Evaluation of outcomes of laparoscopic repair of recurrent paraumbilical hernia

Osama E.E. Rashad, Ayman Abdarabo, Ahmed M. Kamal, Hesham M.A. Omran, Hossam S. Abdelrehim

Department of General Surgery, Faculty of Medicine, Ain Shams University, Cairo, Egypt

Correspondence to Osama E.E. Rashad, MBBCH, MS, Department of General Surgery, Faculty of Medicine, Ain Shams University, Cairo 11865, Egypt
e-mail: osama_esameldien@yahoo.com

Received: 05 February 2022
Revised: 08 February 2022
Accepted: 24 February 2022
Published: 04 January 2023

The Egyptian Journal of Surgery 2023, 41:561–566

Background
Umbilical hernia repair is one of the most commonly performed surgical procedures with a reported recurrence rate from 1 to 54%. Laparoscopic repair of recurrent umbilical hernia offers better choice of hernia repair while the cost can be optimized by different types of mesh and optimal uses of transabdominal suture and various fixation devices.
Aim
Our aim is to evaluate the outcomes of laparoscopic repair of recurrent paraumbilical hernia (PUH) and to determine the feasibility, safety, and efficacy of the procedures.
Patients and methods
This study was a prospective, noncomparative, nonrandomized study of laparoscopic repair of recurrent umbilical hernia that was conducted at the General Surgery Department of Ain Shams University Hospitals from October 2018 to December 2020. It included 20 patients with recurrent PUH who underwent laparoscopic repair. Patients study included operative time, postoperative pain, hospital stay, conversion to open, visceral injury, surgical site infection, seroma, hematoma, and recurrence.
Results
In our study, we had 20 patients, nine males and 11 females, with a mean age of 45.45 ± 8.56 years. The mean BMI in all patients was 30.1 ± 3.61 kg/m^2. Also, the mean defect size was 3.35 ± 1.09 cm and number of patients who had previous repair with mesh was 18 (90%) and without mesh was two (10%). The mean operative time was 118.5 ± 20.14 min, with three (15%) patients converted to open due to extensive adhesions, with no reported intraoperative visceral injury, mean blood loss was 92 ml, and mean hospital stay was 1.40 days. Regarding postoperative complications, two (10%) patients had seroma, one (5%) had hematoma, one (5%) had surgical site infection, and thus recurrence with no port site hernia and failure was 20% due to conversion to open or wound infection.
Conclusion
Laparoscopic repair of recurrent PUH is a feasible and safe technique with accepted morbidity.

Keywords:
laparoscopic, paraumbilical hernia, recurrent

Egyptian J Surgery 2023, 41:561–566

1110-1121

Introduction

An umbilical hernia is defined as a protrusion or bulge of an organ or part of it, usually the omentum, small bowel, or colon from an umbilical or paraumbilical opening [1]. A true umbilical hernia is congenital and results from failure of closure of the umbilical ring in the early years of life [2]. In adults, paraumbilical hernias (PUH) are usually acquired, defined as a defect 3 cm above or below the umbilicus [3,4].

Studies about umbilical hernia repair mentioned that obese patients have a higher risk of postoperative wound infections and recurrence rates. The combination of heavily contaminated areas (umbilicus) and the skin folds in obese patients can raise the incidence of infection and recurrence [3].

In recent years, the laparoscopic approach has advantage of decreased postoperative pain and the risk of bleeding and has been associated with a shorter recovery time. Some studies have also proposed a decrease in wound infection rates with decreasing exposure to the contaminated umbilical area through the laparoscopic approach either transabdominal preperitoneal (TAPP) technique or intraperitoneal onlay mesh (IPOM) technique, which would decrease the rate of infection and recurrence rates [5].

Aim

Our aim is to evaluate the outcomes of laparoscopic repair of recurrent PUH and to determine the feasibility, safety, and efficacy of the procedures.

Patients and methods

This is a prospective, noncomparative, nonrandomized study which was conducted at Ain Shams University Hospitals between October 2018 and December 2020. It included 20 patients with recurrent PUH. The aim of this study was to assess our early experience in laparoscopic TAPP repair of recurrent PUH. All cases were operated by the same surgical team at Ain Shams University Hospital. An informed consent was taken from all the patients after being informed by the details of procedure, its possible complications, and anticipated morbidity and accepted to participate in the study. We got acceptance from the ethics committee of the General Surgery Department, Ain Shams University.

