

# Laparoscopic slit mesh repair of parastomal hernia using a designated mesh: long-term results

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## Abstract

**Background** Parastomal hernia (PH) is a frequent complication of colorectal surgery, which incidence reaches 55% of all stoma formation. Currently, there is no definitive strategy for its repair. This study was designed to assess the outcome in patients who underwent laparoscopic PH repair using a slit mesh/keyhole technique.

**Methods** We undertook a retrospective case review of all patients who underwent laparoscopic PH repair with a designed slit mesh/keyhole between 2005 and 2010. Three ports were placed opposite the stoma site, and careful adhesiolysis and hernia content reduction were performed. The parastomal fascial defect was measured and covered with a designated mesh. Fixation of the mesh was achieved with concentric tacks and transcutaneous Prolene suture. Recurrence was diagnosed after examination of patients by two surgeons or by imaging demonstrating an indolent hernia.

**Results** Twenty-nine laparoscopic PH mesh repairs were performed with an average age of 63.5 (range 42–81, median 64) years to treat paracolostomy hernia in 18 of 29 cases (62.1%), para-ileostomy hernia in 10 of 29 cases (34.5%), and for an ileal conduit site hernia in 1 of 29 cases (3.4%). The average operative time was 179 (range, 80–300; median, 180) min. Two operations (6.9%) were converted to an open approach. Early postoperative complications were documented in four patients (13.8%), including one elderly patient with severe comorbidities

who died from postoperative sepsis (mortality rate, 3.4%). Only one late complication was recorded (3.4%). The average hospital stay was 4.7 (range, 1–19; median, 3) days. Average follow-up time was 28 (range, 12–53; median, 30) months. Recurrence of the hernia was found in 13 of 28 patients (46.4%).

**Conclusions** Laparoscopic slit mesh/keyhole repair is feasible, although it is a complex surgery reflected by extended operative time. The high recurrence rate suggests that technical improvement of the method is essential.

**Keywords** Laparoscopic · Para-stomal hernia · Keyhole para-stomal hernia repair

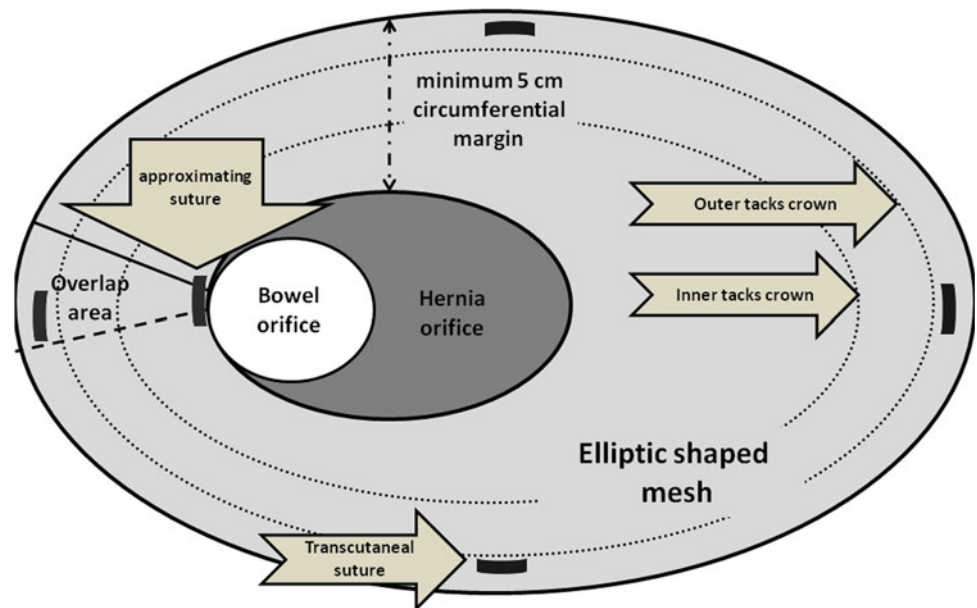
Parastomal hernia is a frequent complication of colorectal surgery, the incidence of which reaches 55% of all stoma formations [1–3]. Most patients are managed with conservative treatment, but 11–70% require surgery due to discomfort, pain, obstructive symptoms, and cosmetic dissatisfaction [4]. Currently there are three surgical approaches to parastomal hernia repair, including primary fascial repair, relocation of stoma, and mesh repair, which can be performed by open surgery or laparoscopically [5]. None of these techniques is definitive and each has a risk of recurrence as well as other postoperative complications [1, 2, 4–6].

A laparoscopic approach for parastomal hernia repair enables mesh to be placed from within the abdomen and might have the benefits of less pain, shorter hospital stay, and early bowel recovery. One of the laparoscopic mesh placement techniques is to cover the hernial orifice with a slit mesh with a keyhole through which the bowel can be passed. This study was designed to assess the outcome in patients who underwent parastomal hernia repair using a slit mesh/keyhole technique.

