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# **An observational study of comparison between laparoscopic retro-rectal vs open pre-peritoneal Ventral hernia repair**

**Dr. Mitkumar Rojesara**

Senior resident, Department of general Surgery, G.C.S Medical College, Hospital & Research Centre, Ahmedabad

**Dr. Akshay Sutaria**

Assistant Professor, Department of general Surgery, Parul Institute of Medical Sciences and Research, Vadodara

Corresponding author email: [axaysutaria14@gmail.com](mailto:axaysutaria14@gmail.com)

**Dr Chirag Parikh**

Associate professor, Department of general Surgery, Parul Institute of Medical Sciences and Research, Vadodara

**Dr. Rahul Damor**

Assistant Professor, Department of general Surgery, Parul Institute of Medical Sciences and Research, Vadodara

**Dr. Jaimish Gajjar**

Associate Professor, Department of General Surgery, G.C.S Medical College, Hospital & Research Centre, Ahmedabad

**Abstract**---Background: Hernias are one of the most common anatomical derangements in men and women and have left an indelible mark throughout most of recorded history. For hundreds of years various surgical and non-surgical treatments were offered to patients suffering from chronic pain, obstruction and strangulation related to their hernias. Materials & Methods: The study was undertaken in tertiary health centre in prospective manner from July 2017 to July 2019 on Laparoscopic retro-rectal versus Open pre-peritoneal ventral hernia repair. Results: In present study, mean age of patients in Laparoscopy group was 45.26 years & in Open group was 48.92 years. 25 patients were males and 15 patients were females in the study. 10 patients were of Umbilical hernia, 3 patients were of Paraumbilical hernia and 2 patients were of Epigastric hernia in Laparoscopy group. While for Open group there were 14, 7 & 4 patients respectively. Swelling in abdomen which disappears on lying

down was the main complaint of patients, followed by pain in abdomen. Average BMI of patients in Laparoscopy group was 25 Kg/m<sup>2</sup> while in Open group it was 25.33 Kg/m<sup>2</sup>. Mean size of hernia defect on USG was 20.5 mm in Laparoscopy group and was 20.32 mm in Open group. Conclusions: The selection of the best technique for a particular patient with a ventral hernia should depend upon the patient's preferences, surgeon's comfort & experience with the procedure & fitness of the patient from anesthesia point of view.

**Keywords**--Hernias, observational study, laparoscopic retro-rectal, open pre-peritoneal ventral.

## Introduction

No disease of the human body, belonging to the province of the surgeon, requires in its treatment a better combination of accurate anatomical knowledge with surgical skill than Hernia in all its varieties. Sir Astley Paston Cooper (1804). The word "hernia" is derived from a Latin term meaning "a rupture". Hernia is defined as an abnormal protrusion of viscus or a part of a viscus or intra-abdominal fat accompanied by surrounding peritoneum to either external or internal cavity through a normal or abnormal opening in abdominal wall musculature or fascia within which it is normally contained.

Hernia of anterior abdominal wall, or ventral hernias represent defects in the parietal abdominal wall fascia and muscle through which intra-abdominal or pre-peritoneal content can protrude. Ventral hernia may be congenital or acquired. Acquired hernia may develop via slow architectural deterioration of the Musculo-aponeurotic tissue or they may develop from failed healing of an anterior abdominal wall incision. Acquired hernias typically occur after surgical incision and are therefore termed incisional hernias. Incisional hernia is a common long-term complication of abdominal surgery and is estimated to occur in 3% to 13% of laparotomy incisions. However, its incidence is greater than 23% in patients who have developed an infection in the laparotomy wound.<sup>(1)</sup>

Although not a true hernia, divergation of recti can present as a midline bulge. In this condition, the linea-alba is stretched, resulting in bulging at the medial margins of the rectus muscles. Abdominal diastasis can occur at other sites besides the midline. There is no fascial ring or hernia sac, and unless significantly symptomatic, surgical correction is avoided. Primary ventral hernias (non-incisional) also are termed "true"ventral hernias. These are more properly named according to their anatomic location.<sup>(2)</sup>