Inclusion criteria

From the outpatient clinic of the General Surgery Department, we recruited the cases with recurrent PUH with a defect size of less than 5 cm [measured by computed tomography (CT) scan]. The study included male or female patients in the age range from 18 to 70 years.

Exclusion criteria

We excluded patients with previous abdominal surgery rather than hernia repair or those who have ascites, coagulopathy, severe cardiopulmonary disease, renal failure, abdominal malignancies, obstructed or strangulated PUH, and cases with divarication of recti.

Preoperative assessment

All patients underwent history taking, general examination, local examination, and routine preoperative investigation. CT scan for all cases was done to confirm diagnosis and determine the defect size.

Operative techniques

The patient was placed in the supine position with the left arm tucked alongside the patient. A monitor was placed at the other side of the surgeons. After induction of general anesthesia, a pneumoperitoneum was achieved with Veress needle insertion at palmer's point, a point 3 cm below the left costal margin in the midclavicular line. A 10 mm port (for camera) was placed along the anterior axillary line at the left lumbar region; two additional 5 mm ports (working ports) were placed along the anterior axillary line at the left hypochondrium and left iliac regions. A 30° laparoscope was placed through the 10 mm port. Laparoscopic exploration of the abdomen was performed. The incarcerated contents were reduced. Then we raised the peritoneal flap 5 cm around the defect starting from the left side until reaching the sac, then gentle reduction of the sac from the defect was done (without trial to remove a previous mesh, if present) preserving it for mesh coverage. Then closure of the defect was done using nonabsorbable V-Loc 2/0 with mild deflation of the abdomen to decrease tension on stitching. Prolene mesh (nonabsorbable synthetic Prolene Ethicon mesh) was applied and fixed by tackers on the posterior rectus sheath Then closure of the peritoneum over the mesh was done by tackers or Vicryl 2/0; no drain was inserted.

Postoperative workup

Follow-up of the vital data and port wounds was done for all cases. We started oral fluids once intestinal sounds are audible and discharged the patient once tolerating oral fluids. Intravenous antibiotics and analgesic were administered.

Follow-up

After patient discharge, follow-up in the outpatient clinic was done after 1 week, 1 month, 3 months, 6 months up to 1 year postoperatively to detect complications as recurrence and port site hernia and if recurrence was suspected clinically, CT was be done to confirm.

Data collection

We collected the following data from our cases, preoperative demographic data (age, sex, BMI, diabetes mellitus, defect size, and previous hernial repair with or without mesh). Also, operative data (operative time, blood loss, visceral injury, and conversion to open) was collected. Finally, we collected the postoperative data such as hospital stay, postoperative pain, surgical site complications, recurrence, port site hernia, and failure (defined as intraoperative or postoperative conversion to open due to complication or recurrence). Postoperative pain was assessed by the visual analog scale (VAS). This scale consists of graduated straight 100 mm line marked at one end with the term 'no pain' and the other end 'the worst unbearable pain.' The patient makes a cross on the line at the point that best approximates to their pain intensity. It is subdivided into seven groups as follows: 0/10 no pain, 1/10 slight discomfort, 2–3/10 mild pain, 4–5/10 moderate pain, 6–7/10 severe pain, 8–9/10 severe pain, and 10/10 worst unbearable pain [6].

Data management and analysis

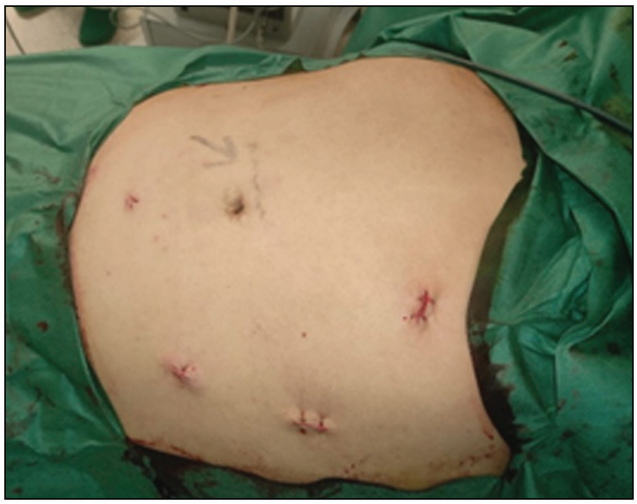
Data was revised, coded, entered on a computer, and analyzed using SPSS, version 26 for Windows (SPSS Inc., Chicago, Illinois, USA). Quantitative data was

tested for normality with Shapiro–Wilk test and described as mean and SD. Student's *t* test was used for comparing quantitative variables between two study groups. Qualitative data was expressed as frequencies and percentage. χ^2 and Fisher's exact tests were used to test the association between qualitative variables. *P* value less than or equal to 0.05 was considered significant.