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**Fig. 1** Diagram of laparoscopic slit mesh



## Methods

We undertook a retrospective case review of all patients who underwent laparoscopic parastomal hernia repair with a slit mesh/keyhole within the Colorectal Unit at Darent Valley Hospital (DVH) in Dartford, UK, and the Department of Surgery at Benenden Hospital, Benenden, UK, under the care of a single consultant laparoscopic surgeon between 2005 and 2010. Data, including demographic details, stoma type and cause, ASA score, operation time, hospital stay, and postoperative complications, were recorded. Complications occurring within 30 days from the operation were documented as early postoperative, whereas later events were defined as late postoperative complications. All patients were examined physically by two surgeons for recurrence, and the notes were surveyed for imaging tests proving indolent hernia. A diagnosis of hernia recurrence was recorded if either of these was positive.

## Procedure

Laparoscopic operation was performed in all patients in a supine position with the arms in adduction. Pneumoperitoneum was established with a Veress needle and three Covidien VersaStep™ bladeless trocars (two 5-mm and one 10-mm diameter) were inserted laterally, opposite the stoma site. A 5-mm, 30-degree Karl Storz camera was used. Careful adhesiolysis and hernia content reduction were performed when needed until the edges of the hernial orifice were cleared. The size of the parastomal fascial defect was measured and a Bard® CK™ Parastomal Hernia Patch with monofilament polypropylene facing the parietal

surface and ePTFE (expanded polytetrafluoroethylene) facing the visceral surface was placed. The hernial defect was covered with a minimum of 5 cm of circumferential margin mesh length and an overlap cover at the slit area. Fixation of the mesh was achieved with circular concentric tacks spaced at approximately 2-cm intervals. Transcutaneously buried Prolene sutures were added to fix the mesh in four circumferential peripheral points, and one internal approximating suture of the slit edges of the mesh near the stoma site was placed (Fig. 1).

## Results

During the study period, 29 laparoscopic parastomal hernia mesh repairs were performed. Ten males and 19 females underwent surgery with an average age of 63.5 (range, 42–81; median, 64) years. Four patients had a previous parastomal hernia repair attempt (13.8%). The procedure was performed to treat paracolostomy hernia in 18 of 29 cases (62.1%), para-ileostomy hernia in 10 of 29 cases (34.5%), and for an ileal conduit site hernia in 1 of 29 cases (3.4%). The cause for stoma was colorectal cancer in 17 of 29 patients (62.1%), inflammatory bowel disease in 8 of 29 patients (27.6%), and for other reasons in 4 of 29 patients (10.3%), including one case of anal incontinence, one case of metastatic ovarian cancer, one case of perforated diverticular disease, and one case of bladder cancer. The average preoperative ASA score was 1.9. All patients had a laparoscopic parastomal hernia repair with Bard® CK™ Parastomal Hernia Patch, and the average operative time was 179 (range, 80–300; median, 180) min. Two operations (6.9%) were converted to an open approach (one due

to adhesions and another due to bleeding). Early postoperative complications (30 days after the operation) were documented in four patients (13.8%). One elderly patient with severe comorbidities developed a retroperitoneal hematoma necessitating a second operation, but eventually died of sepsis (mortality rate of 3.4%). One patient had bowel obstruction due to bowel incarceration through the mesh site, which resolved after a second operation; one patient had postoperative ileus that was probably related to a frozen-metastatic abdomen and resolved with conservative treatment. One patient had an arterial embolus to the foot and was treated conservatively. No amputation was needed. Only one late complication was recorded (3.4%), which was a parastomal abscess that necessitated mesh removal. Overall, three patients had a second operation (10.3%). The average hospital stay was 4.7 (range, 1–19; median, 3) days. Average follow-up time was 28 (range, 12–53; median, 30) months. Recurrence of the hernia was found in 13 of 28 patients (46.4%).

## Discussion

Parastomal hernia is a challenging problem for the surgeon, because its incidence is high but no definitive operative strategy has been established, which is implied by the wide range of operations available. Presently, there are three major approaches to parastomal hernia repair, but mesh repair is presumed to be superior due to lower rates of recurrence. A recent review of the literature reported an overall risk of recurrence of 0–33% for mesh repair, but most series reported in the literature are lacking in outcome data, and there are no randomized, controlled studies [6, 7].

Laparoscopic parastomal hernia repair is a tempting approach to this complex surgical task. It offers the benefits of laparoscopic surgery: mainly less pain, shorter hospital stay, and faster recovery with the advantages of inlay mesh hernia repair. Furthermore, there is no contact with bowel content, because there is no direct involvement of the stoma. There are three ways to perform laparoscopic parastomal hernia mesh repair: a modified Sugarbaker technique, which uses a mesh patch to cover the orifice of the hernia while the distal bowel loop is layered between the abdominal wall and the mesh [8]; a slit mesh repair with a keyhole for the bowel to pass through; and a third technique that combines both slit mesh as a first step and a second mesh that covers the abdominal wall with the slit mesh, also known as the “sandwich technique” [9]. Our goal in this study was to assess our outcomes with laparoscopic parastomal hernia repair in which we used a manufactured slit mesh designed for this purpose.

