

Original Research Article

Comparative Study of Outcomes of Laparoscopic Versus Open Ventral Hernia Repair

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ABSTRACT

Background

Two primary methods for treating ventral hernias are laparoscopic and open surgery. Shorter hospital stays and less discomfort following surgery are two advantages of laparoscopic surgery. Studies have also shown that laparoscopic surgery has fewer complications than open surgery. The aim of this study was to compare the outcomes, complications, length of stay, discomfort following surgery, and return to work between laparoscopic and open ventral hernia repairs.

Methods

This was a prospective observational study with 50 patients over the age of 18 that was carried out at the Government Medical College in Vellore between 2020 and 2022. Purposive sampling was used to choose 25 patients for each group. On postoperative days 1, 3, and 5, the visual analog scale was used to calculate the amount of pain following surgery. On postoperative days 3, 5, 7, and 4, the Eura HS quality of life scale was calculated. Results of the surgery were noted in terms of the emergence of a seroma, wound, or mesh infection. Patients were monitored for up to a year following surgery, starting one and two weeks later. Pearson's chi squared test and Fischer's exact test were used for statistical analysis.

Results

The majority of the groups started oral intake within 6 hours, with no difference in the time required to start oral fluids. Infections from wounds occurred 72% of the time in the traditional group and none at all in the laparoscopic group. Hospital stay was substantially shorter in the laparoscopic group (2.4 ± 0.5 days) than in the traditional group (7.32 ± 1.07 days) ($p < 0.001$). While 76% of patients in the laparoscopic group returned to normal activity in less than 14 days, all patients in the traditional group-all but one-took more than that amount of time. There was a statistically significant difference ($p < 0.001$). Suture

removal occurred 7.84 ± 0.69 days earlier in the laparoscopic group than in the traditional group ($p < 0.001$).

Conclusion

Compared to open hernia repair, LVHR (Laparoscopic Ventral Hernia Repair) has several advantages, including shorter recovery times, shorter hospital stays, and an earlier return to regular activity with fewer problems.

Keywords: Ventral Hernias, Laparoscopic, Open Hernia Repair.

INTRODUCTION

Except in the case of femoral and inguinal hernias, a ventral hernia is the protrusion of the contents of the abdomen via a hole in the abdominal wall. There are two primary methods for treating ventral hernias: laparoscopic and open surgery. LVHR has become increasingly common due to advancements in technology and surgical technique, and is being carried out on a regular basis in the majority of centers. Shorter hospital stays and less discomfort following surgery are two advantages of laparoscopic surgery. Studies have also shown that laparoscopic surgery has fewer complications than open surgery.^[1]

In the general population, a number of recent studies have shown that laparoscopic repairs yield better results. Comparing laparoscopic ventral hernia repairs to open repairs, a study examining two sizable statewide databases revealed a decreased incidence of complications, a shorter length of stay, and fewer readmissions.^[2] Additional research that shows a decreased incidence of wound infection following laparoscopic ventral hernia surgery supports this.^[3,4] It has also been shown in urgent circumstances that laparoscopic repairs have less wound-related problems than open repairs^[5] and in patients who are fat.^[6]

The aim of this study was to compare the outcomes, complications, length of stay, return to work, and pain following surgery between laparoscopic and open ventral hernia repair procedures.

MATERIALS & METHODS

This was a prospective observational study that took place at the Government Medical College in Vellore between 2020 and 2022. It involved 50 patients who were more than 18 years old and had undergone laparoscopic intraperitoneal mesh repair or open onlay mesh repair for different kinds of ventral hernias. Each group consisted of 25 patients chosen through purposive selection. Women who had not yet finished having children and patients with strangulated or blocked hernias were not included in the study. On the first, third, and fifth postoperative days, the visual analog scale was used to measure postoperative pain. The Eura HS quality of life scale was computed on the third, fourth, and fifth postoperative days. Results of surgery regarding the emergence of a seroma, wound, or mesh infection were recorded. Following surgery, patients were monitored for up to a year and for one and a half weeks. Fischer's exact test and Pearson's chi-squared test were used for statistical analysis. A p-value of < 0.001 was deemed significant.