Results

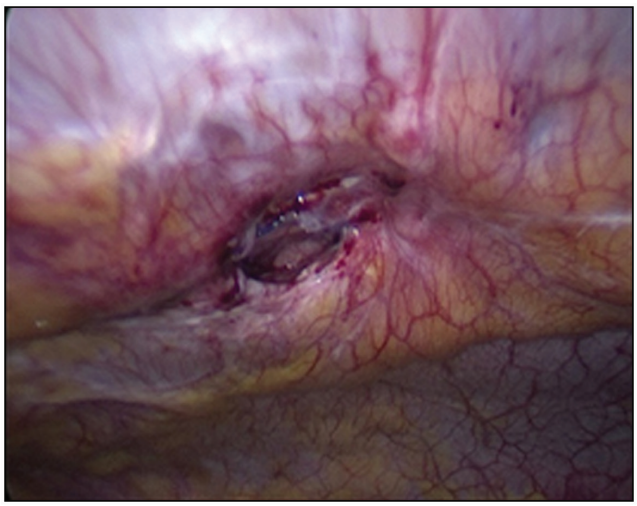
In our study, we had 20 patients fulfilling the eligibility criteria with demographic data. We had nine males and 11 females with a mean age of 45.45 years; only three patients had diabetes. The mean BMI of patients was 30.1 kg/m^2; also, the mean of defect size was 3.35 cm.

Figure 1



Site of ports.

Figure 2



The defect after complete reduction of content.

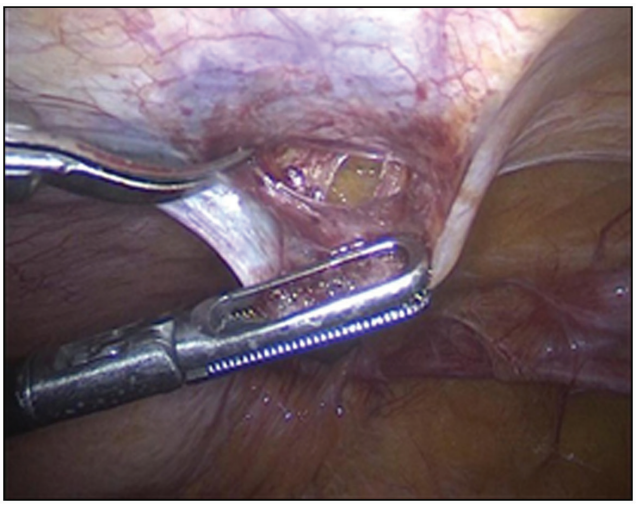
We had 18 (90%) cases in our study with previous repair with mesh and two (10%) cases without mesh.

Regarding operative data, the mean operative time was 118.5 min, with three (15%) cases having undergone conversion to open due to extensive adhesions with failure creation of intact peritoneal flap. The mean blood loss was 92 ml. We did not report intraoperative visceral injury.

Postoperative pain assessment using the VAS revealed that pain score at day 0 was 2.80, which is a low score and by day 7 the score nearly becomes 0. It is the mean low pain profile for this technique. The mean hospital stay in our study was 1.40 days.

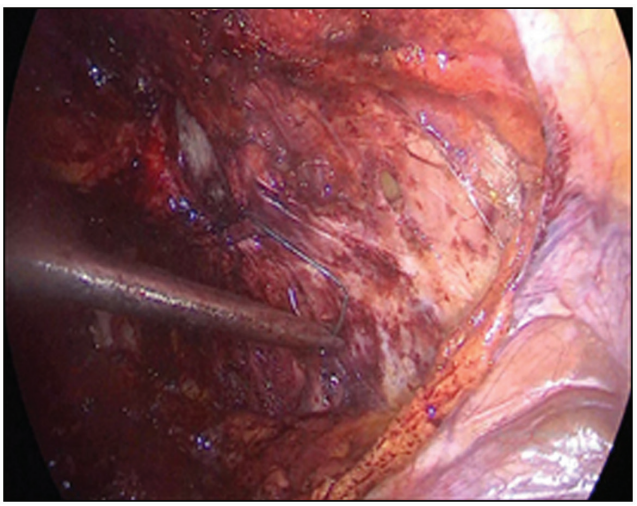
Regarding postoperative complications, two (10%) cases had mild surgical site seroma, which was treated

Figure 3



Start raising the peritoneal flap.