When comparing our results to similar series in the literature that used the slit mesh technique, we found

variance. Hansson et al. reported 20 of 55 (37%) recurrence rate after using Gore-Tex Dual Slit Mesh. Interestingly, patients in this series were very satisfied with the results, and 18 of 20 (90%) reported improved quality of life even if they had recurrence unless the operation was converted to an open technique. The authors suggest that the recurrent hernia was smaller compared with the preoperative hernia, but we would like to suggest an alternative explanation, namely the rapid and trouble-free recovery period after laparoscopic surgery [10]. After having these disappointing results, the same group of authors published a modified technique using both open and laparoscopic approaches with a hand-made “funnel-shaped” Gore-Tex dual mesh, but long-term results are yet to be published [11]. Muysoms et al. [12] also abandoned the slit mesh repair technique after having unsatisfactory results in 8 of 11 (72.7%) recurrent hernias. A subsequent series of parastomal hernia repair with a modified Sugarbaker technique reached a recurrence rate of only 2 of 13 (15.4%). Safadi [13] reported a recurrence rate of four of nine (44.4%) and one patient (11.1%) suffered a prolapsed stoma after using Gore-Tex slit mesh. All failures occurred after a 6-month follow-up period. The only study, to the best of our knowledge, that published a tolerable result of 3% recurrence rate is the paper by Wara and Andersen [14]. They used a two-layer mesh similar to ours, but cut out the shape of the key hole and the slit after estimating the size of the fascial defect. The self-cut key hole and slit might be a small but important difference that explains the huge variance between the recurrence rates, because it is difficult to estimate laparoscopically the size of mesh needed. In our study, we used a specially designed mesh that comes in two sizes (12.5 cm × 15.5 cm or 15.5 cm × 20.5 cm), and each has two stoma opening sizes (28–35 and 35–45 mm). Most of the hernia recurrences in the Muysoms’s series were in the central hole, and we believe that a more diverse precut slit/keyhole mesh size might be required [12].

The combination of two materials in a double layer mesh applies dual advantages. The polypropylene gives the mesh the necessary strength and the PTFE acts as a barrier prevents visceral adhesions. In the study, the use of unprotected polypropylene mesh was the cause of serious complications, including obstruction, dense adhesions, and mesh-related abscess [15]. PTFE is made out of synthetic polymer, which is biologically inert but has a tendency to shrink with time. That might explain some of the disappointing results with the use of double-layer mesh, although no studies have compared different mesh usage.

Another different attempt to improve the recurrence rate of parastomal hernia repair was made by Berger and Bientzle [9], who developed a combination of both Sugarbaker and slit mesh technique to create a “sandwich-technique”. In this study, parastomal hernia repairs were

performed with two layers of mesh: one with a slit inlayed in a similar manner (described earlier) and a second to cover the slit mesh and the abdominal wall. The sandwich-technique resulted in a recurrence rate of less than 3% with an acceptable complication rate.

Although we feel it to be unlikely, a possible explanation for our disappointing long-term results might be the lack of different sizes of mesh for the procedure such that the diameter of the bowel at the site of transgressing the abdominal wall might be less than the nearest size of mesh, thus leaving a potential defect through which a hernia might later develop. We doubt that it was due to inadequate surgical experience for such complex surgery, because although we believe that laparoscopic repair of parastomal hernia is a difficult task that demands a committed laparoscopic surgeon, all of the operations in our series were performed by a surgeon dedicated to the field and with vast experience of complicated colorectal surgery. We also found that our technical results with a mean operative time of 179 (range, 80–300; median, 180) min resemble others studies that used similar slit mesh technique and reported an operative time range of 40–360 min [9, 11–13]. We assume that the reason for the seemingly extended length of the procedure is the considerable amount of time spent on adhesiolysis and hernia content retrieval. We report a conversion rate of 6.9% and a mortality rate of 3.4%, both of which lie in the reported range of the literature. Our overall complication rate is 17.2%, which compares favorably with the reported range in the literature of 8.4–33.3% [11–14]. We consider these perioperative data to be supportive evidence of the technical feasibility of laparoscopic parastomal hernia repair, but we believe that a modification to the operation in the form of “sandwich-technique” might produce better results and we intend to explore that possibility in the future.

## Conclusions

We have found that laparoscopic parastomal hernia slit mesh repair is a complex and demanding laparoscopic procedure. We believe that it is technically feasible with

reasonable morbidity and mortality, but recurrence rates are still high and technical improvement is essential.

**Disclosures** Drs. H. Mizrahi, P. Bhattacharya, and M. C. Parker have no conflicts of interest or financial ties to disclose.

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