### **Ventral Abdominal wall hernias** <sup>(2)</sup>

1. Anterior Abdominal wall hernias (Spontaneous or primary ventral):
  - a) Umbilical
  - b) Para Umbilical
  - c) Epigastric
  - d) Spigelian
2. Incisional (Secondary ventral hernias)

Umbilical hernia occur at the umbilical ring and may be present at birth or develop later in life. In adults, the defect in the median raphe is immediately adjacent to (most often above) the true umbilicus. The term 'paraumbilical hernia' is commonly used for them. Umbilical hernias are present in approximately 10% of all newborns and are more common in premature infants. Most of the congenital hernia closes spontaneously by 5 years. Adults with small and asymptomatic umbilical hernia should be followed clinically. Surgical treatment is offered if hernia is observed to enlarge or associated with symptoms or if incarceration occur. Surgical treatment consists of primary suture repair or placement of prosthesis Mesh for large defect (>2cm) using Open or Laparoscopic method.

Over the last decade, The Laparoscopic repair of ventral hernia has been used with increasing frequency in which the mesh is placed deep to the hernia defect and can be fixed to the healthy abdominal wall. **E-TEP (extended TEP)** is the newer approach of laparoscopic ventral hernia repair in which the mesh is placed in the pre-peritoneal plane for the infra-umbilical defects.

In our study, In the Laparoscopic retro-rectal mesh plasty, the mesh is placed in the retro-rectus position using the Hassan's Cannula above the arcuate line. The mesh gets fixed by the raised intra-abdominal pressure which spreads equally over the wall of abdomen according to the Pascal's Law.

### **Aims and Objectives**

- To study & to evaluate various types of ventral hernia
- To compare the Methods of Open Pre-peritoneal and Laparoscopic Retro-rectal Ventral Hernia Repair by mesh-plasty.
- To study operative time, post-op complications, recurrence & outcome of laparoscopic retro-rectal ventral hernia repair over open pre-peritoneal ventral hernia repair.

### **Materials and Methodology**

#### **Study design**

1. Study type: prospective, observational study
2. Study site: department of general surgery, GCSMCH&RC, Ahmedabad
3. Study duration: July 2017 to Jan 2019 for case enrollment & followed up to July 2019.

#### **Subject Selection**

##### **➤ Inclusion Criteria**

- Patient diagnosed with uncomplicated umbilical, paraumbilical and epigastric hernia
- Patient willing to Participate In Study and give Written Consent
- Male patients  $\geq 18$  years.
- Female patients  $\geq 18$  years, non-lactating, using effective contraceptive methods, non-pregnant

### ➤ Exclusion Criteria

- Patient not fit for Anesthesia
- Patient of <18 years age
- Incisional Hernias
- Patient of generalised peritonitis
- BMI of >30Kg/m<sup>2</sup> (obesity)
- Pregnant females
- Lactating females
- Complicated hernias
- Severe renal, Cardiovascular or hepatic conditions

### Pre-operative

The diagnosis was made by history, clinical examination and ultrasound examination of abdomen and pelvis. All patients were evaluated for systemic disease or precipitating causes. Patients who had hypertension, diabetes mellitus or cough were controlled preoperatively. Patients were admitted to surgical ward two days prior to operation. The procedure was explained to the patient and written and informed consents were taken.

### Data Analysis

Recorded informations from case record form were coded and entered in microsoft excel worksheet. Data was analysed using appropriate statistical tests like Student's t test, chi square test, Z test, Fischer's exact t-test.

### Results & Observations:

Total number of patients: 40

Group A (**n=15**): Laparoscopic Retro-rectal Hernioplasty

Group B (**n=25**): Open Pre-peritoneal Hernioplasty

Patients were allotted to Group A or B on a non-random basis as per the patient's preference of surgery.

