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Laparoscopic umbilical hernia repair: Our experience with 45 cases

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Abstract

Background and aims. Laparoscopic repair of umbilical hernia using a mesh for the closure of the hernial defect by excising the sac after reducing its contents is most accepted technique of surgical treatment of umbilical hernia with excellent results. The aim of this study was to determine the operative outcomes of patients treated by the laparoscopic umbilical hernia repair technique.

Methods. This was a retrospective, single centre study carried out over a period of 5 years from April, 2016 to June, 2021 at Maxxlyfe Hospital, Sunjwan Morh, near Bathindi, Jammu (J & K), India on patients who underwent laparoscopic mesh hernioplasty for umbilical hernia. The data was collected and analysed using descriptive statistics.

Result: Authors analysed 45 patients (F=29; M=16) in the study period & mean age of the patients was 44 years. Thirty-six patients were operated with two-port technique & 9 patients required additional third port. The operative time ranged from 35 min to 90 min. There was no significant procedural blood loss, iatrogenic injury or subcutaneous emphysema. No patient required conversion to conventional open surgery. All patients were comfortable in the postoperative period & were discharged on the second postoperative day.

Conclusion: Excellent outcomes are possible by laparoscopic umbilical hernia repair with combined hernioplasty & intra-abdominal mesh fixation with low recurrence & minimal complications. However, proper patient selection & experience & proficiency in performing laparoscopic hernia repair are prerequisites for good outcome.

Keywords: Laparoscopy; Pneumoperitoneum; Polypropylene mesh; Port; Umbilical hernia

INTRODUCTION

An umbilical hernia occurs when part of the intestines or abdominal fat (omentum) bulges out through an opening in the muscles of the abdomen near the navel or belly button called umbilicus. About 10% of the abdominal hernias are umbilical hernia.¹ They occur more often in adults over 60 years when the muscles start to weaken² & most of umbilical hernias in adults are acquired (9 out of 10). This means that increased pressure near the umbilicus causes the umbilical hernia to bulge out. Old age, overweight & obesity, chronic straining, ascites & multiple pregnancies are some of the risk factors for the development of umbilical hernia. The patients usually present with a visible bulge on the abdomen, especially when coughing, straining or laughing and there may be pain or pressure at hernia site (Figure 1).



Fig 1. Showing patient of Umbilical hernia

Treatment is only operation in the form of herniorrhaphy (the surgical repair of a hernia) or hernioplasty (the surgical repair of a hernia with mesh inserted to reinforce the weak area). Surgery can be either an open hernia repair where an incision is made over the site & surgeon repairs the hernia with a mesh or by suturing (sewing) the defect or laparoscopic hernia repair by placing a mesh to cover the defect and fixing the mesh to the abdominal wall. The umbilical hernia repair has undergone impressive developments in recent years & laparoscopic mesh repair is now the treatment of choice for umbilical hernia due to its low recurrence rate, short hospital stay & low complication rate.^{3,4} An increased incidence of wound infection & high recurrence in open mesh repair led to continuing research into the optimal method of treatment of umbilical hernia which led the surgeons to adopt laparoscopic approach. Some issues need to be addressed such as fixation of the prosthesis with single-crown or double-crown helical tackers and transabdominal sutures, number of ports required, seroma formation, incidence and management of chronic pain. This paper reports our experience of performing laparoscopic umbilical hernia repair using a two or three port technique.

MATERIAL AND METHODS

Between April 2016 to June 2021, 45 patients with umbilical hernia underwent laparoscopic mesh hernia

repair. Informed consent was taken from all the patients. This series represents the experience with this technique by a single consultant surgeon. Operative time and complications were recorded in each case.

Exclusion criteria were very large hernias, strangulated hernias & severe comorbid conditions with high risk for general anaesthesia.

Laparoscopic Repair Technique. The patient is placed in the supine position with the left arm tucked alongside the patient. Operating surgeon stands on the left side of the table & monitor is placed on the opposite side. After general endotracheal anaesthesia is induced, 1 gm ceftriaxone antibiotic intravenous injection is administered & the abdominal skin is sterilized and draped. An orogastric tube is placed for stomach decompression. CO₂ pneumoperitoneum is achieved with a veress needle inserted at Palmer's point, which lies 3 cm below the left costal margin in the midclavicular line and represents the point at which intra-abdominal adhesions are least likely.⁵ 10 mm port is then placed percutaneously at this point along the anterior axillary line. One additional 5 mm port is placed under direct vision on the left side of the abdomen. A 30-degree laparoscope is placed through the 10 mm port, laparoscopic examination of the abdomen is performed & the hernial defect is identified and any other abnormality is noted (Figure 2).



