

**Comparative Study of Repair of Ventral and Umbilical Hernia-Laparoscopic Versus Open Repair: A Prospective Non-Randomised Hospital Based Study**

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Abstract

Ventral Hernia is a protrusion of an abdominal viscus or part of a viscus through the anterior abdominal wall occurring at any site other than groin. It includes incisional hernias, paraumbilical hernias, umbilical hernia, epigastric hernias and spigelian hernias.

In this study we have tried to evaluate comparison between laparoscopic versus open repair of ventral and umbilical hernia. Laparoscopic ventral hernia repair was associated with reduced postoperative pain, decreased postoperative complications, reduced length of hospital stay, and less time for return to normal activity as compared to open approach. Hence, laparoscopic ventral hernia repair is a safe and feasible alternative to open repair.

Keyword: Ventral Hernia, incisional hernias, paraumbilical hernias, umbilical hernia, epigastric hernias and spigelian hernias.

Introduction:

Ventral hernias are unique in that they are the abdominal wall hernias that are considered to be iatrogenic mostly.^[1] It continues to be one of the more common complications of abdominal surgical procedures and is a significant source of morbidity and loss of time from productive

employment. For many years, the repair of ventral hernia was associated with a high recurrence rate. In more recent years, the introduction of synthetic prosthetic materials has provided the opportunity to perform a tension free repair, thereby reducing the rate of recurrence.^[2] Midline hernia occurring through linea alba abutting superiorly or inferiorly on the umbilicus is called as paraumbilical hernia. They are generally acquired lesions. After diagnosis of a ventral hernia, there is no reason to wait for repair, the chances for incarcerations are high and surgery remains the only permanent cure.^[3] In this modern era of surgery, most of the emphasis is made on decreasing the hospital stay of the patient and also decreasing the post-operative morbidity and importance is given to cosmesis. Hence Laparoscopic surgery has gained paramount importance due to its minimally invasive technique, decreased hospital stay and also better cosmesis.^{[4][5][6]}

The trend toward minimal access surgery (MAS) has prompted general surgeons to scrutinize all operations towards laparoscopic techniques. There is continued debate as to the role of laparoscopy in ventral hernia repair, although laparoscopic repair has become increasingly popular, its outcomes need further evaluation.

Material and Method:

Patients admitted with ventral hernia at G.S.V.M MEDICAL COLLEGE & L.L.R and associated hospitals, Kanpur are taken up for study with the help of relevant history, clinical examination and appropriate investigations.

Inclusion Criteria:

Patients presenting with midline ventral hernias who are managed in our hospital with mesh repair are included after taking a written consent.

Exclusion Criteria:

- Spigelian hernia.
- Lumbar hernia
- Obstructed hernia.

Methodology:

Preoperative evaluation:

All the patients are evaluated by proper history and detailed physical examination. Data collected by proforma. All the patients underwent the routine blood investigations and in our study we got ultrasound abdomen done for all our patients to know the size, number of defects, contents and any other abdominal pathology.

Procedure for open surgery:

Almost all the patients were operated under spinal anaesthesia. Foleys catheterization and nasogastric tube were occasionally used. Patients were placed in supine position. Skin incision was made according to the site and size of the defect and type of hernia. The hernia sac was dissected out and reduced and the defect assessed. When there were adhesions, sac was opened and contents were reduced. In onlay repair, polypropylene mesh is sutured over the anterior rectus sheath, while in inlay technique, the mesh is placed in the preperitoneal space. The mesh is fixed at its four corners with non absorbable sutures. Anterior rectus sheath was closed over the mesh by non

absorbable sutures. Suction drain was placed in few cases based on the surgeon's choice. Skin and subcutaneous tissue closed in layers.

Procedure for laparoscopic surgery:

All the patients were operated under general anaesthesia. Nasogastric tube was placed for upper abdominal hernia and a Foleys catheter for lower abdominal hernias. Both are removed after the procedure on the operating table. Patient is in supine position without any tilt. Pneumoperitoneum established by veres needle in palmers point, 2 to 3cm below the left costal margin in the midclavicular line. A 10 mm camera port is place at this point and the intraabdominal pressure is maintained at 12 mm Hg. Two additional 5mm ports are placed depending on the type of hernia under direct vision. Adhesiolysis was done using sharp dissection or monopolar diathermy. Defect is delineated. A thread was passed through the 5mmport and the defect size measured intracorporeally. The size of the mesh required is assessed. The area to be covered by the mesh is marked after the pneumoperitoneum is released and the sites for transfacial sutures marked with the defect at its centre. The mesh is prepared, 2 non-absorbable ethilon sutures on either side at the upper end and two polypropylene sutures at the opposite end. This is mainly done for the easy identification based on color difference. The mesh is rolled around the grasper and inserted through the 10 mm port. Mesh is opened intraperitoneally and with the use of a spinal needle or cobbler and mesh is anchored to the anterior abdominal wall. In some cases we also used tackers in a double crown fashion. At the completion of the procedure, the ports are withdrawn under vision. 10 mm port is closed with 2-0polyglactin. Skin closed with ethilon 3-0. A compression dressing is placed in the area of defect to reduce the incidence of post operative seroma.

