Original Article

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Surgery Section

Laparoscopic versus Open Repair of Para-Umbilical Hernia- A Prospective Comparative Study of Short Term Outcomes

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ABSTRACT

Introduction: Para-Umbilical Hernia (PUH) is one of the most common surgical problems. Since the prosthetic repair has become the standard of practice for inguinal hernia management, the same has been adapted for para-umbilical hernia management with better outcome. There is still debate going on regarding the optimal surgical approach. There are very few prospective studies comparing the laparoscopic and open method of para-umbilical hernia mesh repair. This study compared the short term outcomes following laparoscopic versus open mesh repair of PUH.

Aim: To compare the early complications of open repair with laparoscopic repair of PUH. To compare the post-operative hospital stay of open repair with laparoscopic repair of PUH.

Materials and Methods: This was a prospective comparative clinical study done from August 2014 to August 2016. All the patients above the age of 13 who attended our surgical outpatient department with PUH were taken into our study. Exclusion criteria included 1) Patients with obstructed or strangulated PUH 2) Patients with abdominal malignancies 3) Patients with coagulopathy, severe cardiopulmonary disease, ascites and renal failure 4) Patients who had PUH repair in combination with another major surgical operation such as laparoscopic cholecystectomy and inguinal hernia repair 5) Patients with recurrent PUH. Institute Ethical Committee clearance was obtained for this study.

Results: Out of 40 patients with PUH, 20 received open meshplasty and 20 patients received laparoscopic meshplasty. Postoperative pain and length of hospital stay is significantly less in laparoscopic PUH repair. Postoperative complications like wound infection, seroma, and haematoma are relatively less in laparoscopic group though statistically not significant.

Conclusion: Laparoscopic PUH repair has significantly better outcome in terms of postoperative pain and postoperative hospital stay.

Keywords: Laparoscopic repair of umbilical hernia, Para umbilical hernia repair, Umbilical hernia

INTRODUCTION

Para-Umbilical Hernia (PUH) is one of the most common surgical problems with rise in the repair rate annually [1,2]. Previously PUHs were repaired by tension-free suture technique. Due to a high unacceptable recurrence rate this procedure lost popularity [3]. A real change in view of PUH repair came with the introduction of meshplasty [4]. Nowadays meshplasty is the most commonly performed procedure for PUH [5].

An increased incidence of wound infection and wound-related complications in open mesh repair lead to continuing research into the optimal method of treatment of PUH which lead the surgeons to adopt laparoscopic approach. Conventionally, smaller PUH (<3 cms) has been repaired by open suture technique such as MAYO repair and its modifications but with a high recurrence rate of more than 20% [6,7]. 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 [8].

The recent introduction of laparoscopic repair of ventral hernias is gaining popularity and is being practiced by many surgeons all over the world [9,10]. There is an increasing evidence that laparoscopic repair of PUH is superior to open mesh repair regarding operative and postoperative complications, postoperative pain and overall morbidity and mortality [11]. Very few studies are available comparing the open versus laparoscopic para-umbilical mesh repair and most of these are retrospective [12–14]. This is a prospective 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, and morbidity.

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

MATERIALS AND METHODS

This was a prospective clinical study done in the department of surgery in a Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER), a tertiary care hospital in Southern India, from August 2014 to August 2016. The study was approved by the Institute Ethical Committee. All the patients above 13 years who attended surgical outpatient department with PUH were enrolled in our study. Patients who underwent laparoscopic repair in any surgical unit formed the laparoscopic group whereas those who underwent open repair formed the open group. Exclusion criteria included 1) Patients with obstructed or strangulated PUH 2) Patients with abdominal malignancies 3) Patients with coagulopathy, severe cardiopulmonary disease, ascites and renal failure 4) Patients who had PUH repair in combination with another major surgical operation such as laparoscopic cholecystectomy and inguinal hernia repair 5) Patients with recurrent PUH. After the patient's consent to participate in the study, the surgeon collected the demographic data, clinical presentation, comorbidity, size of the defect, intraoperative

complications, post operative complications, post operative pain, operating time and length of hospital stay.

Surgery in OHR group was done mostly under regional anaesthesia. In some cases, general anaesthesia was also given. All cases in LHR group were done under general anaesthesia. Antibiotic was prophylactically given before incision and two doses given postoperatively. Urinary bladder catheterization is done in the LHR group. Abdomen was prepared, painted and draped.