RESULTS

The study's findings are displayed in Tables 1-3. The study population's mean age was 47 ± 14 years for the conventional group and 42 ± 12 years for the laparoscopic group. In both groups, the majority consisted of men. While the laparoscopic group had a higher incidence of umbilical hernias, the traditional group had a higher incidence of incisional hernias.

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traditional group and none at all in the laparoscopic group.

The hospital stay was substantially shorter in the laparoscopic group (2.4 ± 0.5 days) than in the traditional group (7.32 ± 1.07 days) ($p < 0.001$). While 76% of patients in the laparoscopic group returned to normal activity in less than 14 days, all patients in the traditional group-all but one-took more than that amount of time. There was a statistically significant difference ($p < 0.001$). Suture removal occurred 7.84 ± 0.69 days earlier in the laparoscopic group than in the traditional group ($p < 0.001$).

	Characteristic	Laparoscopic Ventral Hernia Mesh Repair (N = 25)	Conventional Open Mesh Repair, (N = 25)	P-Value
Age	N	25	25	
	Mean (SD)	42 (12)	47 (14)	
	Median (IQR)	39 (36, 49)	49 (35, 58)	
	Range	21, 69	21, 68	
Sex	Female	11 (44%)	7 (28%)	
	Male	14 (56%)	18 (72%)	
Diagnosis	Incisional Hernia	6 (24%)	12 (48%)	
	Paraumbilical Hernia	7 (28%)	6 (24%)	
	Umbilical Hernia	12 (48%)	7 (28%)	
Pain	2	8 (32%)	0 (0%)	<0.001
	3	6 (24%)	0 (0%)	
	4	8 (32%)	2 (8.0%)	
	5	3 (12%)	10 (40%)	
	6	0 (0%)	8 (32%)	
	7	0 (0%)	5 (20%)	
The Period to Start Orals in Hours	6	22 (88%)	24 (96%)	0.609
	12	3 (12%)	1 (4%)	
Wound Infection	Absent	25 (100%)	7 (28%)	<0.001
	Present	0 (0%)	18 (72%)	
Hospital Stay Period (in days)	N	25	25	<0.001
	Mean (SD)	2.4 (0.5)	7.32 (1.07)	
	Median (IQR)	2.00 (2.00, 3.00)	7.00 (6.00, 8.00)	
	Range	2.00, 3.00	6.00, 8.00	
Return to Normal Activity (in days)	<=14	19 (76%)	1 (4.0%)	<0.001
	>14	6 (24%)	24 (96%)	
Suture Removal Period (in days)	N	25	25	
	Mean (SD)	7.84 (0.69)	11.36 (1.73)	<0.001
	Median (IQR)	8.00 (7.00, 8.00)	12.00 (11.00,12.00)	
	Range	7.00, 9.00	5.00, 14.00	
n (%)				
Statistical test used - Pearson's Chi-squared test; Fisher's exact test; t test				
P-value <0.001 is significant				

Table 1

Two-Sample T-Test with Equal Variances					
Group	OBS	Mean	Std.Err	SD	[95% Conf. Interval]
LAP	25	2.4	.1	.5	2.19361 2.60639

OPEN	25	7.32	.2138535	1.069268	6.878628	7.761372
Combined	50	4.86	.3703391	2.618693	4.115776	5.604224
Diff		-4.92	.2360791		-5.394669	-4.445331

diff=mean(LAP)-mean (OPEN) t=-20.8405a
 Ho: diff=0
 degrees of freedom= 48
 Ha: diff<0
 Pr(T<t)=0.0000
 Ha: diff! = 0
 Pr(|T|>|t|) = 0.0000
 Ha: diff>0
 Pr(T>t) = 1.0000
 *PValue – <0.001 Significant (Two-sample t test used)