Postoperative management:

During postoperative period all patients received intravenous aqueous diclofenac injections 12 hourly for 1 day unless contraindicated and there after oral analgesics are given on the patient demand. All the patients are ambulated within 12 hours of surgery and are encouraged for oral feeds. Initially the feeds were sips of liquids followed by normal diet after the resolution of postoperative ileus (indicated by passing of flatus and normal bowel sounds on auscultation and return of appetite). In patients with persistent ileus, they were kept NPO and whenever required a nasogastric tube is passed only to be removed once the resolution of the ileus. The wounds were inspected for any seroma, hematoma or any infection. In open group drains were removed when the collection was less than 30 ml for 2 consecutive days. Patients were discharged after complete ambulation and tolerating normal diet.

Follow up evaluation:

After discharge, patients were encouraged to take normal diet and return to their normal activities as early as possible. After the discharge, patients were followed up at 1 week, 1 month, 3 month, 6 month intervals. In the initial follow up, the patients were evaluated for short term complications like seroma or hematoma, wound infection and wound dehiscence. During subsequent visits, chronic pain at the operated site, return to normal activity and recurrence were noted.

Postoperative assessment of pain:

The pain experienced by the patients in the postoperative period has been graded according to the Visual Analogue Scale (VAS)^[7] which ranges from no pain to the worst possible pain on the scale of 0 to 10.

End points of the study:

The end points measured in both the groups are duration of surgery, intra operative complications, incidence of postoperative complications like seroma formation,

wound infection, postoperative ileus etc, duration of postoperative pain using the visual analogue scale, length of hospital stay, return to normal activity, reoperation and recurrence rates during the follow up.

Statistical Methods:

Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean \pm SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance.

Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups.

Significant figures:

+ Suggestive significance (P value: 0.05<P<0.10)

* Moderately significant (P value: 0.01<P 0.05)

** Strongly significant (P value: P<0.01)

Statistical software: The Statistical software namely SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc9.0.1 ,Systat 12.0 and R environment ver.2.11.1 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

Results

- The study consists of two groups, open group which consists of 41 patients and laparoscopy group with 32 patients.
- Of the 41 patients in open group, 4(9.8%) had epigastric hernia, 8 (19.5%) had umbilical hernia, 10 (19.5%) had paraumbilical hernia and 19 patients (46.3%) had incisional hernia.
- Of the 32patients in laparoscopy group, 3 (9.4%) had epigastric hernia, 13 (40.6%) had umbilical hernia, 7 (21.9%) had paraumbilical hernia and 9 (28.1%) patients had incisional hernia.

- The mean age of the patients in open group is 46.43 years whereas in laparoscopy group it is 43.0 years.
- Out of the 41 patients in open group 11 (28.8%) are male while 30 (73.2%) are females where as in laparoscopy group, out of the 32 patients 18 (56.3%) are males while 14(43.7%) are females. the P value is 0.518 which is statistically not significant.
- In open group maximum number of patients i.e 30 (73.2%) had defect size less than 3x3cms whereas in laparoscopy group 20 (62.5%) patients had defect size less than 3x3 cms . P value is 0.212 not significant statistically.
- In the open group, most of the patients 29 (70.7%) underwent onlay while 12 (29.3%) underwent inlay repair. None of the patients in the present study underwent underlay repair.
- In open group 95.2% patients underwent repair with a polypropylene mesh, while in laparoscopy group 75% patients underwent repair with a composite mesh.
- The mean duration of surgery in open group is 84.17 minutes while in laparoscopy group it is 83.62 minutes. The P value is 0.4596, which is statistically not significant.
- In open group, 2 (4.9%) patients had bowel injury. In laparoscopy group, 1 (3.1%) patient had an accidental injury to the inferior epigastric artery.
- The mean duration of pain was 6.36 days in open group while it is 3.34 days in laparoscopy group. The P value is <0.05, which is statistically significant.
- On day 1, 87.5% patients in laparoscopy group had a VAS score of 1 – 5, while 82.9% patients in open group had a score of 6 – 10. Almost all the patients were pain free by 5days in laparoscopy group, while 26 (63.9%) had pain even after 5 days.
- Seroma rates were 53.6% in open group when compared to 25% in laparoscopy group.
- Wound infection rates in open group were 24.3% compared to 6.2% in laparoscopy group.
- The mean duration of stay for open group is 11.31 days, while in laparoscopy group is 3.18 days. P value is < 0.05, which is statistically significant.
- Regarding return to normal activity majority of the patients i.e 22(53.7%) took more than 10 days to return to their normal activity, while in laparoscopy almost all the patients i.e 27 (84.4%) took less than 10 days for the same P value is <0.05, which is statistically significant.
- The mean follow up in open group is 12.07 months, while in laparoscopy group is 8.4 months.
- Mesh infection was observed in 3 (7.3%) patients in open group and 1 (3.1%) patients in laparoscopy group. Mesh infection was controlled by conservative methods. Hence removal of the mesh was not warranted.
- There were no reoperations in the present study.
- There were no recurrences in the present after a follow up of 6 months to 2 yrs.

