

## Laparoscopic versus Open Repair of Paraumbilical Hernia- A Retrospective Comparative Study

Dr. Ritvik Resutra<sup>1</sup>, Dr. Rajive Gupta<sup>2\*</sup>, Dr. Madhu Gupta<sup>3</sup>

<sup>1</sup>Postgraduate Resident, Department of Surgery, ASCOMS, Sidhra, Jammu (J & K), India

<sup>2</sup>Surgeon Specialist, Maxxlyfe Hospital, Sunjwan Morh, Near Bathindi, Jammu (J & K), India

<sup>3</sup>Radiologist, Govt. Subdistrict Hospital, Vijaypur, Jammu, (J & K), India

**\*Corresponding Author:**

**Dr. Rajive Gupta MBBS, MS (Surgery)**

Surgeon Specialist, Maxxlyfe Hospital, Sunjwan Morh, Near Bathindi, Jammu (J & K), India

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### Abstract

**Introduction:** Paraumbilical hernia is a common surgical problem. Since the prosthetic repair has become the standard of practice for inguinal hernia management, the same has been adapted for Paraumbilical hernia management with better outcome. This can be done either laparoscopically or by open technique. There is still debate going on regarding the optimal surgical approach. There are very few studies comparing the laparoscopic and open method of Paraumbilical hernia mesh repair. The aim of this study is to compare the outcomes following laparoscopic versus open mesh repair of Paraumbilical hernia.

**Materials and Methods:** This was a retrospective comparative clinical study done from April, 2016 to July, 2021. All the patients above the age of 18 years who attended surgical outpatient department at Maxxlyfe hospital, Sujma Morh, Bathindi, Jammu, J and K, India with Paraumbilical hernia were taken into this study.

**Results:** Out of 40 patients with Paraumbilical hernia, 20 patients were operated by open meshplasty and 20 patients were operated by laparoscopic meshplasty. Postoperative pain and length of hospital stay is significantly less in laparoscopic Paraumbilical hernia repair. Postoperative complications like wound infection, seroma and haematoma were relatively less in laparoscopic group and were statistically significant.

**Conclusion:** Laparoscopic Paraumbilical hernia repair has significantly better outcome in terms of postoperative hospital stay and postoperative complications.

**Keywords:** Laparoscopy; Mesh hernioplasty; Paraumbilical hernia repair; Umbilical hernia

### INTRODUCTION

A Paraumbilical hernia is a hole in the connective tissue of the abdominal wall in the midline with close approximation to the umbilicus and is a type of midline ventral abdominal hernia. If the hole is large

enough, there can be protrusion of the abdominal contents including omental fat and /or bowel (Figure 1)



Figure 1 (a, b, c) showing patients with Paraumbilical herniae

It is one of the most common surgical problems with rise in the repair rate annually.<sup>1,2</sup> Previously, Paraumbilical hernias were repaired by tension-free suture technique. Due to a high unacceptable recurrence rate, this procedure lost popularity.<sup>3</sup> A real change in view of Paraumbilical hernia repair came with the introduction of meshplasty.<sup>4</sup> Nowadays, meshplasty is the most commonly performed procedure for Paraumbilical hernia repair.<sup>5</sup> An increased incidence of wound infection and wound-related complications in open mesh repair led to continuing research into the optimal method of treatment of Paraumbilical hernia which led the surgeons to adapt laparoscopic approach. Conventionally, smaller Paraumbilical hernia (<3 cm) has been repaired by open suture technique such as Mayo's repair and its modifications, but with a high recurrence rate of more than 20%.<sup>6,7</sup> The open repair using prosthetic mesh usually require adequate subcutaneous dissection, raising of flaps and drain insertion with increased incidence of wound complications such as infection.<sup>8</sup> The recent introduction of laparoscopic repair of ventral hernias is gaining popularity and is being practiced by many surgeons all over the world.<sup>9,10</sup> There is an increasing evidence that laparoscopic repair of Paraumbilical hernia is superior to open mesh repair regarding operative and postoperative complications, postoperative pain and overall morbidity and mortality.<sup>11</sup> Very few studies are available comparing the open versus laparoscopic para-umbilical mesh repair and most of these are retrospective.<sup>12,13,14</sup> This is also a retrospective study conducted to compare the Laparoscopic Hernia Repair (LHR) with Open Hernia Repair (OHR) with mesh in terms of operative time, intra and postoperative complications, total hospital stay, postoperative pain, recurrence and morbidity.

