

# A retrospective audit comparing outcomes of open versus laparoscopic repair of umbilical/paraumbilical herniae

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Laparoscopic mesh repair has been advocated as the treatment of choice for ventral hernias [1]. In the case of umbilical and paraumbilical herniae, the role of laparoscopic hernioplasty, at present, remains unproven. A Medline literature search supports the thought that no firm consensus currently exists on the best technique for primary repair of these herniae. A Medline search identified two prospective and two retrospective studies conducted within the last 6 years [1–4]. Furthermore, an EAES consensus meeting recommended open mesh, suture, or laparoscopic repair for defects <3 cm [5]. Although ventral hernia repair is increasingly performed laparoscopically, complication rates with this procedure are not well characterized [2].

The case for laparoscopic repair of (para)umbilical hernia is convincing. (Para)umbilical herniae have historically been repaired without mesh resulting in recurrence rates in some series of up to 54% [6, 7]. The use of prosthetic material for open umbilical hernia repair has been reported to reduce recurrence rates [3, 4]. Ideal placement of the mesh is behind the defect, in the sub-lay position, which would be more difficult to achieve in an open approach, unless performed laparoscopically.

Laparoscopic in-lay patch hernioplasty has been shown to be a safe and efficacious technique for the repair of (para)umbilical hernia [8]. The laparoscopic approach

potentially confers the advantages of reduced recurrence rates, postoperative pain, shorter hospital stay, and a diminished morbidity rate [2, 4]. Potential disadvantages include comparatively prolonged operative time and operator experience relating to the laparoscopic approach to these repairs.

We set out to audit all primary (para)umbilical herniae repairs performed at our center during the past ten years to determine the differences in outcome and complication rates between open and laparoscopic repair.

## Methods

Our goal was to determine the outcome and complication rates of primary open and laparoscopic repair of (para)umbilical herniae in adults and children performed in our unit. Using our operative database, we identified 724 patients who had primary (para)umbilical hernia repairs during a 10-year period (May 1998 to December 2008). The operative and medical records of the select group of patients were examined and screened for demographic data, type of hernia, mode of repair, size of defect, and type and size of mesh where recorded. Any documented intraoperative and postoperative complications and recurrences in follow-up were recorded. The time to hospital discharge (TD) was noted and compared between the groups. To enable comparison between groups, patients were categorized into three groups based on the hernia repair method used: laparoscopic repair with mesh (LM), open repair with mesh (OM), and open repair without mesh (ONM).

We excluded, from the analysis, patients undergoing para(umbilical) hernia alongside or secondary to other procedures and recurrences after a primary repair. Comparative statistical analysis was applied to the three groups.

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Statistical methods used included the Fisher's exact test. *P* values <0.05 were deemed to be significant.

OM repair was performed by primary fascial closure and secured with polypropylene (Prolene) mesh on-lay or sub-lay in cases before 2004 and composite polyester (Parietex) mesh from 2004 onwards. The ONM repair mode of repair was performed using nonabsorbable interrupted or continuous sutures for fascial closure. The laparoscopic repair consisted of 10-mm trocar placement followed by CO<sub>2</sub> peritoneal insufflation. Additional trocars were placed depending on operator preference and approach. After reduction of the hernia and its contents, the fascial edges were delineated. A polypropylene (pre-2004)/Parietex composite (post-2004) mesh was placed according to size on the underlying side of the abdominal wall fascia and held with tacks consistent with standard laparoscopic ventral hernia repair [9].

## Results

During the designated audited period, 724 (para)umbilical hernias were performed in as many patients. The mean age was 43 ± 2.2 (range, 3–86) years, whereas 468 (65%) of patients were men and 256 (35%) were women.

