

A COMPARATIVE AND PROSPECTIVE STUDY OF VENTRAL HERNIA REPAIR BY LAPAROSCOPIC AND OPEN TECHNIQUE

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Abstract

Background: We aimed to compare duration of surgery, post-operative pain, post-operative complication, cosmesis, hospital stay after laparoscopic and open repair technique. **Methodology:** The study was conducted as a prospective observational study on patients presenting with ventral hernia at tertiary care centre. Patients were then randomized into 2 groups based upon types of surgery i.e. Laparoscopic and open mesh hernia repair. Immediately post-operatively, pain assessment was done using VAS. Patients were followed up till discharge thereafter monthly till 6 months. Length of stay in Hospital was noted and days to return to normal activities were documented along with presence of immediate and longterm complication. **Results:** A total of 60 patients with ventral hernia who underwent surgery were included, of them, laparoscopic repair was done in 25 (41.7%) whereas open repair was done in 35 (58.3%) patients. Mean duration of surgery in laparoscopic was 90.52±12.653 minutes whereas duration was 59±9.139 in open repair. We observed a significantly prolonged duration of surgery, shorter duration of post operative pain, lower incidence of seroma, early post operative ambulation, short duration of hospital stay early return to normal activity and better cosmesis in laparoscopic surgery group as compared to open surgery (p<0.05). **Conclusions:** Elective ventral hernias can be managed using both open as well as laparoscopic surgery. Laparoscopic hernia repair is superior to open hernia repair in terms of low post operative pain, early ambulation, low complication such as seroma, early return to normal activity, less hospital stay and achieving good cosmetic results.

Keywords: Ventral Hernia, Mesh Repair, Laparoscopy, Open Repair, Cosmesis, Complications.

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Introduction

Ventral hernias are defined as defect in the fascia of anterior abdominal wall. These defects exclude hiatal hernia and inguinal hernias. Ventral hernias (VH) results from weakness in the musculofascial layer of anterior abdominal wall. These hernias may be classified based upon their site as epigastric, hypogastric or umbilical hernia or according to underlying etiology as primary (spontaneous) and secondary (acquired). Acquired hernias usually develop secondary to previous abdominal surgery involving opening of anterior abdominal wall to gain access to abdominal cavity. Incisional hernia are most common causes of ventral hernias and their incidence have been documented in the range of 6 to 13% and their number is expected to increase with increase in number of abdominal surgeries.[1-4]

Ventral hernia repair is one of the frequent surgical procedures performed all over the world. Hernia repair may be performed via various techniques such as open repair without mesh, open repair with mesh and laparoscopic hernia repair. Primary open repair of hernia is the most basic approach and is typically performed in defects of less than 2 cm, whereas tension free closure with the use

of mesh is recommended for repair of large defects (3-5 cm). However, open surgical repair without mesh is usually associated with certain disadvantages such as large incision size, prolonged hospital stay, increased postoperative pain, flap complication, high rate of recurrence and poor cosmesis. With the introduction of open mesh repair instead of open repair, the recurrence rate reduced from 63% to 32%. The utility of open mesh repair was also established for smaller hernia (recurrence rate reduced from 67% to 17%). The laparoscopic ventral hernia repair was first described in 1993 by Leblanc K and Booth. Laparoscopic surgery may have certain advantages such as less hospital stay, small incision size, minimally invasive, less postoperative pain, and good cosmesis.[5-9]

Many of the previous studies have clearly showed the superiority of laparoscopic ventral hernia repair in terms of less recurrence rate as compared to open surgeries. Few studies however showed that recurrence rate following laparoscopic repair are almost equal to open repair over the long term follow up. We wanted to assess the known advantage of laparoscopic surgery for ventral hernia repair in our hospital; which can be utilized for better management and reducing morbidity in patients undergoing ventral hernia repair. The objectives of the study are to compare duration of surgery, post-operative pain, post-operative complication, cosmesis and hospital stay after laparoscopic and open repair technique.[10-13]

Materials and Methods

The study was conducted as a prospective observational study on patients presenting with ventral hernia in Department of General

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Surgery, People’s College of Medical Sciences and Research Centre and associated People’s Hospital during the study period of 18 months i.e. from 1st November 2019 to 30th April 2021. All patient with ventral hernia scheduled for ventral hernia repair at the study area during the study period willing to participate in the study were included whereas patient medically not fit for surgery, Pregnant women, Child less than 12 years of age, patients with groin hernia, obstructed hernia or Immunocompromised state were excluded.