The primary objective of the study was to compare the complications of LHR and OHR with mesh in patients of Paraumbilical hernia. Secondary objectives were to compare the operative time and length of postoperative hospital stay.

## MATERIAL AND METHODS

This was a retrospective study done in the department of surgery at Maxxlyfe Hospital, Sunjwan Morh, near Bathindi, Jammu (J and K) India over a period of 5 years between April, 2016 & July, 2021. All the patients above 18 years who attended surgical

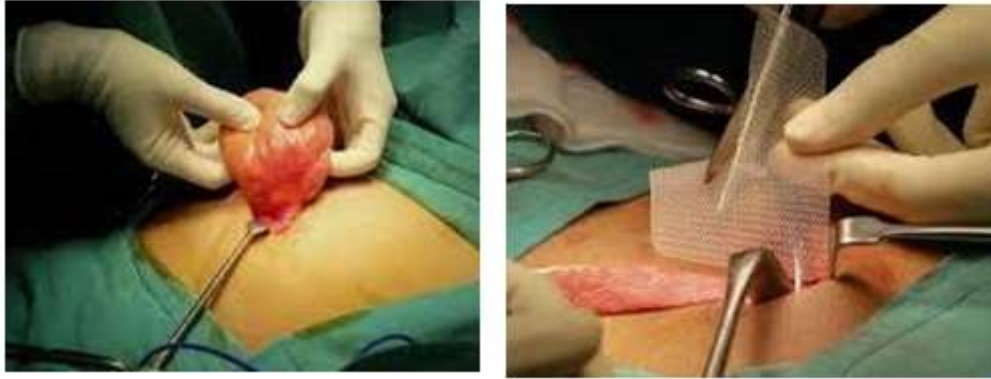
outpatient department with Paraumbilical hernia were enrolled in the study. Patients who underwent laparoscopic repair formed the laparoscopic group, whereas those who underwent open repair formed the open group.

Exclusion criteria included

- 1) Patients with obstructed or strangulated Paraumbilical hernia
- 2) Patients with abdominal malignancies
- 3) Patients with coagulopathy, severe cardiopulmonary disease, ascites and renal failure
- 4) Patients who had Paraumbilical hernia repair in combination with another major surgical operation such as laparoscopic cholecystectomy and inguinal hernia repair
- 5) Patients with recurrent Paraumbilical hernia

After the patient's consent to participate in the study, the demographic data, clinical presentation, comorbidity, size of the defect, intraoperative & postoperative complications, postoperative pain, operating time and length of hospital stay were analyzed. Surgery in OHR group was done mostly under regional anesthesia. In some cases, general anesthesia was also given. All cases in LHR group were done under general anesthesia. Antibiotic in the form of intravenous injection of 1 gram of ceftriaxone was prophylactically given before incision and two doses given postoperatively. Abdomen was prepared, painted and draped.

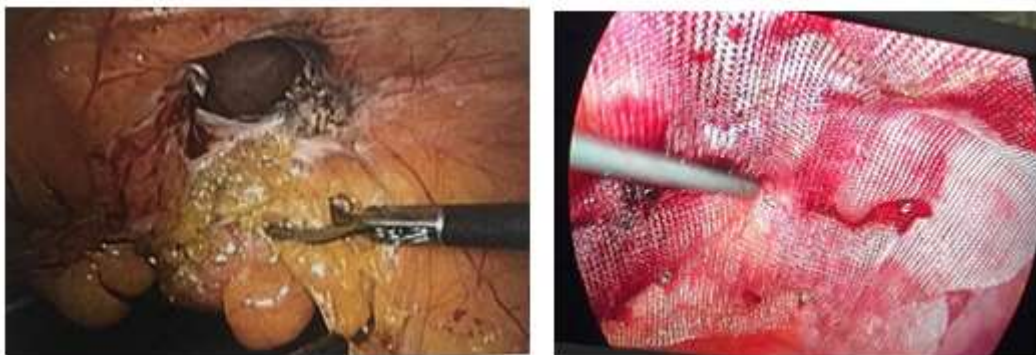
In OHR, the sac was identified and rectus sheath was defined all around the sac. Sac was entered and adhesions were separated between the sac and surrounding tissues in all directions (Figure 2). Sac was excised or sometimes reduced into abdominal cavity without excising. In anatomical repair, the defect in rectus was closed primarily with nonabsorbable suture (No. 1 Polypropylene). In open meshplasty in addition to closure of defect, an Ultrapro (Partially Absorbable Light Weight Mesh) of suitable size with a minimum of 3 cm overlap beyond the margin of the defect was placed and fixed by a series of "U" stitches through the mesh and anterior rectus sheath and skin closed over it. A suction drain of suitable size was placed subcutaneously depending upon the extent of dissection and size of a hernia.