Table 2: Hospital Stay Period in Days by Procedure

Two-Sample T-Test with Equal Variances						
	OBS	Mean	Std. Err	SD	[95% Conf. Interval]	
LAP	25	7.84	.1375984	.6879922	7.556011	8.123989
OPEN	25	11.36	.3458323	1.729162	10.64624	12.07376
Combined	50	9.6	.3116775	2.203893	8.973661	10.22634
Diff		3.52	.3722007		-4.26836	-2.77164

diff=mean(LAP)-mean(OPEN)
 t= -9.4573 Ho: diff=0
 degrees of freedom= 48
 Ha: diff<0
 Pr(T<t)=0.0000
 Ha: diff! = 0
 Pr(|T|>|t|) = 0.0000
 Ha: diff>0
 Pr(T>t)=1.0000
 *PValue – <0.001 Significant (Two-sample t test used)

Table 3. Suture Removal Period in Days by Procedure

DISCUSSION

Simple suture repair was used in the past; however, it was linked to a high recurrence rate. The first documented case of a prosthesis being used to heal a ventral hernia dates back to 1958. Although there have been significant reductions in the recurrence rates linked to ventral hernia surgery since then, disagreements still persist over the most suitable approach for treating ventral hernias.

The laparoscopic approach is now accepted by surgeons because of the increased risk of wound infection and wound-related problems following open hernia surgery. This has prompted an ongoing study into the best management strategy for ventral hernias.^[7] Adequate subcutaneous resection, flap raising, drain insertion, and heightened wound complications are necessary for the open repair.^[8] Surgeons are using the recently developed laparoscopic procedure for ventral hernias, and it is becoming more and more common. During the laparoscopic operation, the surgeon can better identify any abnormalities that were overlooked during the clinical evaluation and determine the defect's margins. Occult hernias can be identified and treated with laparoscopic surgery.^[9] Nowadays, every laparoscopic center performs laparoscopic ventral hernia repair, which is likely the procedure of choice for

treating ventral hernias. According to certain data, the recurrence rates have decreased to as low as 1–14% with the introduction of meshes.^[10] The laparoscopic method involves making a safe cut in the abdomen, releasing adhesions, reducing the sac, strengthening it, or bridging the fascial defect, and placing mesh of the right size behind the fascia in the intraperitoneal space. This method works well for the majority of ventral hernias. This is especially helpful for Swiss cheese hernias, or hernias with several faults, since one mesh can cover all the defects. Shorter hospital stays, reduced pain, and improved cosmetic outcomes are among its advantages; yet, it is still a difficult treatment, particularly in the reoperative abdomen and in patients with significant comorbidities. Similar to every major laparoscopic procedure, there are contraindications for laparoscopic ventral hernia repair. Numerous studies have attempted to compare the results of laparoscopic versus open repair of abdominal wall hernias^[11-15] but neither technique has shown a clear advantage to date. A recent systematic review came to the conclusion that although the laparoscopic approach generally required a longer operating time, the rate of infection was lower.^[16]

The study population's mean age in the laparoscopic group was 42±12 years, while the traditional group's mean age was 47±14 years. Comparably, in the Misra et al. study from 2006, the patients' mean age in the open group was 45.2 years, whereas in the laparoscopic group it was 45.96 years.^[17] In our study, the majority of participants were men in both categories. Contrarily, Basheer et al. study^[18] included a larger proportion of female participants, which was thought to be related to the female group's stronger concerns about appearance. The mean age of patients who underwent open hernia repair and laparoscopic repair was 50.78 ± 11.88 years and 52.29 ± 12.96 years, respectively, according to the study by Kalyan M et al.^[19] In total, there were 46% female patients and 54% male patients. In the groups undergoing laparoscopic and open hernia surgery, the male-to-female ratios were 1:1.08 and 1.5:1, respectively.

