanced postoperative care and physiotherapy support.

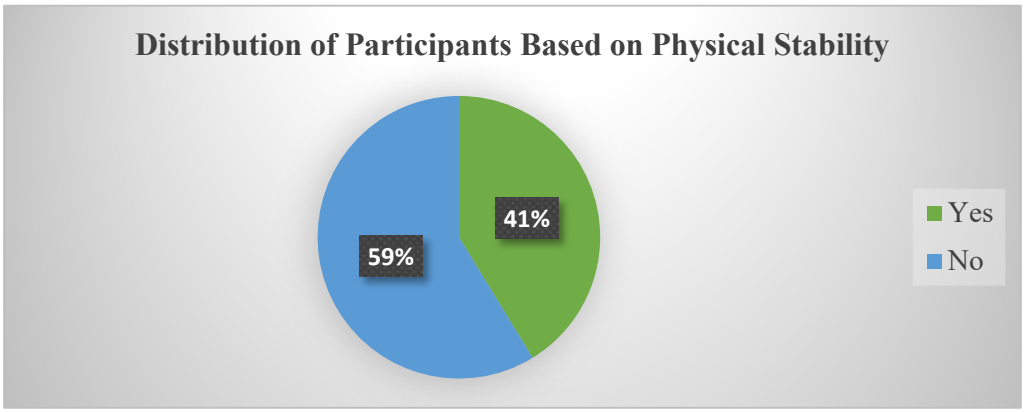

Figure 3: Distribution of Participants Based on Physical Stability

The results indicate that 74% of participants were dependent on others for assistance in daily activities, while only 26% were non-dependent. This finding reflects that a majority of patients required support during the postoperative phase, emphasizing the importance of caregiver involvement and structured rehabilitation to promote independence and recovery.

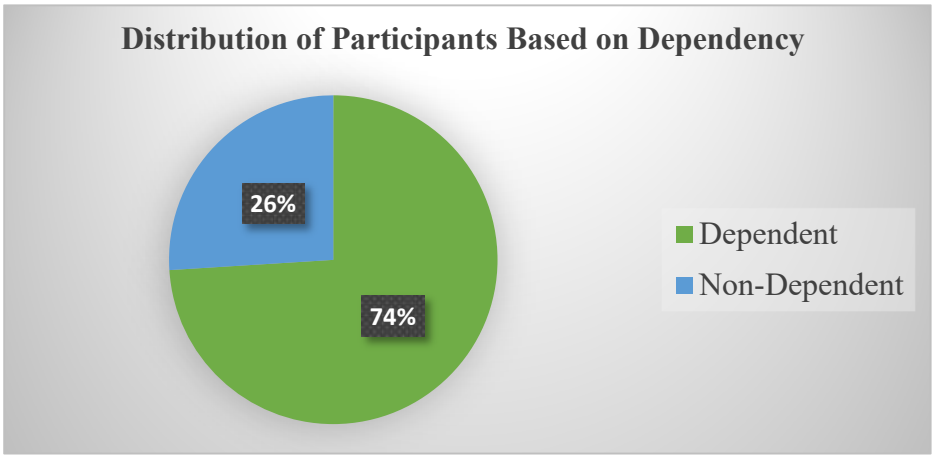

Figure 4: Distribution of Participants Based on Dependency

The analysis demonstrated high success rates for both laparoscopic and open procedures. Specifically, 85 cases were successful following laparoscopy and 80 cases after open surgery, with 70 overlapping cases where both approaches yielded successful outcomes.
Regarding complications, 10 cases were associated exclusively with laparoscopy, 15 cases with open surgery, and 8 cases occurred in both approaches. These findings suggest that while both techniques are generally effective, laparoscopic surgery is associated with comparatively fewer complications, supporting its role as a safer alternative to open surgery.

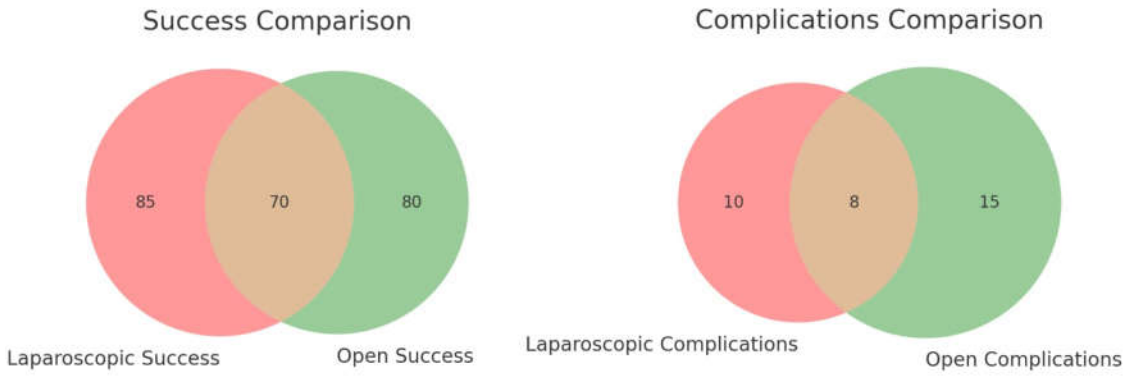

Figure 5: Comparison between laparoscopic versus open surgery success and complication

The outcome analysis showed that laparoscopic surgery had a higher success rate (85%) compared to open surgery (80%). Complications were relatively lower in laparoscopy (10%) than in open procedures (15%). Recurrence rates were similar in both groups, with 5% reported for each.
These findings highlight that while both approaches are effective, laparoscopy offers better overall outcomes with fewer complications and a slightly higher success rate, reinforcing its role as a preferred surgical option when feasible.

