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Original Research

Laparoscopic versus open ventral hernia repair: A comparative study

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Abstract

Background: A ventral hernia, excluding femoral and inguinal hernias, is the protrusion of the contents of the abdomen through a defect in the abdominal wall.

Objectives: The aim of the current study was to compare laparoscopic and open ventral hernia repair.

Materials and Methods: The present prospective randomized hospital-based observational study was conducted in the department of general surgery (I.G.I.M.S.) and included 80 patients of both genders who needed surgical intervention for non-complicated ventral hernias.

Results: The mean age of patients in the open group I was 50.83 ± 12.72 years, while the mean age in the laparoscopic group II was 42.90 ± 10.63 years. There were 34 males and 46 females in both the open and laparoscopic groups. Paraumbilical hernias were the most common in both groups, which accounted for 68.75% of all patients involved in the present study. The mean duration of postoperative hospital stay in the open group was 5.32 days, which was longer as compared to the laparoscopic group (2.70 days). Postoperative seroma following laparoscopic repair accounted for 25% versus 10% following open repair.

Conclusion: According to the current study, laparoscopic ventral hernia repair offers several advantages over open repair, including less pain following surgery, a shorter hospital stay, faster return to regular activities, a lower risk of wound infection and ileus following surgery, and improved cosmetic results.

Keywords: Ventral hernia, laparoscopic ventral hernia repair, open ventral hernia repair, post-operative pain

Introduction

A ventral hernia, excluding femoral and inguinal hernias, is the protrusion of the contents of the abdomen through a defect in the abdominal wall [1]. Ventral hernias are classified as primary or secondary, depending on where in the abdominal wall they develop. Primary hernias include umbilical, epigastric, and hypogastric hernias, while secondary ventral hernias occur following surgery and are hence also referred to as incisional hernias [2]. Deciding on the surgical approach and repair procedure (open or laparoscopic), the type of mesh to use, anatomical or mesh repair, and where to place the mesh to ensure the strongest repair with the lowest chance of recurrence are the main challenges in managing hernias [3]. The two main approaches to managing ventral hernias are open and laparoscopic surgery. The use of laparoscopes in the treatment of abdominal wall hernia repair was first reported in 1993 by LeBlanc and William [4]. With improvements in technology and surgical technique, laparoscopic ventral hernia repair (LVHR) has gained significant popularity and is now routinely performed in most centres. This may offer benefits for the patients from the use of laparoscopic surgery, in which there is less operative time, a shorter hospital stay, reduced postoperative pain, improved patient outcomes, and fewer complications in comparison to open hernia repair [5].

Aims and Objectives

1. The aim of the current study was to compare laparoscopic and open ventral hernioplasty in relation to postoperative pain and
2. To compare the duration of surgery, hospital stay, and return to normal activity between the laparoscopic and open ventral hernia repair groups.

Materials and Methods

Study design: The present prospective randomized hospital-based observational study was conducted in the department of general surgery at Indira Gandhi Institute of Medical Sciences (I.G.I.M.S.), Patna, Bihar, India, from July 2018 to January 2020and included 80 patients of both genders who needed surgical intervention for non-complicated ventral hernias after the approval of the institutional ethical committee. All patients provided informed consent to participate in the research for the surgical procedure.

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Inclusion criteria

- Those who gave informed written consent
- Patients with non-complicated ventral hernias

Exclusion criteria

- Patients who refused to informed written consent
- Unfit for general anaesthesia,
- Complicated ventral hernias,
- Recurrent hernias,
- Those who converted from laparoscopic to open surgery and
- Pregnancy

Keeping power (1-beta error) at 80% and confidence interval (1-alpha error) at 95%, the minimum sample size required was 60 patients; therefore, we included 80 (more than the minimum required number of cases) patients in the present study. The current study included 80 patients with ventral hernia, who were divided into two groups: group I included 40 patients with ventral hernia who were operated on by laparoscopic ventral hernia repair (LVHR), and group II included 40 patients with ventral hernia who were operated on by open repair.
Simple randomization using computer-generated numbers was used to classify patients into two groups. No blinding of the allocated operation procedure was done for patients or medical staff.