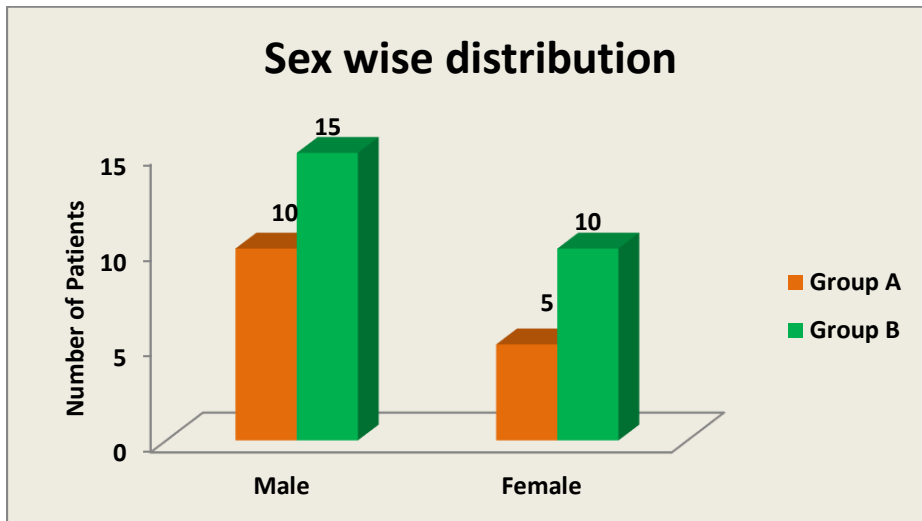
Table 1: Age wise Distribution

Age group	Group A (n=15)	Group B (n=25)
20-30	2 (13.3%)	2 (8%)
31-40	4 (26.6%)	7 (28%)
41-50	3 (20%)	5 (20%)
51-60	5 (33.3%)	3 (12%)
61-70	1 (6.67%)	8 (32%)
Total	15 (100%)	25 (100%)
Mean Age	45.26 ± 12.13	48.92 ± 13.73
P value	0.3999	

According to above table, in present study, majority of the patients in laparoscopy group are in age group of 51-60 years (33.3%) with a mean age of 45 years while

majority of the patients in open group are in age group of 61-70 years (32%) with a mean age of 49 years.

As the p value is  $>0.05$  the difference in mean age of both groups is statistically **not significant**.