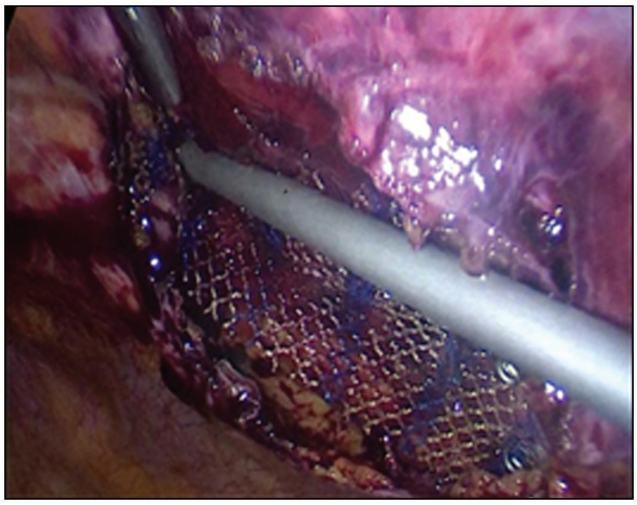
Figure 4



Closure of defect by V-Lock 2/0.

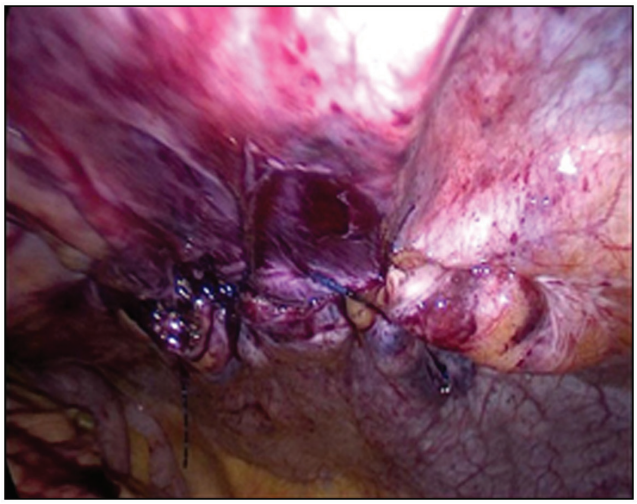
by aspiration. We had one (5%) case with infection and abscess formation in the surgical site donating early recurrence with incarcerated bowel loops through peritoneal defects into the mesh; open exploration was done at the hernia site with drainage of preperitoneal abscess and mesh removal and then repair of defect was done by polydioxanone suture one loop without mesh. We had one (5%) case with surgical site hematoma, which was treated conservatively. After 1-year of follow-up, there was no port site hernia in patients. Failure was documented in four (20%) cases due to intraoperative conversion to open or postoperative conversion due to surgical site infection (Figs 1–9).

Figure 5



Prolene mesh fixation over peritoneum by tackers.

Figure 6

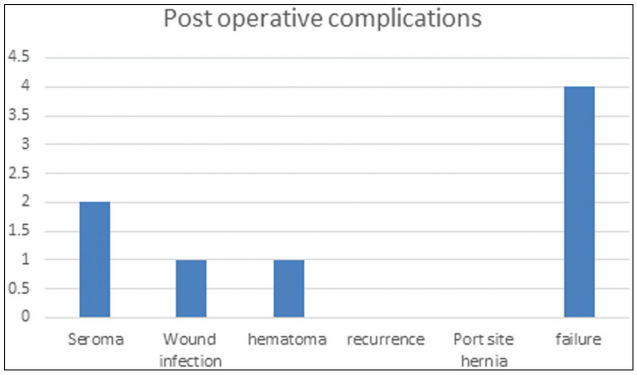


Closure of the peritoneum.