The most common complaint among people who have had hernia surgery is postoperative pain. VAS is a widely used instrument for postoperative pain assessment. When comparing the laparoscopic group to the traditional group, more patients in the latter group reported higher pain levels, and the difference was statistically significant ($p < 0.001$). Our analysis yielded comparable results to those of Navarra et al.^[20] Additionally, they discovered that the open group's postoperative analgesia lasted substantially longer (4.9 days) than it did for the laparoscopic group (1.4 days). Postoperative pain was more common in the open group than in the laparoscopic group in the Kalyan M^[19] trial (p -value = 0.001). In a related study, Purushotham et al. discovered that the open group experienced more postoperative pain (VAS score) than the laparoscopic group.^[21] In the traditional group, wound infections occurred more frequently (72%) than in the laparoscopic group (0%). Laparoscopic ventral hernia repair has been shown to have a lower risk of wound infection than open surgery in two recent meta-analyses by Zhang et al. and Sauerland et al.^[22,23]

The hospital stay was substantially shorter in the laparoscopic group (2.4±0.5 days) than in the traditional group (7.32 ± 1.07 days) ($p < 0.001$) in the current study. The patients' discomfort in the open group was the primary cause of their prolonged hospital stay. Hospital stay was substantially shorter in the laparoscopic group (2.4 ± 0.5 days) than in the traditional group (7.32 ± 1.07 days) ($p < 0.001$). The results of Basheer et al. study^[18] were comparable to ours in that the laparoscopic group's mean hospital stay lasted 1.15 days, whereas the open group's was 4.55 days. These results were in line with prior research conducted by Navarra et al.^[20] Mishra et al.^[17] and Olmi et al.^[24]

A notable decrease in the duration of hospital stays and the incidence of postoperative problems were noted in the majority of the series. The long-term follow-up of these patients revealed that the laparoscopic procedure reduced the incidence of hernia recurrence. Notably, the Olmi and colleagues study^[24] was the only sizable prospective randomized comparison

study carried out to assess the two methods. In addition, a shorter operating duration (2.7 days versus 9.9 days), a lower complication rate (16% versus 29%), and a quicker return to work period (13 days versus 25 days) were all observed in this study for the laparoscopic group. These results undoubtedly highlight the significance of a well-designed prospective randomized trial to precisely identify the benefits of either a laparoscopic or an open approach to ventral hernia repair, even though the surgical community has been sluggish to adopt the laparoscopic approach. Above all, these studies would be useful in directing the right patient selection process to determine which patients would most benefit from each strategy.

It is anticipated that following any laparoscopic procedure, patients will heal more quickly and resume their regular daily activities. In our study, all patients in the traditional group took longer than 14 days to return to normal activity, whereas 76% of the laparoscopic group recovered in ≤ 14 days. According to Basheer et al.^[18] patients who had open repair need 13.8 days to return to normal activity. Before the patients were released from the hospital, we checked the wounds for infection, and none of them showed any symptoms of a surgical site infection. Two patients in the open group experienced a minor seroma during the two-week follow-up, which was treated with aspiration. In the group that underwent laparoscopic surgery, no such issues were noted. Our study's inability to use blinding while evaluating the postoperative pain in the two groups is one of its shortcomings. Another drawback was that we neglected to account for patient comorbidities, which may have raised the possibility of postoperative problems.

Numerous studies have demonstrated a shorter hospital stay following laparoscopic incisional hernia repair as opposed to open surgery.^[24,25] An average hospital stay of 2.5 days was recorded in the Rashid T. et al.^[26] study, which is consistent with other studies that have been published in the literature. The Kalyan M. et al.^[19] study found that the group that underwent laparoscopic surgery required considerably shorter time to resume ordinary activities than the group that underwent open surgery (p -value = <0.0001 ; significant). According to Badiger et al., the laparoscopic group's mean time to resume activity was 4.1556 ± 2.13 days, while the open method group's mean time was 13.9811 ± 3.27 days.^[27] According to Purushotham et al., 70.29% of the laparoscopic group resumed activities on day 14 (mean = 14.81), whereas the open group resumed activities on day 16 (mean = 23.62) with 54.45% of the former group.^[21] According to Thota et al., the group that underwent laparoscopic surgery returned to regular activities after 3.61 days, while the group that underwent open surgery took 29.7 days.^[28]

CONCLUSION

Compared to open hernia repair, LVHR has several advantages, including shorter recovery times, shorter hospital stays, and an earlier return to regular activity with fewer problems.

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