Operative technique

Laparoscopic ventral hernia repair: A veress needle was used to create pneumoperitoneum, usually at the umbilicus or in the left hypochondrium, according to the site of the hernia. Carbon dioxide gas was used, and an intra-abdominal pressure of 15 mmHg was considered safe. One 10-mm port for the telescope and two or three 5-mm ports are placed, depending on the location of the hernia. The most frequent location of the ports is the left flank. Omental and bowel adhesions were reduced by the use of diathermy. After reduction of hernial contents, a dual mesh was placed with a 5 cm overlap beyond the margins of the defect. In larger defects, the mesh was first secured using transfascial sutures and two rows of tacks. The skin was closed by staples.

Open ventral hernia repair: The site of the hernia determined where the skin incision should be made. The hernia sac was dissected, and its contents were reduced. The primary defect was closed with a Prolene 1-0 suture. Subcutaneous flaps were raised to about 5 cm beyond the defect. A Prolene mesh of adequate size was placed over the site of the defect and was then secured to the anterior rectus sheath with Prolene sutures. Over a suction drain, nylon sutures were used to close the skin.

Postoperative follow-up: Postoperatively, all patients received intramuscular diclofenac sodium for 48 hours, followed by oral diclofenac sodium as and when required. Pain experienced by patients was recorded using the visual analog scale (VAS) on the first and seventh postoperative days. Patients were encouraged to start oral feedings eight hours following the surgery, initially with liquids followed by a normal diet. Surgical wounds were inspected on the day of discharge for seroma and signs of infection. After eight hours of surgery, patients were advised to begin oral feedings, starting with liquids and then shifting to a normal diet. Surgical wounds were checked for seroma and infection symptoms the day before they were discharged. Drains were taken out when output was less than 30 ml. Patients were initially followed up weekly for the first month, followed by monthly for the next six months. Operative time, postoperative complications, postoperative pain, duration of hospital stay, and time to return to normal activity after discharge were recorded. In order to avoid bias, all surgeries were performed by two experienced surgeons under the guidance of the head of the department.

Statistical analysis

IBM SPSS Version 22.0 and Microsoft 16 were used for the data analysis. Qualitative data were presented as numbers and percentages, while quantitative data were presented as the mean ± standard deviation. Data were analysed using the student's t-test and the chi-square test, and a p-value of less than 0.05 was considered to be statistically significant.

Results

The present study consists of 80 patients of both genders who were divided into two groups equally. In group I, patients underwent open ventral hernia repair, while patients in group II underwent laparoscopic ventral hernia repair (LVHR). The mean age of patients in the open group I was 50.83 ± 12.72 years, while the mean age in the laparoscopic group II was 42.90 ± 10.63 years. There were 34 males and 46 females in both the open and laparoscopic groups. The male-to-female ratio was 1:1.35 (Table 1).

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Table 1: Gender-wise distribution of the patients

Gender	Open Group I (n = 40)	Laparoscopic Group II (n = 40)
Male	16	18
Female	24	22

Figure 1:Gender wise distributions of patients

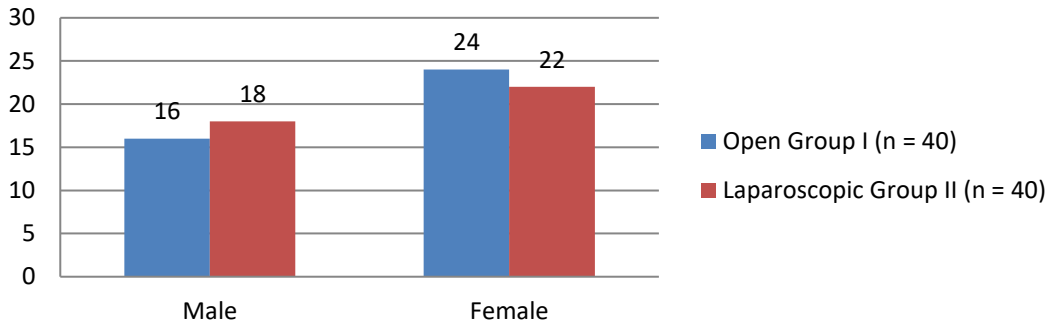

Table 2: Types of ventral hernias in the present study

Types of Hernia	Open Group I (n = 40)	Laparoscopic Group II (n = 40)	P value
Epigastric	04	04	>0.05 (Not significant)
Para umbilical	28	27	
Incisional	08	09	