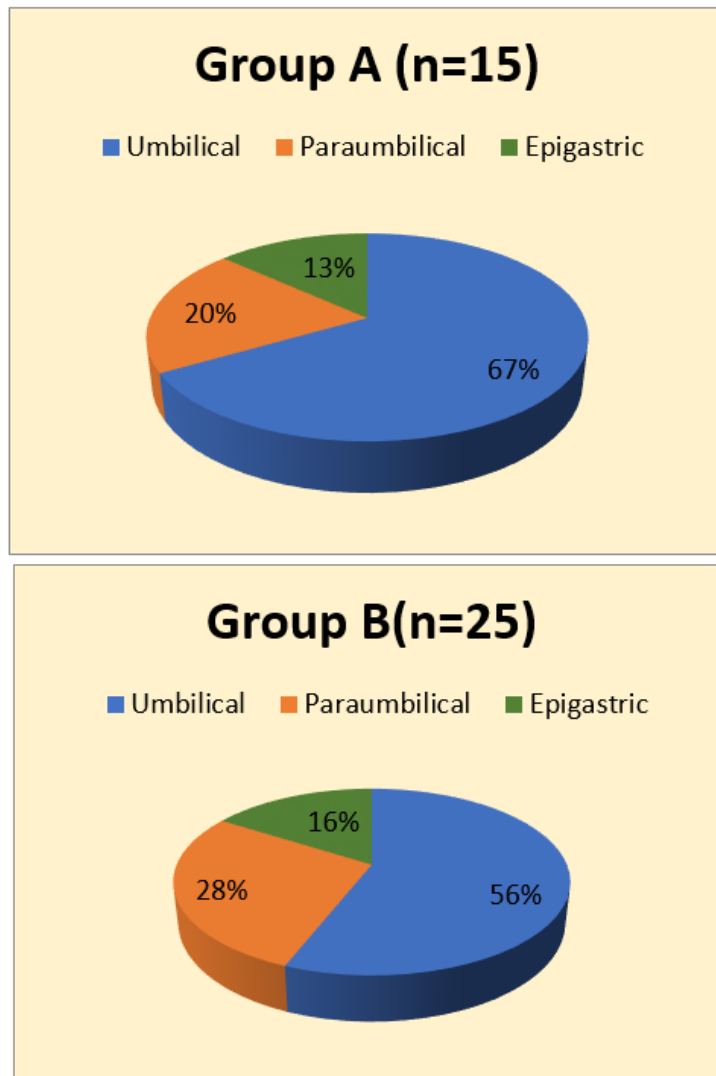


Graph 1 : sex wise distribution

There are 66.7% male patients & 33.3% female patients in laparoscopy group while in open group, males are 60% and females are 40%.

Male: Female ratio of laparoscopy group is 2:1 and of open group is 1.5:1. There are total 25 males & 15 females with an overall ratio of 1.67:1.

Since the p value is  $>0.05$  there is no statistically significant difference for sex between both the groups.



Graph 2: Type of Ventral Hernia

From above graphs, in present study, the most common type of hernia is umbilical type in both the groups followed by paraumbilical & epigastric types.



Graph 3: chief complains

According to above graph, all the patients in both groups have chief complain of swelling in abdomen. The swelling disappears on lying down in 33.3% cases in laparoscopy group & in 60% cases in open group. Second most common complaint was of pain in abdomen in 2 out of 15 (13.3%) cases & in 10 out of 25 (40%) cases in laparoscopy and open groups respectively. Nausea is present in 2 cases of open group. None of the patients had vomiting or abdominal distension. In the causative factors, 13.3% have persistent cough and 6.67% have constipation in laparoscopy group while in open group they are 24% & 28% respectively.

Table 2: BMI Wise Distribution

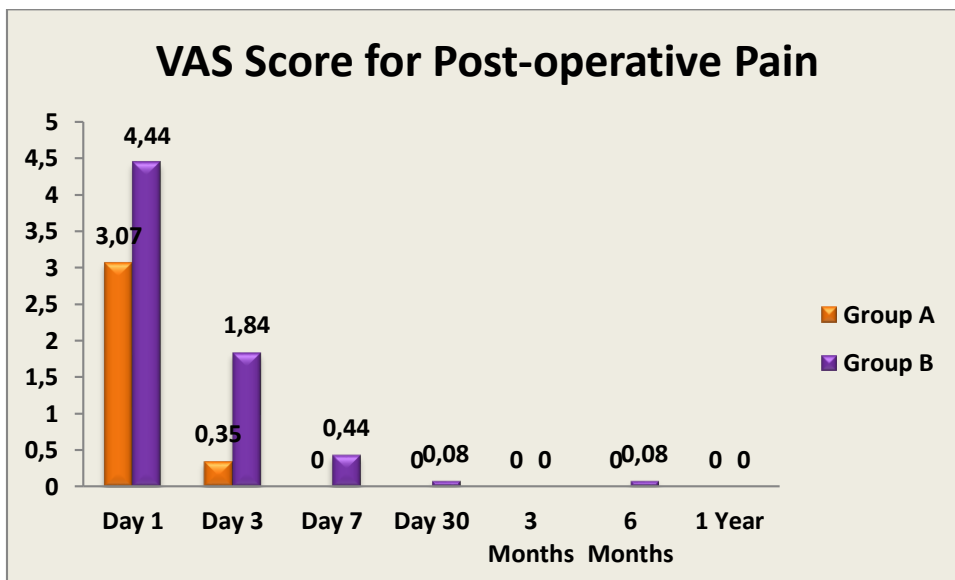
BMI(kg/m <sup>2</sup> )	Group A (n=15)	Group B (n=25)
18-24.99	9 (60%)	12 (48%)
>25	6 (40%)	13(52%)
Total	15 (100%)	25 (100%)
Mean	25.0±2.59	25.33±3.07
P Value	0.7297	

On the basis of obesity in present study, 6 cases (40%) in laparoscopy group & 13 cases (52%) in open group have BMI (Body Mass Index) of >25 Kg/m<sup>2</sup>.