Discussion

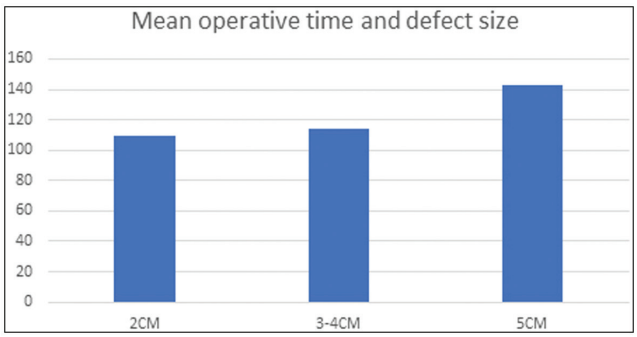
Umbilical hernias are one of the most common ventral abdominal hernias, which may be congenital (present at birth) or acquired (develop later). Surgical repair with

Figure 8



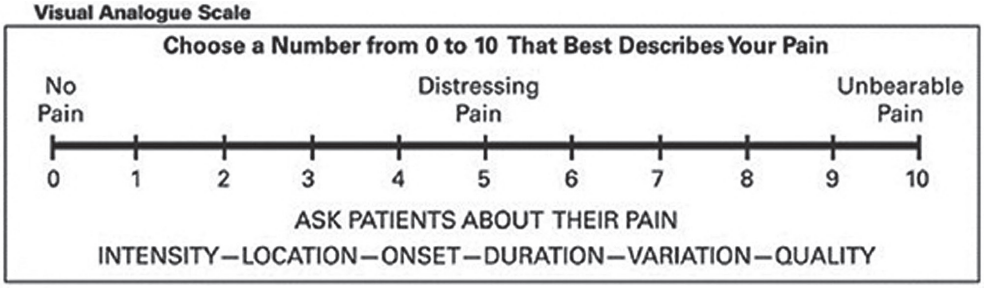
Postoperative complications.

Figure 9



Correlation between defect size and operative time.

Figure 7



Visual analog scale [7].

mesh is the standard modality of treatment. The most common approach for repair is open approach with periumbilical incision [7]. Recurrent PUH is a challenging problem for surgeons due to the dense subcutaneous adhesion especially with previous mesh application. There are different modalities for laparoscopic approach like TAPP and IPOM techniques [8]. We conducted this study to evaluate the outcomes of our early experience in laparoscopic TAPP repair of recurrent PUH.

Most of the studies in the literature about laparoscopic repair of recurrent PUH used the IPOM technique and minimal studies used the TAPP approach. The mean operative time in our study was 118.5 min with significant correlation with defect size. In a study conducted by Prasad *et al.* [9] (comparative study between TAPP and IPOM laparoscopic ventral hernia repair), the mean operative time was 87 min in the IPOM group and 96 min in the TAPP group with significant statistical difference between them [9]. This difference between both approaches referred to the need for the creation of a preperitoneal flap and dissecting it from the sac in the TAPP approach consuming more time. Our early learning curve in the TAPP approach explained the difference in mean operative time in our study than the Prasad and colleagues one. Also in the Barbaros *et al.* [10] study (comparative study between open and laparoscopic incisional hernia repair IPOM technique) the mean time in the open group was 72 min and in the laparoscopic group was 99 min, the laparoscopic approach takes more time than the open approach due to the learning curve and IPOM technique that takes less than our time due to not requiring dissection of preperitoneal flabs, and by just applying the mesh [10].

Regarding conversion to open, there were three (15%) patients with conversion to open due to massive adhesions and failure to create an intact peritoneal flap. Generally, the main causes of open conversion are difficult adhesiolysis, bleeding, perforation, and failure to raise flabs. One of the major advantages of IPOM over TAPP repair is negligible incidence for open conversion due to no need to dissect the preperitoneal flap, which is the most difficult step in the TAPP approach resulting in its open conversion [11].

In our study, there was no reported case with visceral injury which may occur during the introduction of trocars or manipulation of viscera. In a study conducted by Gillian *et al.* [13], 3% had bowel injuries (two small bowel, one right colon) with no contamination due to bowel preparation, and they were repaired laparoscopically [12]. In the Prasad and colleagues study 2.9% had serosal tear with no enterotomies in the TAPP technique and 2.3% serosal tear with 0.4% enterotomies in IPOM with no significant difference and the study had a larger sample size in comparison with our study. In the study conducted by Navarra *et al.* [13] (a comparative study between open and laparoscopic incisional hernia repair IPOM technique), there was no difference between laparoscopic and open bowel injuries.