After obtaining ethical clearance from Institute’s ethical committee, all the patients fulfilling inclusion criteria were enrolled. Their baseline sociodemographic data detailed history regarding mode of presentation, duration of symptoms, previous surgery, and other relevant history was obtained and entered in questionnaire. All the patients were then subjected to detailed general and physical examinations. Their vitals were recorded, height and weight were recorded and BMI was calculated.

Local examination of the defect was done with respect to size, location, content, reducibility and presence of complications. Further all the participants were subjected to routine investigations. Hernia was classified using EHS classification.^[14]

Patients were then randomized into 2 groups using random number table-

- Group 1- Laparoscopic mesh hernia repair
- Group 2- Open mesh hernia repair

Standard pre-operative protocol was followed and pre-operative antibiotics were given. But in few cases, laparoscopic was converted to open and was taken into open group.

Open Mesh Repair surgery

- After giving spinal anesthesia in sitting position, patient were placed in supine position.
- Based upon the defect, technique of open repair were decided i.e. inlay, onlay or sublay.

- Polypropylene mesh was used and was sutured over the anterior rectus sheath in onlay technique whereas it was placed on preperitoneal space in inlay technique.
- The mesh was then fixed with non absorbable sutures.
- Suction drain was placed when needed.

Laparoscopic Mesh Hernia surgery

- Patients were operated under general anesthesia.
- Nasogastric tube and Foley’s catheter were placed for upper and lower abdominal hernia respectively.
- Depending upon the location of hernia, the position of camera was determined.
- Pneumoperitoneum was established by Veres needle in palmers point.
- With the help of sharp dissection or monopolar diathermy, adhesiolysis was done
- Based upon the defect, size of mesh were determined and area was marked after pneumoperitoneum was released.
- With the defect in the centre, sites for transfacial sutures were also marked.
- Two nonabsorbable ethilon sutures were used for suturing at the upper end whereas two polypropylene sutures were used for suturing at the opposite ends.
- A compression dressing was done over the defect.
- Immediately after procedure, nasogastric tube and Foley’s catheter were removed.

Immediately post-operatively, pain assessment was done using Visual analogue scale. Patients were followed up daily till discharge thereafter monthly till 6 months. Length of stay in Hospital was noted and days to return to normal activities were documented. Further, presence of immediate and long term complication if any were noted and documented.

Observation Chart

Table 1: Comparison of baseline variables between the groups

Baseline variables	Laparoscopic (n=25)		Open (n=35)		P value
	n	%	n	%	
Age (years)	<30	1	4	1	0.106
	31-40	10	40	5	
	41-50	9	36	12	
	51-60	5	20	15	
	>60	0	0	2	
Sex	Male	11	44	8	0.08
	Female	14	56	27	
Defect Size (cm) [mean±SD]	5.32±2.056		6.34±2.114		0.067