As the p value for mean BMI in laparoscopy group (25.0Kg/m<sup>2</sup>) & in open group (25.33Kg/m<sup>2</sup>) is >0.05, this is difference is statistically not significant.

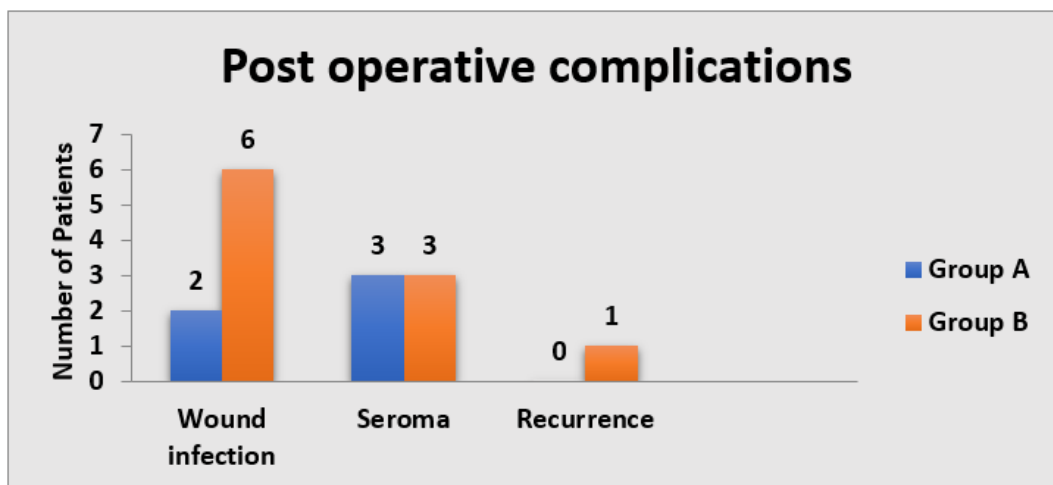
Average defect size on USG in laparoscopy group is 20.5cm and in open group it is 20.32 cm. The average overlap of defect with mesh is 4.71cm in laparoscopy group & 4.8cm in open group. The p value for both the data is >0.05, suggesting that the differences are statistically not significant.

The operative time for laparoscopy group is 139.42min and for open group is 100.2min. This difference is statistically significant. (p value- <0.0001)



Graph 4: VAS Score for Post-operative Pain

According to the above Graph, the average post operative visual analogue score for pain on post operative day 1 is 3.07 in laparoscopy group & 4.44 in open group. On post operative day 3 the VAS score is 0.35 in laparoscopy group & 1.84 in open group. The p value for both the observations is  $<0.05$ , so the difference of post operative pain in both groups on post operative day 1 & day 3 is statistically significant. From post operative day 7 onwards the VAS score is zero for all patients except for open group on day 7 (0.44), on day 30 (0.08) & at 6 months (0.08).



Graph 5: Post operative complications

From the above-mentioned graph regarding the post operative complications, in laparoscopy group 2 out of 15 (13.3%) cases & in open group 6 out of 25 (24%) cases developed wound infections.

Seroma formation is noted in 3 out of 15 (20%) cases in laparoscopy group & 3 out of 25 (12%) cases in open group. One patient in open group has developed recurrence in the post-operative period. But none of the patients of laparoscopy group developed recurrence. P values for all these are  $>0.05$ , so the differences in post-operative complications between both groups are statistically not significant.