Paraumbilical hernias were the most common in both groups, which accounted for 68.75% of all patients involved in the present study. Incisional hernias were the second most common (21.25%), followed by epigastric hernias, which were the least common (10%) [Table 2].

Table 3: Comparison of open versus laparoscopic ventral hernia repair: Based on operative outcomes

Characteristics	Open Group I (n = 40)	Laparoscopic Group II (n = 40)	P Value
	Mean ± SD		
Mean age (years)	50.83 ± 12.72	42.90 ± 10.63	0.20
Mean Duration of Surgery (minutes)	92.05 ± 6.05	62.40 ± 4.20	<0.001
Hospital stay (days)	5.32 ± 0.83	2.70 ± 1.09	<0.02
Mean duration of return to work (days)	2.96 ± 0.72	1.47 ± 0.19	<0.001

The mean duration of surgery was significantly shorter in the laparoscopic group (62.40 ± 4.20 minutes) as compared to the open group (92.05 ± 6.05 minutes). The mean duration of postoperative hospital stay in the open group was 5.32 days, which was longer as compared to the laparoscopic group (2.70 days). Compared to the open group, patients in the laparoscopic group returned to their regular activities more quickly (Table 3). All the above parameters were significant, as the p value was <0.05. The present results show that there is a significant difference between the periods of hospital stay between both groups. The return to normal activity took longer for the open group, with a significant difference between both groups.

Table 4: Comparative analysis of postoperative pain using VAS (Visual Analogue Scoring)

VAS score (0–10)	Open Group I (n = 40)	Laparoscopic Group II (n = 40)	P value
Day 0	6.21±1.96	4.01±1.60	<0.01
Day 1	5.62 ± 1.73	3.41 ± 1.18	<0.01
Day 7	2.91 ± 1.50	1.72 ± 2.83	<0.02

*The P value is significant. The pain experienced by the laparoscopic group on the operative day and first postoperative day based on VAS was less as compared to the open group. On the seventh postoperative day, the majority of the patients in the laparoscopic group experienced grades 1-2 on VAS as compared to the open group, which experienced grades 2-3. There was statistical significance regarding the postoperative pain score according to the VAS between the two groups (P< 0.05).

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Table 5: Postoperative complications

Complications	Open Group I (n = 40)	Laparoscopic Group II (n = 40)	P value
Wound infection	6 (15%)	2 (5%)	>0.05 (Not significant)
Seroma	4 (10%)	10 (25%)	
Post-operative ileus	6 (15%)	3 (7.5%)	
Recurrence	2 (5%)	4 (10%)	

Table 5, shows that postoperative seroma following laparoscopic repair accounted for 25% versus 10% following open repair. Eight patients developed wound infections, 6 (15%) of them in the open repair group and 2 (5%) of them in the laparoscopic repair group. Recurrence rates were 10% in laparoscopic repair versus 5% in open repair. Six (15%) cases in the open group and three (7.5%) cases in the laparoscopic group had postoperative ileus and were managed conservatively. No vascular or bowel injuries were reported in both groups of this study.