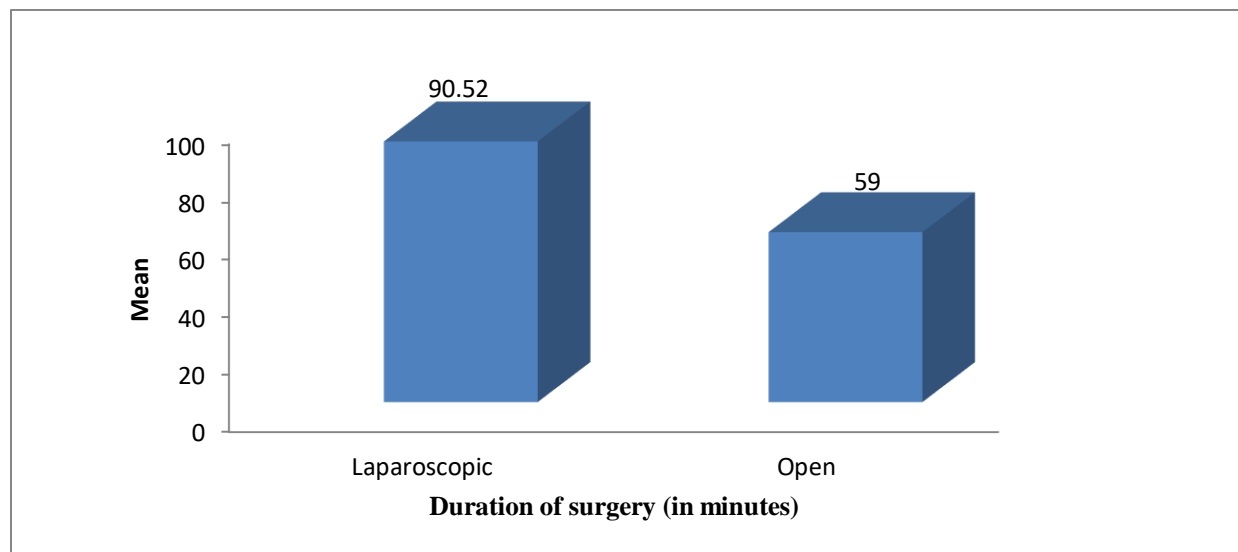


Fig. 1: Comparison of duration of surgery between the groups

Table 2: Comparison of postoperative variables between the groups

		Laparoscopic (n=25)		Open (n=35)		P value
		n	%	n	%	
Duration of post operative pain (>2 days)	No	23	92	23	65.7	0.02
	Yes	2	8	12	34.3	
Seroma	Absent	24	96	25	71.4	0.02
	Present	1	4	10	28.6	
Wound infection	Negative	24	96	30	85.7	0.19
	Positive	1	4	5	14.3	
Post Operative Ambulation (days)	1	22	88	9	25.7	0.01
	2	3	12	26	74.3	
Duration of Hospitalization (in days) [mean±SD]		3.48±1.61		7.31±2.689		0.001
Return to normal work (in days) [mean±SD]		8.28±2.03		14.14±2.60		0.001
Cosmesis	Poor	2	8	19	54.3	0.01
	Average	1	4	12	34.3	
	Good	22	88	4	11.4	

Results

The present study was conducted on a total of 60 patients with ventral hernia who underwent surgery. Out of 60 patients who presented with ventral hernia, laparoscopic repair was done in 25 (41.7%) whereas open repair was done in 35 (58.3%) patients. Mean age of patients in laparoscopic group was 42.28±7.93 years and in open group was 48.98±8.88 year. The mean defect size of ventral hernia was 5.32±2.056 cm and 6.34±2.114 cm in laparoscopic and open group respectively. The age and gender composition as well as defect size of the two groups were comparable ($p>0.05$). Mean duration of surgery in laparoscopic was 90.52±12.653 minutes whereas duration was 59±9.139 in open repair. Mean duration of surgery was significantly lower in open repair as compared to laparoscopic repair technique ($p<0.05$). The present study observed a significantly shorter duration of post operative pain, lower incidence of seroma, early post operative ambulation, short duration of hospital stay, early return to normal activity and better cosmesis in laparoscopic surgery group as compared to open surgery ($p<0.05$).

Statistical Analysis

The collected data was summarized by using frequency, percentage, mean & S.D. To compare the qualitative outcome measures Chi-square test or Fisher's exact test was used. To compare the quantitative outcome measures Independent t test was used. If data was not following normal distribution, Mann Whitney U test was used. SPSS version 22 software was used to analyse the collected data. p value of <0.05 was considered to be statistically significant.

Discussion

Ventral hernias refers to the defect in the fascia of anterior abdominal wall and are usually attributed to weakness in the musculofascial layer of anterior abdominal wall. The most basic approach for management of ventral hernia is primary open repair of hernia without mesh, but this method is associated with certain disadvantages such as large incision size, increased postoperative pain, flap complication, prolonged hospital stay, high rate of recurrence and poor cosmesis. However, mesh repair reduced the recurrence rate to approximately half. Later, with the introduction of minimally invasive laparoscopic surgeries, complication rates are lower and better cosmesis could be achieved due to small incision size.[1,2,7,9]

In present study, laparoscopic repair of ventral hernias was done in 41.7% cases whereas ventral hernia repair using open technique was done in 35 (58.3%) patients. Davies et al included a total of 268 patients with ventral hernia, of them, 110 were managed via open technique whereas 158 cases underwent laparoscopic hernia repair. Singhal et al performed laparoscopic repairs in 36% cases whereas open repairs were the management technique for hernia repair in 62% cases. However, laparoscopic converted to open

repair was done in 2%.[15,16]