## Discussion

There are various studies available on various methods of ventral hernia repair and comparing different methods regarding the per-operative & post-operative factors as well as the cost factor. One such study by Jaykar et al has been published in the Int. Surgery journal in June 2017 comparing the various clinical factors of 50 cases of ventral hernia.<sup>(1)</sup> Another study done by Purushotham B et al in May 2015 comparing 42 cases of umbilical & paraumbilical hernia repair by laparoscopic IPOM repair & conventional open sublay meshplasty (21 cases each) has compared the operative time, post-operative parameters & cost analysis.<sup>(3)</sup> The study done by M porecha et al in 2009 has compared the laparoscopic intra peritoneal meshplasty and open sublay meshplasty in total 50 cases of ventral hernia (25 cases each). These study results are compared & discussed with our study results.<sup>(4)</sup>

In present study (n=40), patients of ages from 20-70 years were operated for ventral abdominal hernias while in jaykar et al study<sup>(1)</sup> (n=50) age group of 0-80 years were included. Majority of number of patients in laparoscopy group were in 50-60 years age group & in 60-70 years in open group which is comparable to jaykar et al study in which majority of patients were in age group of 60-70 years. So it shows that older age is a risk factor for Ventral hernia formation due to weakness of abdominal wall. In a study conducted by Purushotham B et al <sup>(3)</sup> the mean age of patients was 47.81 years in open group & 32.38 years in laparoscopy group. In present study it was 48.92 years & 45.26 years respectively. In present study (n=40) there were 25 male patients (62.5%) & 15 female patients (37.5%) making male to female ratio 1.67:1 while in other studies there were more number of female patients as compared to males as seen in the above table.

In present study (n=40) most common type of hernia was umbilical hernia followed by paraumbilical & epigastric hernia for open as well as the laparoscopy group. Patients with incisional hernia were not included in the study. In jaykar et al study (n=50) 16 patients (32%) presented with umbilical hernia, 23 patients (46%) presented with incisional hernia, 6 patients (12%) presented with paraumbilical hernia and 5 patients (10%) presented with epigastric hernia. Also in M Porecha et al study (n=50) indicated that incisional hernia was the most common variety followed by umbilical hernias followed by epigastric & paraumbilical hernia in open as well as in laparoscopy group.

Table 3: Chief Complaints

Complaint	Present Study		Jaykar et al Study(n=50) %
	LAP(n=15)%	OPEN(n=25)%	
Swelling in abdomen	100	100	100
Abdominal pain	13.3	40	20

According to the above data all the cases in present study & the study by Jaykar et al had the complaint of swelling in abdomen. The second most common symptom was pain as also shown in the Jaykar et al study. The pain is usually the dull & dragging type of pain due to stretching of the peritoneum in the hernia sac. In present study, average overlap of defect with mesh was 4.71 cm in laparoscopy group & 4.8 cm in open group in all the directions of defect. As per the recommendations, overlap of the defect with mesh should be at least 4 cm to reduce the chances recurrences due to inadequate mesh size. So selection of an adequate sized mesh is important during ventral hernia repair with either laparoscopic or open approach.

The average operative time in our study was 139 min in laparoscopy group & 100 min in open group. Also in Purushotham B et al study the average operative time was 62 min in laparoscopy group & 38 min in open group which is comparatively lesser than our study because in our study we used the extra-peritoneal (sub-lay) method of meshplasty which is a comparatively newer technique than IPOM. But the average operative time was significantly more in laparoscopic approach as compared to the open approach in both the studies. Operating time of hernia repair varies considerably between surgeons and also between surgical centres and reduces with experience. For laparoscopic repair it is considerably more because of the difficult learning curve, technical aspects of laparoscopy

Laparoscopy group had less postoperative pain compared to Open meshplasty group, as assessed by Visual Analogue Scale at postoperative day 1, 3,7 and Postoperative month 3, 6 & 1. This is comparable to the Study by Purushotham B et al. where post-operative pain (VAS score) was greatest in the open group 7.48 in comparison to 3.05 in laparoscopy group on the 1st day. None of the patient had chronic post-op pain in laparoscopy group.