Fig 2. Endo-vision of umbilical hernia

If there is no contraindication to proceed, the contents of the hernial sac are reduced. This can be accomplished with a combination of blunt and sharp dissection with scissors. Occasionally, bipolar diathermy is useful if the adhesions are particularly vascular. The hernia sac is then removed. The abdominal wall is inspected for additional hernias. If none are found, the umbilical fascial defect is sized. It is easy to overestimate the size of the defect when there is pneumoperitoneum; thus, insufflation pressure should be reduced to 8 to 10 mmHg for this step. The under-surface of the abdominal wall is cleared of any deposits that would inhibit smooth flat fattv application of the mesh. An appropriate size mesh is chosen to adequately close the defect with an overlap of 3 cm circumferentially. We use Polypropylene (Prolene) or Proceed dual layer mesh. It is important to have 3 to 5 cm overlap over the entire fascial defect. An ethylene No. 0 thread with a straight needle is passed from outside the abdomen through the centre of the hernial defect and taken out of the 10 mm trocar

and its one end is held outside the abdominal wall with an artery forceps and the needle end is tied at the centre of the mesh and the needle is removed. The mesh is then rolled and inserted through the 10 mm port into the abdominal cavity. Larger size of mesh requires removal of the port and placement directly through the skin opening. The mesh is centered over the defect by pulling the thread from outside and mesh is unrolled inside the abdomen & positioned with the polypropylene side towards the abdominal wall & the polytetrafluoroethylene side down toward the abdominal contents in case of dual mesh. The pneumoperitoneum is decreased to 10 mmHg & the mesh is raised to the abdominal wall and its edges are fixed to the under-surface of the abdominal wall using a helical tacker (Protack or Profound or endo-anchor) at 3 cm intervals. A 3 to 5 cm overlap is once again confirmed. Additional tacks are placed if any sagging of mesh is found (Figure 3). Pneumoperitoneum is released and ports sites are closed.



Fig 3. Polypropylene mesh being fixed using titanium tacker

RESULTS

45 patients underwent laparoscopic umbilical hernia repair and none of them had any previous abdominal surgery. As shown in Table 1, 29 patients were females & 16 were males and mean age of the patients was 44 years (range 28 to 63). The average defect size was 4 cm² (range 2 cm² to 12 cm²). The average mesh size was 15x15 cm. Thirty-six patients were operated with two-port technique, 9 patients required additional port. In 6 patients, it was difficult to dissect the contents of hernia sac due to dense adhesions & 3 patients required additional 3rd port due to difficulty in unrolling the large mesh intraabdominally. The mean operative time was 54 minutes (range 35-90 minutes). There was no significant blood loss during the procedure, no iatrogenic injury or subcutaneous emphysema at either port site. No patient required conversion to conventional open surgery. Patients were allowed enteral feeding as early as 4 hours following surgery. All patients were comfortable in the postoperative period & were discharged on the second postoperative day. The average hospital stay was 24 hours.

Characteristics	Number of Patients
Age in years (Mean)	44
Sex ratio (F:M)	1.81:1
Average time taken	54 minutes
Average size of hernial defect	4 cm^2
Average size of mesh required	15x15 cm
Average duration of hospital stay	24 hours
Three ports required in number of cases	9(20%)

Table 1. Demographic data

Follow up surveillance for complications & recurrence of hernia was performed in an outpatient clinic at 1st, 3rd & the 4th week. No complications occurred in thirty-nine (86.6%) patients. Five (11.11%) patients complained of abdominal pain which resolved over 2–3 months without further treatment. As shown in Table No. 2, four (8.88%) patients developed infection and discharging sinus and in 1 patient, mesh got to be removed to cure infection. No patients presented with chronic pain or recurrence over the follow up period. There was no mortality in our study.

Table 2.	Complications	5
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Complication	Number of patients	Percentage
Abdominal pain	5	11.11%
Wound infection	4	8.88%
Subcutaneous hematoma/Ecchymosis	4	8.88%
Bleeding of omentum	3	6.66%
Seroma formation	2	4.44%
Mesh removal	1	2.22%

DISCUSSION

In the laparoscopic technique, the mesh is placed in an intraperitoneal location & less often in the preperitoneal location, where the rise in the intraabdominal pressure is totally diffused along each square inch of the mesh & not along a tenuous suture line, as happens in conventional suture repairs. An increase in the intra-abdominal pressure thus helps to keep the mesh in place rather than displace it, as is the case in conventional overlay repairs. The laparoscopic approach gives the surgeon the ability to clearly define the margins of the hernia defect & to identify additional defects that may not have been clinically apparent preoperatively. One of the key determinants to a high recurrence rate following conventional repairs is the phenomenon of occult hernias. These are the hernias liable to be missed during an open repair. A wide overlap of the defect with mesh would help to prevent the intra-abdominal forces from displacing the mesh into the defect. The laparoscopic approach allows for easier placement of a larger prosthesis with good overlap. In the open approach, attaining an overlap of 3 to 5 cm requires extensive soft tissue dissection, with resultant increase in wound complications. This advantage is more prominent in obese patients & those with larger defects.