Discussion

In the present study, the number of female patients (57.5%) was higher than that of male patients (42.5%), due to the higher cosmetic concerns of females. Other previous studies show similar findings. Anderson et al. [6], with 30 (53.6%) female patients and 26 (46.4%) male patients, and Ecker et al. [7], with 8303 (61.2%) female patients and 5.264 (38.8%) male patients. Basheer et al. [8] also had a greater number of females in their study, which was believed to be due to higher cosmetic concerns in the female group. It is not the same as the study conducted by Ferrari et al. [9], where there were 17 (47.3%) female patients and 19 (52.7%) male patients; or Juo et al. [10], where there were 2455 (68.3%) male patients and 1139 (31.7%) female patients. In all cases, the percentage of male patients was higher than that of female patients. Compared to open repair (92.05 minutes), laparoscopic repair (62.40 minutes) required a significantly shorter time during the operation. This is because open repair often requires extensive lateral dissection and flap creation, both of which are time-consuming processes, while laparoscopic mesh fixation using tacks is not. Other studies also found that open repair took a longer time as compared to LVHR [8, 11-12]. Misra et al. [12], with 75 min for laparoscopic repair versus 86 min for open repair. In the present study, there was a significant difference between hospital stays for both groups. The mean hospital stay of the laparoscopic group was 2.70 days shorter in comparison to the open group (5.32 days). This was consistent with the previous studies of Basheer et al. [8], with 1.15 days for the laparoscopic group versus 4.55 days for the open group; Misra et al. [12], with 1.5 days for laparoscopic repair and 3.4 days for open repair; and Barbaros et al. [13], with 2.5 days for laparoscopic repair and 6.3 days for open repair. In the present study, patients resumed normal activity by 1.47 days following discharge from the hospital as compared to the open group, which took longer (2.91 days). Basheer et al. [8] found that patients with open repair took a considerably longer time to return to normal activity (13.8 days). Pain experienced by patients was assessed based on the VAS. Compared to the open group, the majority of patients in the laparoscopic group reported less pain following surgery on the first postoperative day. We also found that on the seventh postoperative day, patients with open repair scored a 2.91 on VAS as compared to the laparoscopic group, which scored a 1.72.Navarra et al. [14], had similar findings to our study. They also found that the duration of postoperative analgesia was significantly longer in the open group (4.9 days) as compared to the laparoscopic group (1.4 days). However, in Eker et al. [15], at the 4-week follow-up, 25% of the laparoscopic group and 24% of the open group reported persisting pain, requiring prolonged analgesia use. The most common postoperative complication of laparoscopic repair is seroma formation. In the current study, postoperative seroma following laparoscopic repair accounted for 25% in comparison to 10% following open repair. Rogmark et al. [16] also found postoperative seroma following laparoscopic repair accounted for 10.9% in comparison to 8.6% following open repair; Colavita et al. [17], with 9.7% for the laparoscopic group in comparison to 7.5% for the open group; and Wound-related infectious complications included superficial infection, deep infection, and flap necrosis. In the current study, eight patients developed wound infections, with two of them in the laparoscopic repair group (5%) and six of them in the open repair group (15%). The ratio is expected given that the open technique is linked to more tissue handling and dissection, even though these changes did not achieve statistical significance. The probability of wound-related complications may be increased by wound secretions and the placement of a foreign body like mesh in such an environment. This finding agreed with the results of Ecker et al. [15], with 0.9% for the laparoscopic group in comparison to 1.9% for the open group; Rogmark et al. [16], with 1.5% for the laparoscopic group in comparison to 18.8% for the open group; and Colavita et al. [17], with 0.3% for the laparoscopic group in comparison to 3% for the open group and Ahonen-Siirtola et al. [18], with 3.2% for the laparoscopic group in comparison to 8.6% for the open group. Regarding the recurrence, laparoscopic and open repair showed recurrence rates of 10% and 5%,

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respectively. Ahonen Siirtola et al. [18] observed that 4.2% for the laparoscopic group compared to 2.7% for the open group.

Limitations of the study

The sample size was small, and there was no blinding when assessing the postoperative pain in the two groups.

Conclusions

Laparoscopic ventral hernia repair is routinely performed and is a safe and feasible alternative to open ventral hernia repair. According to the current study, laparoscopic ventral hernia repair offers several advantages over open repair, including less pain following surgery, a shorter hospital stay, faster return to regular activities, a lower risk of wound infection and ileus following surgery, and improved cosmetic results. Thus, laparoscopic treatment is thought to be the best option when it comes to ventral hernia repair.

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