This difference can be explained by using the non-absorbable sutures for fixation of the mesh in open repair while there is no need for fixation in laparoscopic repair in our study. Also, with the help of tacker devices in laparoscopy the post-operative pain is reduced.

Table 4: Post Operative Parameters

Postoperative parameters	Present study		Purushotham b et al study		M porecha et al study	
	LAP (n=15)	OPEN (n=25)	LAP (n=21)	OPEN (n=21)	LAP (n=25)	OPEN (n=25)
Post-op Hospital stay (days)	2.93±0.88	5.48±2.74	1.37	3.56	03	07
Stitch removal (days)	11.28±2.52	15.76±4.39	-	-	-	-

Mean post operative hospital stay was significantly less in laparoscopy group as compared to the open group in our study and the results were also comparable to the Purushotham B et al study & M porecha et al study.

The reasons behind the early discharge of patients in laparoscopic group are as followed:

- Early recovery after surgery with minimal access technique

- Less post-operative pain
- No drains
- Early mobilization & less wound related complications

The average stitch removal day was also earlier in laparoscopic group as compared to the open group because of lesser wound related morbidities in our study.

Table 5: Post Operative Complications

Post operative complications	Present study		Purushotham b et al study		M porecha et al study	
	Lap (n=15)%	Open (n=25)%	Lap (n=21)%	Open (n=21)%	Lap (n=25)%	Open (n=25)%
Wound infection	13.3	24	0	9.5	4	16
Seroma	20	12	4.8	4.8	-	-
Recurrence	0	4	0	6.67	0	4

From above data comparing the post-operative complications, chances of wound infections are more in open group as compared to the laparoscopy group. The main differences of laparoscopic approach as compared with the open technique are:

- The smaller incisions
- Minimal soft tissue dissection needed for the placement of a large mesh overlap
- Entry point at a different site which decreases the incidence of wound complications

Seroma formation was noticed in 20% cases of laparoscopy group & 12% cases of open group in our study while in Purushotham B et al study the incidence was 4.8% for both groups. Seroma occurs in both the approaches due to tissue reactions to mesh and also because of the dissection to create the space for mesh plasty.

Recurrence was noted in 1 case of open group in our study which is comparable to the other two studies with one case of recurrence noted in open group in both. But there was no recurrence in any case of laparoscopic repair in Purushotham B et al study or in M Porecha et al study as well as in our study.

### Limitations

- Small sample size.
- Cost factor had not been studied.
- All the patients enrolled in our study were not operated by the same surgeon. Operative outcome varies depending on the skills & experience of the operating surgeon.
- This study was done in a single hospital. A multi-centric, large, randomized controlled trial studies are needed for better outcome assessment.

## Conclusion

Laparoscopic ventral hernia repair is a reasonably safe, effective & feasible alternative to the conventional open ventral hernia repair that requires mesh.

The advantages of laparoscopic repair over open repair are:-

- Smaller incisions and reduced scar related morbidities.
- Less post operative pain.
- Less postoperative hospital stay.
- Early recovery after surgery.
- Less chances of wound infections.
- Early stitch removal & early return to routine activities.
- Better cosmetic results.

The limitations of laparoscopic repair over open repair are:-

- Higher learning curve & experience is required
- Availability of the laparoscopic facility
- Anesthetic fitness for general anesthesia
- Longer operative time (can be reduced with experience)

Cost of the procedure (not been included in the present study)

Laparoscopic approach is becoming more & more popular nowadays as compared to the conventional open approach but there is no clear cut superiority of one procedure over other.

Also in our study we have done the laparoscopic repair of ventral hernia by total extra-peritoneal (sub-lay) approach which is a newer technique as compared to the IPOM repair with advantages of:

- No need for a costly composite mesh,
- No peritoneal cavity entry & its related morbidity
- No drains are needed.

Hence it is concluded that the selection of the best technique for a particular patient with a ventral hernia should depend upon the patient's preferences, surgeon's comfort & experience with the procedure & fitness of the patient from anesthesia point of view.

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