**Figure 2 showing OHR.**

In laparoscopic hernia repair, pneumoperitoneum was created with a veress needle at Palmer's point, located in the upper left quadrant in the mid-clavicular line, three finger breadths below the left costal margin. After inspection of the abdomen, additional trocars were placed in the lateral abdominal wall, well enough from the edge of the hernia defect under direct vision. Adhesiolysis was done and the sac contents were reduced using blunt and sharp dissection. Electrocautery was used carefully to avoid unnecessary thermal injury to visceral organs. The hernia sac was dissected and removed. At this point, with the hernia contents reduced, the fascial edges of the hernia defect were identified circumferentially and size of the defect estimated after reducing the intra-abdominal pressure. To these measurements, 6 cm was added in both the directions to provide overlap of fascial edges (minimal 3 cm) of the hernia by the mesh. A Polypropylene or Proceed mesh or composite

dual side mesh of appropriate size was introduced into the abdomen through the 10 mm port. The circumference of the mesh was then tacked to the abdominal wall at approximately 3 cm intervals, thereby preventing bowel and other abdominal contents from getting trapped in the mesh (Figure 3). No drain was placed and the port sites were closed under vision. Intra-operatively, the size of the defect and operating time was noted. Patients in both the groups were discharged with oral antibiotics for five days. The number of days in the hospital were considered as the number of nights patients were in hospital postoperatively. Patients were allowed to take oral meals postoperatively after recovering from anaesthesia. Patients were discharged when they were symptomatically better. Post-operative pain and severity of pain was assessed during hospital stay using Visual Analogue pain Scale (VAS).



**Figure 3 showing LHR.**

Local complications like wound infection, haematoma and seroma were assessed postoperatively. Patients who developed seroma/ haematoma were managed conservatively by oral antibiotic for five days to prevent any secondary infection.

### STATISTICAL ANALYSIS

Data are presented as mean  $\pm$  standard deviation and median with range whichever is appropriate. In the case of qualitative variables, the groups were compared by Chi-square test. In the case of quantitative variables, the groups were compared by Student's unpaired t-test or Mann-Whitney U test

whichever was appropriate. Statistical analysis was done using SPSS 20.0 software. The  $p$ -value $<0.05$  was considered significant

### RESULTS

A total of 40 patients with Paraumbilical hernia were included in the study of which 20 were taken as study group who underwent LHR and remaining 20 were taken as control group who underwent OHR either by open meshplasty or anatomical repair by a single surgeon, Dr Rajive Gupta, the corresponding author. The two groups were almost similar in respect to patient's age, sex and size of the defect (Table 1).

**Table 1: Demographic data and hernia characteristic (NS=nonsignificant; S\*=significant)**

Variables	Laparoscopic group (n=20)	Open group (n=20)	p-value
Operating time (h:m)	1:49 $\pm$ 0:19	1:09 $\pm$ 0:11	NS
Age (years)	48.2 $\pm$ 13.3	45.7 $\pm$ 12.8	NS
Sex M/F	13/7	11/9	NS
Hernia size(cm <sup>2</sup> )	3.125 $\pm$ 0.97	3.525 $\pm$ 0.94	NS

**Table 2. Complications in the two groups (NS=nonsignificant; S\*=significant)**

Variables	Laparoscopic group (n=20)	Open group (n=20)	p-value
Haematoma	0	2	S*
Seroma	0	3	S*
Infection	1	5	S*
Postoperative pain	2.76 $\pm$ 0.98	4.73 $\pm$ 1.46	S*
Hospital stay (days)	3.05 $\pm$ 0.999	4.80 $\pm$ 1.58	S*

In LHR group, no patient developed wound haematoma and seroma (Table 2). In OHR group, two out of 20 patients developed wound hematoma (10%) and three out of 20 patients developed seroma (15%). In LHR group, 1 patient out of 20 developed wound infection (5%) and in OHR group, 5 out of 20 patients developed wound infection (25%). Though the size of the defect was almost similar in both the groups, the operating time was less in the OHR group, but was statistically insignificant ( $p > 0.05$ ). Postoperative pain in terms of VAS scoring in between the two groups was compared by Student's t-test and Mann-Whitney test.