Mean blood loss in our study was 92 ml, which was accepted with this technique. In Prasad *et al.* [9], intraoperative bleeding was 1.4% in the TAPP technique, which is not significant and the same of our result.

The mean hospital stay in our study was 1.40 days. In a study conducted by Ujiki [14], (laparoscopic ventral hernia repair IPOM technique) their mean hospital stay was 2.1 days. While in the study (laparoscopic ventral and incisional hernia repair in 407 patients IPOM technique), their mean hospital stay was 1.8 days. In the Prasad *et al.* [10] study it was 1.5 day in the TAPP group and 1.4 day in the IPOM group with nonsignificant difference between both approaches. The mean hospital stay in these studies was close to ours. In comparison to the open approach, the studies conducted by Barbaros and colleagues and Navarra and colleagues (comparative study between open and laparoscopic incisional hernia repair IPOM technique) showed a significant longer hospital stay (6.3 and 10 days, respectively) [11,13]. And this is one of the most advantages for laparoscopic approach over the open one (due to less postoperative pain and wound related complication in the open approach).

Different measures to assess postoperative pain were used in various studies. In the studies by Misra *et al.* [15] and Pring *et al.* [16] (comparison of laparoscopic and open repair of incisional hernia), VAS score at day 1 was 6.05 and 6, respectively, in the open group, so the open approach was more painful than the laparoscopic approach. Minimal invasive surgeries are known to be less painful. The use of laparoscopic tacks reduces postoperative pain. This may be explained by the fact that sutures penetrate through the full thickness of abdominal wall musculature and fascia, which lead to local muscle ischemia resulting in severe postoperative pain. Also, drain insertion in open approach is considered a source for postoperative pain [13].

As regards postoperative complications, seroma in our study was reported in two (10%) patients which was managed by ultrasound-guided aspiration. Prasad *et al.* [9] mentioned that seroma occurred in 5.8% with the TAPP technique and 8.5% with the IPOM technique. In a study conducted by Ujiki and colleagues, the incidence of seroma was 13% [14]. Incidence of seroma in the IPOM approach was more than TAPP because

the IPOM approach does not include closure of facial defect or excision of hernia sac (as in the TAPP approach) and this finding is the main postoperative complain for IPOM patients.

Hematoma was found in one (5%) patient in our study, which was treated conservatively. Also in the Prasad and colleagues study it was 1.4% in the TAPP and negative in the IPOM technique. In a study conducted by Itani and colleagues (comparison between laparoscopic and open repair of incisional hernia IPOM technique) the incidence of hematoma in the laparoscopic and the open group was 2.8 and 2.7%, respectively, with no significant difference [10–17].

We had one (5%) patient with postoperative hernia site infection and abscess formation in the surgical bed with incarcerated bowel loops (donating recurrence); exploration was done in the emergency room; evacuation of preperitoneal abscess, mesh removal, and repair without mesh were done by the polydioxanone suture loop. In a study conducted by Olmi *et al.* [18] (laparoscopic versus open incisional hernia IPOM) the incidence of wound infection in the laparoscopic group was 1.1 and 8.2% in the open group. The laparoscopic repair had lower incidence of infection due to the incisions being smaller and away from the umbilicus besides the wide subcutaneous dissection in open approach, which increases the risk of seroma and wound infections. Also, the presence of drains in the open approach is considered as a source of infection [9].

After 1-year follow-up, there was no port site hernia. Failure was documented in 20% (four patients) due to conversion to open or hernia site infection. In a study conducted by Ujiki [14], recurrence rates were 6 and 3.4%, respectively. TAPP is superior to IPOM because of the less recurrence rate due to the advantage of facial closure in TAPP approaches besides the nature of Prolene mesh (mainly used in TAPP approach), which can produce more fibrosis than the composite mesh used in IPOM. Mechanisms of recurrence of umbilical hernia in the decreasing order of frequency are infection, lateral detachment of the mesh, improper mesh fixation, inadequate mesh overlap, missed hernias, and increased intraabdominal pressure [19].