Discussion

Comparison with Other Similar Studies

Reference	Patients(n)		Operating time(mins)		Length of hospital stay(days)		Infection (%)		Seroma (%)		Follow up (months)		Recurrence	
	open	Lap	Open	Lap	Open	Lap	Open	Lap	Open	Lap	Open	Lap	Open	Lap
Holzman et al. ^[8]	16	21	98	128	5	1.6	6	5	0	5	19	10	13	10
Ramshaw et al. ^[9]	174	79	82	58	2.8	1.7	3	0	-	-	21	21	7	0
Misra et al ^[10]	33	33	75	86	1.47	3.43	33.3	6.06	3.03	12.1	12.17	13.73	3.3	6.2
Pring et al ^[11]	30	24	43.5	42.5	1.47	1.33	16.67	3.3	33.3	16.67	27.5	27.5	4.16	3.3
Asencio et al ^[12]	45	39	101.8	70	3.46	3.33	0	0	5.12	28.89	12	12	7.9	9.8
Itani et al ^[13]	73	73	-	-	4	3.9	24.66	5.47	24.66	8.2	24	24	8.2	12.5
Present study	41	32	84.17	83.62	11.31	3.18	24.4	6.2	53.6	25	12.07	8.4	0	0

The operating time is one of the determining factors in the assessment of the effectiveness of the procedure. In the present study, the mean operating time was 84.17 mins in open group and 83.62 mins in laparoscopy group. The above values (P = 0.4596) are not significant statistically. In the study conducted by **Ramshaw et al and Asencio et al**, they reported lesser operating times in laparoscopy group.^{[9][12]} Other studies by **Misra et al, Pring et al** haven't shown any significant difference between the two procedures.^{[10][11]} In the studies conducted by **Olmi et al and Carbajo et al**, they showed significant reduced time in laparoscopic surgery when compared to conventional surgery.^{[14][15]}

In the present study 3 events of intra operative complications had occurred. Two bowel injuries were reported in the open group. **Carbajo et al** in 1999 in his RCT reported similar results.^[15] **Asencio et al** 2009 and **Barbaros et al** 2006 reported one event of bowel injury each in the laparoscopy group when compared to none in open group.^{[12][16]} The one intra operative complication that occurred in the laparoscopy group is bleeding from the inferior epigastric artery, which was controlled by transfascial sutures. Laparoscopic surgery is generally associated with reduced pain. In 4 RCTs (**Asencio** 2009, **Barbaros** 2006, **Misra** 2006, **Pring** 2008) all reported almost equal incidence of

postoperative pain scores in both the groups.^{[12][16][10][11]} In the present study, the mean duration of postoperative pain in open group is 6.36 days, while in laparoscopy group is 3.34 days, ($P < 0.05$), which is statistically significant.

One of the main advantages of laparoscopic repair is the decreased wound related complications. Almost all the RCTs except **Asencio** 2009 reported decreased wound related complications with laparoscopic repair. Amongst all, the most common complications are seroma formation and superficial wound infection. Seroma rates are higher in open group in the studies conducted by **Asencio et al**, **Misra et al** and **Pring et al**, while **Itani et al** at 2010 reported lower seroma rates in laparoscopy group. Wound infection rates are higher in open group in all the studies.^{[12][10][11][13]}

In the present study, the seroma rate is 53.65% in open group when compared to 25% in laparoscopy group. The wound infection rate in open group is 24.3% in open group when compared to 6.2% in laparoscopy group ($p = 0.053$). Mesh infection was observed in 3 (7.3%) patients in open group and 1 (3.1%) patient in laparoscopy group. Mesh infection was controlled by conservative methods. Hence removal of the mesh was not warranted. The other complications observed are persistent postoperative ileus, which was seen in 2 (4.8%) in open and 4 (12.5%)(7.8%) in laparoscopy group. Chronic pain (>3-6 months) was observed in 17% patients in open group when compared to 12.5% in laparoscopy group. In the study conducted by **Heniford et al** with 850 cases, postoperative ileus was reported in 3% of cases undergoing laparoscopic surgery.^[17] In the meta analysis conducted by **Sains et al**, there was no significant difference between laparoscopy and open groups with regard to postoperative ileus.^[18]

In the present study, the mean length of hospital stay was 11.31 days in open group compared to 3.18 days in laparoscopy group. The P value is < 0.05 , which is

statistically significant. In two RCTs conducted by **Holzman et al** and **Ramshaw et al** showed significant difference between the two groups and favoured laparoscopy, while most of the other studies didn't show much difference between the two groups.^{[8][9]}

Conclusion

Laparoscopic ventral hernia repair has shown promising results and a clear advantage over open repair in regard with reduced postoperative pain, decreased postoperative complications, reduced length of hospital stay, and less time for return to normal activity. Hence, laparoscopic ventral hernia repair is a safe and feasible alternative to open repair. The drawback in the study is the time period for the assessment of recurrence rates is short.

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