Mesh Fixation. The preferred method of mesh fixation during laparoscopic umbilical hernia is controversial. The physics of mesh fixation during laparoscopic ventral hernia repair does not support the sole placement of tackers & other fixation devices. The majority of the meshes used for laparoscopic umbilical hernia repair are roughly 1 mm thick & the spiral tacks are 4 mm long and take up a 1 mm profile on the surface of the patch. A perfectly placed tack can be expected to penetrate only 2 mm beyond the mesh, hence tacks will likely not give the same holding strength as a full thickness abdominal wall suture. Since many patients presenting for laparoscopic umbilical hernia repair are obese (having a substantial amount of preperitoneal fat), the 2 mm penetration of the tack will not reach the fascia in most cases. Experimental studies have confirmed the superior strength of sutures versus tacks alone in mesh fixation to the abdominal wall.^{6,7} They have concluded that suture fixation of the mesh in laparoscopic umbilical hernia repair is imperative, especially during the early period of mesh incorporation. Many proponents of the use of transabdominal sutures cite lower recurrence

rates due to higher tensile holding strength of sutures in comparison to tacks.⁸ Other authors argue that the use of tacks reduces surgical time considerably while maintaining similar recurrence rates.⁹ Recently, it has been shown that mesh fixation with fibrin sealant in laparoscopic umbilical hernia repair was associated with less acute postoperative pain, discomfort & a shorter convalescence than tacker fixation or transabdominal suture without compromising on the recurrence rate.¹⁰ However, we used titanium tacker for mesh fixation in our study without associated complaints.

Recurrence. Numerous studies using the laparoscopic approach have reported a recurrence rate of 10%.^{11,12} Mechanisms of recurrence of umbilical hernia described in the literature are infection, lateral detachment of the mesh, inadequate mesh fixation, inadequate sized mesh, inadequate overlap, missed hernias, increased intra-abdominal pressure & trauma.¹³ In our study, there was no recurrence with the technique of hernioplasty with intraabdominal mesh in umbilical hernia repair

Seroma Formation. Seroma formation is not unique to the laparoscopic approach. Most seroma develop above the mesh & within the retained hernial sac. The mean incidence of seroma at 4 to 8 weeks is 11.4% in large reported series. In the largest multi-institutional trial, seroma that were clinically apparent more than 8 weeks postoperatively were considered a complication & occurred in 2.6% cases.¹⁴ The incidence of seroma is higher where the mesh is fixed by single or double crown technique and the hernial defect is not obliterated. Regardless of whether they are aspirated under sterile conditions or allowed to resolve, seroma rarely result in long term problems. Aspiration is recommended for seroma that enlarge or persist before they reach large sizes, when rarely they can give rise to necrosis of the overlying skin. The patients should be counselled preoperatively regarding the possibility of seroma formation after laparoscopic repair. In our study, seroma formation occurred in only 2 patients and it subsided spontaneously over a period of 3-4 weeks.

Chronic Pain. Some authors argue that the use of tacks significantly reduces postoperative pain. Pain is generally worse after repair with sutures than with tacks. Sutures penetrate through the full thickness of abdominal wall musculature and fascia. This causes

local muscle ischemia resulting in severe pain postoperatively.¹⁵ Cobb et al.¹⁶ has also proposed that intercostal nerves may become entrapped within the transabdominal sutures causing chronic, persistent neuropathic pain. Series of repairs using trans-fascial sutures report persistent pain & discomfort in 1% to 6% of patients.¹⁷ None of our patient presented with persistent pain beyond 2 months. We preferred to use titanium tackers for fixation of the mesh over the umbilical defect as these provide adequate fixation till ingrowth of fibrous tissue into mesh & also prevent accidental long-term entrapment of nerves. Most authors feel that oral anti-inflammatory medications or injections of a local anaesthetic can alleviate the symptoms in the majority of cases.¹⁸ Others have reported re-explorations for persistent pain, finding immediate relief after the release of a suture from the site of symptoms.¹⁹

Number of Ports. The usual 3 port technique for ventral hernia repair is being replaced by 2 port 20 and single port technique with similar operative time and results. We observed that 2 port technique was adequate for dissection of sac contents & adhesions, though in cases of difficulty, additional ports can be used.

Postoperative Morbidity. Causes of postoperative morbidity are unrecognized enterotomy, wound infection, intraperitoneal abscess & bowel obstruction due to adhesion to mesh. Such complications often increase the hospital stay & the cost of treatment. However, the frequency of these complications is comparable to the open technique.²¹ None of our patients developed intra peritoneal abscess or bowel obstruction.

Cost Outcomes. There are encouraging results being reported in comparative studies regarding the cost analysis of laparoscopic versus open repair of umbilical hernias. In a recent series, laparoscopic umbilical hernia repair using a dual-layer polypropylene mesh trans-fascial & sutures significantly reduced surgical site infections, length of hospital stay & costs as compared to open mesh repair.²² However, types of mesh used & fixation device can make a lot of difference in cost calculations. We used titanium tackers for fixation of mesh over the umbilical defect in comparison to transabdominal suture and cost of the procedure was

affordable by the patients and could be compensated by early resumption of routine work.

CONCLUSIONS

Laparoscopic umbilical hernia repair with combined hernioplasty & intraabdominal mesh fixation using titanium tackers offers the ideal outcome with no recurrence & lesser complication of infection, seroma formation & chronic pain.

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