## DISCUSSION

A Paraumbilical hernia is a protrusion of a viscous or part of it through the Linea alba abutting superiorly or inferiorly on the umbilicus. Most common presentation of Paraumbilical hernia is swelling adjacent to umbilicus with the involvement of one of the walls of the umbilicus. It is most common in the fifth and sixth decade of life. Overall, Paraumbilical hernia accounts for 10%-14% of all hernias.<sup>15</sup> Risk factors for Paraumbilical hernia are female sex, obesity, multiparity and cirrhosis.<sup>16</sup> Diagnosis of Paraumbilical hernia is mainly clinical. Some patients present with intestinal obstruction when bowel gets trapped in sac causing adhesions and irreducibility. In such cases, imaging modalities like ultrasonography and abdomen radiography are helpful in knowing the contents of sac and severity of obstruction. Surgery is the treatment of choice. In case of small defects ( $\leq 2$ -3 cm in diameter), primary anatomical repair can be done, but in large defects ( $> 2$ -3 cm in diameter) simple anatomical repair is associated with high recurrence rates. With the advent of mesh repair, there was a drastic decline in recurrence rate. Prosthetic mesh can be placed as on-lay/overlay, inlay and underlay.

**In on-lay method**, the free edges of rectus sheath are approximated after the sac is excised and the mesh is placed outside rectus sheath and fixed to it. Since it is placed outside abdominal cavity it has an advantage of nil contact with abdominal viscera. But it usually requires subcutaneous dissection, raising of flaps and drain insertion with increased incidence of wound complications such as infection.

**In inlay method**, the mesh is placed within the defect of a hernia and fixed to adjacent tissue.

**In sublay or underlay method**, mesh is placed below the fascial components. The mesh can be placed intraperitoneally, pre-peritoneally or in the retro-rectus (retro-muscular) space.

Le Blanc KA and Booth WV in 1993 for the first time described laparoscopic incisional hernia repair by intraperitoneal On-lay Mesh (IPOM) insertion without defect closure.<sup>17</sup> Laparoscopic repair of Paraumbilical hernia has gained ground in recent years with reporting of fewer post-operative complications than the open approach.<sup>18</sup> A recent meta-analysis of randomised controlled trials showed that laparoscopic repair significantly decreases the risk of wound complications like haematoma, seroma and infection following ventral hernia repair. Compared to open repair, laparoscopic repair is technically feasible, safe and effective with good clinical outcome. It is associated with relatively longer intraoperative time, but reduced postoperative pain, analgesic requirement, complications and infection rates with early return to normal activities. Laparoscopic repair is expected to decrease the early postoperative complications and hospital stay. Laparoscopic repair is associated with less chance of infection due to small incision and location of the incision. The incision in open repair is longer and is located in highly contaminated areas as a result has increased risk of wound infection of around 15% to 45%. In laparoscopic repair, contact between mesh and skin is very minimal leading to less chance of mesh infection and also wound infection. In open technique, due to long incision, extensive dissection and raising of adequate flaps for mesh fixation, postoperative pain is generally more when compared with laparoscopic repair. Visceral injury in laparoscopic repair is not uncommon. The visceral injury may occur mostly at the time of insertion of trocar and manipulation of bowel adjacent to sac, though none documented in our study. Intraoperative time in laparoscopic repair is relatively more. The positioning of a patient after induction, installing laparoscopic equipment, insufflation of the abdominal cavity and placement of multiple ports before proceeding with repair may all contribute to increased operative time. Laparoscopic repair also needs surgical expertise. Due to less postoperative pain and morbidity in laparoscopic repair, patients tend to be discharged early than open repair as a result less postoperative hospital stay.

## CONCLUSIONS

Laparoscopic repair of Paraumbilical hernia is safe and effective procedure when compared to open hernia repair. Laparoscopic repair is much better than open repair due to less postoperative morbidity. Postoperative wound complications like infection, seroma and haematoma were more in open group than laparoscopic group. The laparoscopic repair had significantly less postoperative pain due to less tissue handling. As a result, patients after laparoscopic repair can be discharged early and therefore has less duration of hospital stay. Laparoscopic repair has advantages over open repair at the cost of relatively more operative time, though statistically not significant and high expenses. So, it is concluded that laparoscopic Paraumbilical hernia repair is better than open Paraumbilical hernia repair in terms of hospital stay and postoperative complications.

Ethical approval: Institute Ethical Committee clearance was obtained for this study.

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