In present study, duration of surgery was significantly higher in laparoscopic group (90.52±12.653 minutes) as compared to open group (59±9.139 minutes), which could be attributed to time taken to create the pneumoperitoneum. The findings of present study were concordant with the findings of Maurya et al in which mean duration of surgery was significantly higher in patients who underwent laparoscopic repair (94.2 min) as compared to open hernia repairs (80.83 min). Eker et al also observed significantly prolonged operative time in laparoscopic group (100 minutes) as compared to 76 minutes in open group ($P = .001$). Barbaros et al also documented significantly longer duration of surgery in the laparoscopy group ($P < 0.05$).[17-19]

Laparoscopic surgery being minimally invasive surgery have been documented to have less postoperative pain. Laparoscopic surgery was associated with decreased postoperative pain and pain lasted for more than 2 days in only 8% cases following laparoscopic repair as compared to 34.3% cases following open repair ($p<0.05$). Post-operative ambulation was achieved on day 1 in significantly higher proportions of cases in laparoscopic group indicating laparoscopic surgery to be superior to open hernia repair in terms of early postoperative ambulation. Similar findings were documented by Lomanto et al, where though initially during the first 48 hours, pain scores were comparable between the groups, the pain after 72 hours of surgery was significantly lower in laparoscopic group (2.9412) as compared to open repair technique (4.1702). Rubby et al also concluded laparoscopic repair of ventral hernia to be significantly associated with low postoperative pain as compared to open repairs. Thota et al also observed significantly low postoperative pain and overall complication rate in the laparoscopy group as compared to open repair ($P < 0.001$).[9,21,22,23]

Post operative complications in the form of seroma development and wound infection was noted in our study and we documented significantly higher incidence of seroma in patients following open hernia repair (28.6%) as compared to only 4% cases in laparoscopic group ($p<0.05$). Though the incidence of wound infection was higher in open repair group, but the observed difference in wound infection between the group was insignificant ($p>0.05$). Our study findings were supported by the findings of Thota et al, in which overall complication rate and seroma was observed in significantly higher proportions of cases following open repair as compared to laparoscopic repair, whereas incidence of wound infection was almost similar in both the groups. Basheer et al reported higher wound infection in open group (15% in open vs 5% in laparoscopic) but the difference was insignificant. Rubby et al also documented significantly lesser incidence of wound infection in cases following laparoscopic repair.[21-23]

Though the cost of laparoscopic surgery per se is high as compared

to open technique, the laparoscopic surgeries are cost effective due to early post operative ambulation, reduced length of hospital stay, low recurrence rate and lower risk of complications. In our study, laparoscopic hernia repair surgery was associated with significantly reduced duration of hospital stay (3.48 ± 1.6 vs 7.31 ± 2.7 days; $p < 0.05$). This could be attributed to low risk of complications, early post operative ambulation, reduced pain due to its minimally invasive technique. Lomanto et al also documented significantly shorter postoperative stay in laparoscopic group (2.7 days) than open hernia group (4.7 days). In another study by Barbaros et al, the authors concluded that shortened postoperative hospital stay as the greatest advantage of laparoscopic repair. Similarly, Thota et al, Basheer et al and Maurya et al also documented significantly shorter hospital stay in laparoscopic group.[17-23]

In our study, mean days to return to normal work following laparoscopic surgery was 8.28 ± 2.03 days whereas that in open group was significantly higher i.e. 14.14 ± 2.6 days ($p < 0.05$). Thota et al also observed early return to normal activity in cases who underwent laparoscopic hernia repair (3 days vs 29 days; $P < 0.001$). Basheer et al also concluded that LVHR is associated with faster recovery and early return to normal activity as compared to open group. Similarly, Maurya et al also documented early return to normal activities in laparoscopic group.[17,22,23]

Laparoscopic surgery is cosmetically acceptable procedure due to small incision and minimal invasive nature. In our study, good cosmesis (88%) could be achieved in significantly higher proportions of cases following laparoscopic surgery as compared to open surgery ($p < 0.05$). Basheer et al and Thota et al also documented significantly better cosmesis following laparoscopic repair in their study, supporting our study. [9,22,23]

Conclusion

Good cosmesis (88%) could be achieved in significantly higher proportions of cases following laparoscopic surgery as compared to open surgery. Laparoscopic surgery must be preferred wherever possible to reduce the morbidity of patients and complication rate.

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