In OHR, the sac was identified and rectus defined all around the sac. Sac was entered, and adhesions were separated between the sac and surrounding tissues in all directions. Sac was excised or sometimes reduced into abdominal cavity without excising. In anatomical repair, the defect in rectus was closed primarily with non absorbable suture (1-Prolene, Ethicon). In open meshplasty in addition to closure of defect, an ULTRAPRO [Partially Absorbable Light Weight Mesh (ETHICON)] 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. In laparoscopic hernia repair, pneumoperitoneum was created with a Veress needle at Palmer's point (It is a point in the upper left quadrant in the mid-clavicular line, three finger breadth below the left costal margin) which is the site of initial entry. 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 left in situ. 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 Proceed mesh [ETHICON] or Pro visc mesh (composite dual side mesh, LOTUS] 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 1 cm intervals thereby preventing bowel and other abdominal contents from getting trapped in the mesh. No drains were placed, and the port sites were closed under vision. Intra-operatively the size of the defect and operating time was noted. Two more doses of intravenous antibiotics were given at the interval of eight hours. Patients in both the groups were discharged without any antibiotic except in those patients who developed a wound infection. These patients 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 and advised to perform their routine daily activities. Post-operative pain and severity of pain was assessed daily during hospital stay using Visual Analogue pain Scale (VAS).

Local complications like wound infection, haematoma and seroma were assessed postoperatively. Seroma and haematoma formation were confirmed by ultrasound. Patients who developed seroma/haematoma were managed conservatively without any intervention by oral antibiotic for five days to prevent any secondary infection.

STATISTICAL ANALYSIS

Data are presented as mean±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 para-umbilical 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. The two groups were similar in respective to patient's age, sex and size of the defect [Table/Fig-1].

Though the size of the defect was similar in both the groups, the operating time was less in the OHR group. But did not reach statistical significance (p=0.059) [Table/Fig-2]. Both the groups did not have any intraoperative complications. In the postoperative period in the LHR group, no patient developed wound haematoma and seroma. In OHR group two out of 20 patients developed wound hematoma (10%) with a p-value of 0.147 and three out of 20 patients developed seroma (15%) with a p- value of 0.072 which were statistically insignificant. 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%) with a p-value of 0.077 which is statistically insignificant [Table/Fig-2].

Variables	Laparoscopic group (n=20)	Open group (n=20)	p-value
Age (yrs)	48.2±13.3	45.7±12.8	0.965
Sex M/F	13/7	11/9	0.519
Hernia size (9 cms)	3.125±0.97	3.525±0.94	0.721

[Table/Fig-1]: Demographic data and hernia characteristic.

Postoperative pain in terms of VAS scoring in between the two groups was compared by Student's t-test and Mann-Whitney test.

Variables	Laparoscopic group (n=20)	Open group (n=20)	p-value
Operating time (h:m)	1:49±0:19#	1:09±0:11#	0.059
Haematoma	0	2	0.147
Seroma	0	3	0.072
Infection	1	5	0.077
Postoperative pain*	2.76±0.98#	4.73±1.46#	0.04
Hospital stay (days)	3.05±0.999#	4.80±1.58#	0.011

[Table/Fig-2]: Comparison of operative results.
*Visual analogue scale
#Mean and standard deviation

In LHR group, VAS median was 2.58, and interquartile range was 0.9175. In the OHR group, VAS median was 5 and interquartile range was 2.46. The difference of this parameter between the two groups was statistically significant by Mann-Whitney test. In LHR group, VAS mean was 2.76±0.98, whereas in the OHR group, it was 4.73±1.46. This difference was statistically significant (p=0.040) [Table/Fig-2].

Postoperative hospital stay of both the groups was compared by Student's t-test. In LHR group mean postoperative hospital stay was 3.05 days with a standard deviation of 0.999. In OHR group, mean postoperative hospital stay was 4.80 days with a standard deviation of 1.576. The difference in postoperative hospital stay in both the groups was statistically significant (p=0.011) [Table/Fig-2].

In both LHR and OHR groups no patient developed intraoperative complications, deep vein thrombosis, pulmonary embolism, suture granuloma.

DISCUSSION

A para-umbilical 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 PUH 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 PUH accounts for 10%-14% of all hernias [15]. Risk factors for PUH are female sex, obesity, multiparity and cirrhosis [16].

Diagnosis of PUH 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 (≤2-3 cms in diameter) primary anatomical repair can be done but in large defects (>2-3 cms 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 after the sac is excised, the free edges of rectus are approximated, 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, preperitoneally, or in the retrorectus (retromuscular) space.

Le Blanc KA and Booth WV in 1993 for the first time described laparoscopic incisional hernia repair by Intra Peritoneal On-lay Mesh (IPOM) insertion without defect closure [17]. Laparoscopic repair of PUH has gained ground in recent years with reporting of fewer post-operative complications than the open approach [18].

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 [9]. 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 [14].

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% [13]. 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.

LIMITATION

Limitations of study were less sample size, not randomized and not taking cost effectiveness into consideration.

CONCLUSION

Laparoscopic repair of PUH is safe and effective procedure when compared to open PUH 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 then laparoscopic group but were statistically insignificant. 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 PUH repair is effective than open PUH repair in terms of postoperative pain and postoperative hospital stay.

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