Laparoscopic TAPP has the advantages of less hospital stay and wound complication and in comparison to the open approach needs endoscopic facilities and longer learning curve. Our study was limited by being noncomparative with a small sample size and further comparative studies with larger sample sizes are required for more solid results.

Conclusion

Our early experience in laparoscopic TAPP repair of recurrent PUH showed that it is a feasible and safe technique with accepted morbidity and recurrence rate.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1 Ponten JE, Thomassen I, Nienhuijs SW. A collective review on mesh-based repair of mbilical and epigastric hernias. Indian J Surg 2014; 76:371–377.

2 Kaufmann R, Halm JA, Eker HH, Klitsie PJ, Nieuwenhuizen J, *et al*. Mesh versus suture repair of umbilical hernia in adults: a randomised, double-blind, controlled, multicentre trial. Lancet 2018; 391:860–869.

3 Breuing K, Butler CE, Ferzoco S, Franz M, Hultman CS, *et al*. Incisional ventral hernias: review of the literature and recommendations regarding the grading and technique of repair. Surgery 2010; 148:544–558.

4 Sajid MS, Bokhari SA, Mallick AS, Cheek E, Baig MK. Laparoscopic versus open repair of incisional/ventral hernia: a meta-analysis. Am J Surg 2009; 197:64–72.

5 Hwang CS, Wichterman KA, Alfrey EJ. Laparoscopic ventral hernia repair is safer than open repair: analysis of the NSQIP data. J Surg Res 2009; 156:213–216.

6 Win KZ, Umoke IC, Garba SE. Paraumbilical hernia in a southeast Asian population. Int J Surg Med 2021; 7:16-23.

7 Saymour NE, Bell RL. Abdominal wall, Omentum, Mesentery and Retroperitoneum. Schwartz's Principles of Surgery, 10th ed. USA: McGraw-Hill Education 2015; 1449-1464.

8 Awaiz A, Rahman F, Hossain M, *et al*. Meta-analysis and systematic review of laparoscopic versus open mesh repair for elective incisional hernia. Hernia 2015; 19:449-463.

9 Prasad P, Tantia O, Patle NM, *et al*. Laparoscopic ventral hernia repair: a comparative study of transabdominal preperitoneal versus intraperitoneal onlay mesh repair. J Laparoendosc Adv Surg Tech 2011; 21:477-483.

10 Barbaros U, Asoglu O, Seven R, *et al*. The comparison of laparoscopic and open ventral hernia repairs: a prospective randomized study. Hernia 2007; 11:51–56.

11. Shingade PN, Rawat A, Sooraj R. A comparative study of laparoscopic trans abdominal pre peritoneal ventral hernia repair versus open pre peritoneal ventral hernia repair. Int Surg J 2019; 7:274–280.

12. Gillian GK, Geis WP, Grover G. Laparoscopic incisional and ventral hernia repair (LIVH): an evolving outpatient technique. JSLS 2002; 6:315.

13. Navarra G, Musolino C, De Marco ML, *et al*. Retromuscular sutured incisional hernia repair: a randomized controlled trial to compare open and laparoscopic approach. Surg Laparosc Endosc Percutan Tech 2007; 17:86–90.

14. Ujiki MB. One hundred consecutive laparoscopic ventral hernia repairs. Am J Surg 2004; 188:593–597.

15. Misra MC, Bansal VK, Kuklarni MP, *et al*. Comparison of laparoscopic and open repair of incisional and primary ventral hernia: results of a prospective randomized study. Surg Endosc 2006; 20:1839–1845.

16. Pring CM, Tran V, O'Rourke N, *et al*. Laparoscopic versus open ventral hernia repair: a randomized controlled trial. ANZ J Surg 2008; 78:903–906.

17. Itani KM, Hur K, Kim LT, *et al*. Ventral Incisional Hernia Investigators. Comparison of laparoscopic and open repair with mesh for the treatment of ventral incisional hernia: a randomized trial. Arch Surg 2010; 145:322–328.

18. Olmi S, Scaini A, Cesana GC, *et al*. Laparoscopic versus open incisional hernia repair: an open randomized controlled study. Surg Endosc 2007; 21:555–559.

19. Awad ZT, Puri V, LeBlanc K, *et al*. Mechanisms of ventral hernia recurrence after mesh repair and a new proposed classification. J Am Coll Surg 2005; 201:132–140.