In the laparoscopic repair group (LM), a total of 301 procedures were performed. All were primary repairs. The mean age was 41 (range, 19–62) years. All laparoscopic repairs were completed without conversion to open. The size of defect was not recorded consistently and was therefore excluded from the analysis. No significant intraoperative complications were recorded. A total of 11 patients experienced wound complications (3.7%): 4 (1.3%) had wound infections, 5 (1.7%) had incisional hernias, and 2 (0.7%) had seromas. Length of hospital stay was limited to the day of repair (same day discharge) in 260 patients with 41 staying in a minimum of 1 day. There were 3 (1%) recurrences with a mean follow-up of 47 (range, 3–126) months.

In the open repair with mesh group (OM), a total of 277 procedures were performed; all were primary repairs. The mean age was 56 (range, 3–86) years. Closure and repair were performed by mesh on-lay or sub-lay after primary fascial closure. The size of defect and mesh were not recorded consistently and was excluded from the analysis. No significant intraoperative complications were recorded. A total of 16 patients experienced wound complications (5.8%): 6 (2.2%) had wound infections, 6 (2.2%) had incisional hernias, 3 (1.1%) had seromas, and 1 (0.36%) had a hematoma. Length of hospital stay was limited to the day of repair (same-day discharge) in 140 patients; 59 stayed a minimum of 1 day. There were 5 (1.8%) recurrences with a mean follow-up of 68 (range, 3–126) months.

In the open repair without mesh group (ONM), a total of 146 procedures were performed. All were primary repairs performed using interrupted nonabsorbable sutures continuously or interrupted. The mean age was 54 (range, 3–86) years. The size of defect was not recorded consistently and was excluded from the analysis. No significant intraoperative complications were recorded. A total of 8 patients experienced wound complications (5.5%): 8 (5.5%) had wound infections, 1 (0.68%) had an incisional hernia, 2 (1.4%) had wound dehiscence, 2 (1.4%) had seromas, and 2 (1.4%) had a hematoma. Length of hospital stay was limited to the day of repair (same-day discharge) in 98 patients; [48 stayed a minimum of 1 day. There were 44 (30%) recurrences with a mean follow-up of 68 (range, 3–126) months.

There was no statistically significant difference between the LM and OM groups. However, both LM and OM repair groups displayed significantly lower recurrence rates compared with ONM (*p* < 0.001; Table 1). Comparing rates of wound complications, the LM group had significantly lower wound complication rates than both OM and ONM groups (*p* = 0.005; Table 2).

## Discussion

The case for mesh versus nonmesh repair of defects in the abdominal wall is argued, with the conclusion that the evidence-base is sufficiently strong to recommend that all defects in the abdominal wall, whether inguinal, incisional or umbilical hernias, and of whatever size, should be repaired with the use of prosthetic mesh [10].

With umbilical hernias being common both in adults and children, the significant recurrence and wound complication rates with primary open suture repair remains unacceptable. The evidence suggests open mesh repairs have significantly lower recurrence rates [11, 12]. One prospective, randomized, controlled, trial reported a reduced recurrence rate of 1% for open repairs with mesh versus 11% in primary suture repairs [13]. Despite this, the trend continues to lean toward primary suture repair, which provides relatively easy access, relatively smaller incision, and faster completion and ease of procedure, allowing junior trainees to perform the procedure with less training time compared with the laparoscopic method. Reasons cited for this are concerns about mesh-related complications in other types of hernia repair, including wound infections, seromas, mesh extrusion, adhesions, and mesh failure [14, 15].

The use of prosthetic mesh in inguinal and ventral hernia repairs has been shown to reduce recurrence rates compared with suture repairs. Less well established are the advantages laparoscopic repair offers over open (mesh and no mesh) umbilical hernia repair. The benefits of

**Table 1** Summary of categories with comparative analysis

	LM	OM	ONM
Repairs ( <i>n</i> )	301	277	146
Age (mean)	41 ± 2.6 (19–62)	56 ± 3.4 (17–86)	54 ± 3.1 (3–86)
Postoperative TD			
Same day	260	140	98
>24 h	41	59	48
Recurrence ( <i>n</i> )	3 (1%)*	5 (1.8%)*	44 (30%)
Wound complications ( <i>n</i> )	4 (3.7%) <sup>†</sup>	16 (5.8%)	8 (5.5%)