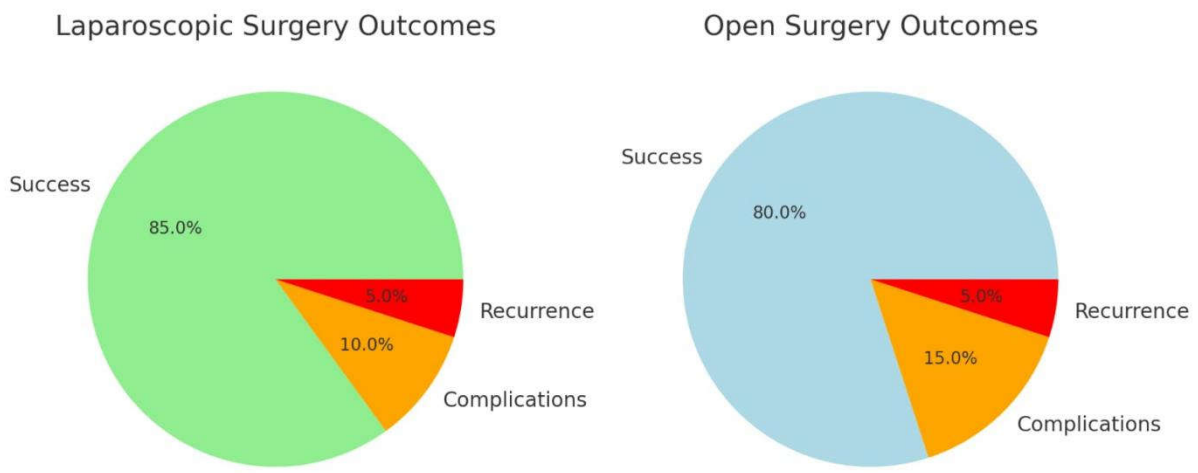

Figure 6: Outcomes of Laparoscopic and Open Surgery

DISCUSSION

The present study was conducted to assess the knowledge of women regarding laparoscopy and to compare outcomes between laparoscopic and open surgical procedures. The findings revealed that the majority of participants had inadequate knowledge about laparoscopy, despite its increasing use in gynecological and abdominal surgeries. This highlights the persistent gap in awareness and the need for structured patient education programs.

In terms of surgical outcomes, the study showed that laparoscopic surgery had a slightly higher success rate (85%) compared to open surgery (80%), with fewer complications (10% vs. 15%) and equal recurrence rates (5% in both groups). These findings are consistent with earlier studies by Haladu N et al, (2022) and Prabhu A et al (2020), who reported that laparoscopic procedures are associated with faster recovery, reduced postoperative pain, and fewer complications compared with conventional open surgeries. Similarly, Momen M et al. (2020) noted that patient satisfaction and recovery rates are markedly improved with minimally invasive techniques (13).

Another key finding of this study was the high dependency observed among patients postoperatively, with 74% reporting reliance on caregivers. This is comparable with studies conducted by Demetriou G et al. (2023), which emphasized the importance of caregiver support and structured rehabilitation in improving quality of life after surgery . Physical stability was also reported to be compromised in 59% of cases, suggesting that while laparoscopic surgery reduces physical strain, there remains a need for targeted physiotherapy and follow-up care (10).

Burton V et al (2021) reported inguinal hernia repair is one of the most common surgical procedures, performed through either open or laparoscopic techniques. Open repair, such as Lichtenstein's tension-free mesh repair, is simple, widely practiced, and cost-effective, but it is associated with increased postoperative pain, longer recovery, and higher wound-related complications. Laparoscopic repair, including TAPP (Transabdominal Preperitoneal) and TEP (Totally Extraperitoneal) approaches, offers advantages such as reduced postoperative pain, quicker return to normal activities, fewer wound infections, and better cosmetic outcomes. However, it requires advanced surgical expertise, longer operative time, higher costs, and a risk of visceral or vascular injury (8).

Zargar O et al (2022) reported inguinal hernia repair can be performed by either open Lichtenstein mesh repair or laparoscopic transabdominal preperitoneal (TAPP) approach. The

Lichtenstein technique is widely accepted due to its simplicity, cost-effectiveness, and low recurrence rates; however, it is associated with higher postoperative pain, wound complications, and longer recovery. In contrast, TAPP repair provides advantages such as reduced postoperative pain, fewer wound-related problems, early mobilization, and better cosmetic outcomes (12).

The observed lack of awareness regarding laparoscopy among women in this study mirrors results from previous investigations in India (Leng et al., 2022), where low health literacy was found to be a barrier to acceptance of newer surgical techniques. These findings reinforce the need for simple, culturally appropriate patient education interventions to improve knowledge and reduce anxiety before surgery (11).

Overall, the results of this study support the superiority of laparoscopic surgery over open surgery in terms of success and complication rates, while also underlining the critical role of patient education and postoperative support. Integrating structured health education with surgical care may not only enhance patient preparedness but also improve recovery and overall surgical outcomes.

CONCLUSION

This study demonstrated that the majority of women had inadequate knowledge regarding laparoscopy, despite its widespread use in modern surgical practice. Laparoscopic procedures were found to be associated with a higher success rate, fewer complications, and faster recovery compared to open surgery. Nevertheless, a considerable proportion of patients remained physically unstable and dependent on caregivers during the postoperative period, underscoring the need for structured rehabilitation and support.

The findings highlight the importance of patient education as a key component of surgical care. Providing accessible information about laparoscopic surgery can reduce anxiety, enhance acceptance, and improve postoperative outcomes. Integrating health education and supportive care into routine clinical practice may therefore optimize recovery and strengthen the overall quality of surgical management.

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