LM laparoscopic repair with mesh; OM open repair with mesh; ONM open repair with sutures/without mesh

\*  $p < 0.001$  LM and OM vs. ONM

<sup>†</sup>  $p = 0.005$  LM vs. OM and ONM

**Table 2** Breakdown of wound complications according to category

Wound complication	LM	OM	ONW
Infection	4	6	8
Dehiscence	0	0	2
Hematoma	0	1	2
Incisional hernia	5	6	1
Seroma	2	3	2

laparoscopic hernia repair have been demonstrated in larger fascial defects in ventral hernias [16, 17]. However, practicing a technique in which a pneumoperitoneum is introduced under a general anesthetic for a procedure that could, in some cases, be repaired under a local anaesthetic and is well established has its own unique disadvantages and associated morbidity [18–20].

In this series, the laparoscopic repair of (para)umbilical hernias resulted in the lowest recurrence rate (1%) and overall complication rate. There was no statistically significant difference between the laparoscopic and open mesh repairs; however, our results have shown both laparoscopic and open mesh repairs to have statistically significant lower recurrence rates than open repairs with sutures. The safety of the laparoscopic repair was demonstrated by no intraoperative complications occurring in the laparoscopic group; similarly none were recorded in the open group. Statistical difference was shown in comparison of postoperative wound complications between the two groups, with laparoscopic mesh repair showing significantly fewer wound complications. This may be accounted for by the placement of the incisions away from the umbilicus in the laparoscopic approach and the advantage that the mesh does not come in contact with the abdominal wall. Whereas the umbilical bacterial flora count is known to be higher relative to other sites on the abdominal wall, microbiological evidence does not support this theory [21].

One further advantage noted in this series was the decrease length of hospital stay in the laparoscopic mesh

group with 86% of patients going home on day of surgery compared with 56% in the open group (51% OM and 67% ONM). Reasons for increased length of stay in the open group are difficult to account for exactly, especially given that a large number of open repairs are performed under local anesthetic. However, with our center favoring laparoscopic repair, elective open procedures in recent years are generally only performed on patients unfit to tolerate a pneumoperitoneum or undergo a general anesthetic and associated comorbidity may have accounted for delayed discharge from hospital.

We were aware of the limitations of the retrospective data collected, with unavoidable exclusions and differences existing between the groups. This study does not include data regarding the size of defect and mesh used as well as the type due to lack of consistent recording in operative notes. Therefore, comparisons between these subcategories were unable to be performed. Furthermore, the operating time was not included due to a lack of accurate data. Inclusion of these in future studies would allow a more accurate assessment to be made of the potential advantages and disadvantages between open and laparoscopic repair.

With our results showing a statistical difference in lower recurrence rates with both laparoscopic and open mesh repairs and published reduced recurrence rates of mesh repairs against nonmesh repairs for other ventral hernias, this should be considered in all umbilical hernia repairs. In this series, the laparoscopic approach resulted in repairs with the lowest recurrence rate and with the lowest incidence of complications.

## Conclusions

Laparoscopic repair of primary umbilical hernias can be considered as a preferred method of repair where a mesh is indicated and where there is suitable expertise. A prospective study of laparoscopic versus open mesh repair of

(para)umbilical hernia repair is proposed. A greater set of factors should be assessed, including patient satisfaction with scar sites and size, postoperative pain, and long-term morbidity. An evaluation of cost was not feasible due to the nature of this study; however, one should be considered in prospective studies. This will inevitably vary depending on the center, because specialist laparoscopic units, as our center is, have facilities already setup to carry out a large number of laparoscopic procedures and therefore economies of scale apply, significantly reducing the cost. Only then can an accurate assessment be made of the potential advantage of the laparoscopic method be made in mesh repairs of (para)umbilical hernias.

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