Ann R Coll Surg Engl 1998; **80**: 184–187

The continuing challenge of parastomal hernia: failure of a novel polypropylene mesh repair

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Key words: Surgery; Parastomal hernia; Polypropylene mesh; Results

In an attempt to reduce the high recurrence rate after repair of parastomal hernia, a technique was devised in which non-absorbable mesh was used to provide a permanent closure of the gap between the emerging bowel and abdominal wall.

Seven patients were treated during the period 1990–1992. Five-year follow-up has given disappointing results, with recurrent hernia in 29% of cases and serious complications, including obstruction and dense adhesions to the intra-abdominal mesh, in 57% and a mesh-related abscess in 15% of cases.

This study highlights a dual problem—failure of a carefully sutured mesh to maintain an occlusive position, and complications of the mesh itself. The poor results obtained with this technique together with the disappointing results with other methods described in the literature confirms that parastomal hernia presents a continuing challenge.

Parastomal hernia is a frequent complication of stoma formation. The incidence after colostomy construction (PCH) has been reported to vary from 1% to 50% *(1,2)*. Many are well tolerated, but they have a tendency to enlarge markedly, then causing symptoms by virtue of their bulk.

Paraileostomy hernia (PIH) is reported to occur less commonly with figures ranging from 0.8% to 10% *(3,4)*. Specific long-term assessment has shown a higher rate of 28% *(5)*. Furthermore, computed tomography has been shown to be an accurate means of detecting PIH, and will increase the incidence further by demonstrating hernias not detectable on clinical examination *(6)*. Cases of PIH are usually smaller than PCH, and some are asymptomatic, but overall morbidity is higher because the hernia bulk leads to leakage from the ileostomy appliance, and also because the neck tends to be tighter, with a higher incidence of colic/obstruction, occasionally leading to strangulation *(7)*.

Although there are many reports of successful repair techniques with excellent short-term results, long-term follow-up has shown less satisfactory results *(8)*. A review of experience at St Mark's reported disappointingly high recurrence rates of 40–80% with a number of techniques. We have had similar disappointing techniques with resiting *(5)* and with various local repair *(9)*.

The poor results are because of the inability to seal permanently the gap between emerging bowel and abdominal wall. Exiting the stoma through the abdominal wall produces the equivalent of an inguinal canal without the protection of obliquity or a shutter mechanism. Because of our own poor results with standard techniques, amply confirmed by others *(8,10,11)* we devised a fitted internal wrap of polypropylene mesh, which we hoped might provide an effective barrier to the defect between the abdominal wall and the emerging ileum. We now report long-term results of the technique.

Patients and methods

Seven patients underwent the polypropylene mesh wrap between 1990 and 1992. Two patients had a terminal colostomy after rectal excision for cancer. The remaining five had a terminal ileostomy, three for Crohn's disease (all clinically quiescent) and two for ulcerative colitis. Because of its unproven status, the technique was used only in problem cases, usually recurrent after surgery (Table I). Five of the patients had undergone revisional stoma surgery. In all cases the original stoma and

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Table I. Indications for and outcomes of parastomal hernia repair using polypropylene mesh

Patient No	*Disease*	*Age (sex)*	*Interval to hernia (months)*	*Indication for repair*	*Size of defect*	*Type/location of stoma*	*Follow-up (months)*	*Complications*
1	CD	44 (M)	34	Seepage	L	Ileostomy/RIF	89	1 Recurrent obstruction 2 Crohn's disease
2	UC	65 (F)	70	Pain	S	Ileostomy/RIF	81	No problems
3	CA	81 (M)	65	Pain	M	Ileostomy/RUQ	86	No problems
4	CA	72 (M)	44	Pain + bulk	L (R)	Colostomy/LIF	60	1 Obstruction
5	UC	68 (M)	88	Pain + prolapse	L (R)	Colostomy/RIF	67	No problems
6	CD	48 (F)	31	Pain + seepage	L (R)	Ileostomy/LIF	83	1 Abscess 2 Obstruction 3 Recurrence
7	CD	35 (F)	84	Pain + seepage	L (R)	Ileostomy/RIF	79	1 Recurrence 2 Adhesions

Crohn's disease = CD, Ulcerative colitis = UC, Adenocarcinoma = CA
Defect size; Large = L, Moderate = M, Small = S, Recurrent = (R)

subsequent repairs were exited through the rectus muscle/sheath. Predisposing factors to herniation included three patients with inflammatory bowel disease (IBD) on corticosteroids, two smokers, one with chronic obstructive airways disease and one grossly obese patient.

The defects were classified according to size: small (0–3 cm), moderate (4–6 cm), and large (> 6 cm). Follow-up is to April 1997, giving a minimum follow-up of 54 months after mesh repair.

Operative technique

The abdomen was entered through the previous incision and sufficient dissection performed to exclude IBD or other pathology. The bowel leading to the stoma was mobilised to define the sac and defect, and the terminal mesentery separated from the abdominal wall sufficiently to allow the mesh to be passed between the two. If the defect was more than 2 cm in diameter, it was narrowed with polypropylene sutures. Two rectangular pieces of polypropylene mesh were cut as shown in Fig. 1, to give three longitudinal 'fingers'. The outer 'fingers' were passed around the neck of the sac and overlapped to strengthen the abdominal wall around the defect. The middle 'fingers' were turned inward along the ileum/colon, and sewn together with polypropylene sutures to form a tubular sheath directed along the bowel into the peritoneal cavity for a distance of 3 cm (Fig. 2). This sheath was sutured to the seromuscular coat of the bowel, but was sufficiently loose to avoid constriction. The main bulk of each piece of mesh was sewn with interrupted polypropylene sutures to the parietal peritoneum and underlying muscle, ensuring coverage well beyond the margins of the defect. The aim was to obtain attachment of the mesh to bowel and parietes, so excluding entry of loops of bowel into the defect. The mesentery was reattached to the mesh.

The abdominal cavity was washed out during and at the end of the procedure with tetracycline solution (1 g/l saline) and the abdomen was closed in standard fashion.

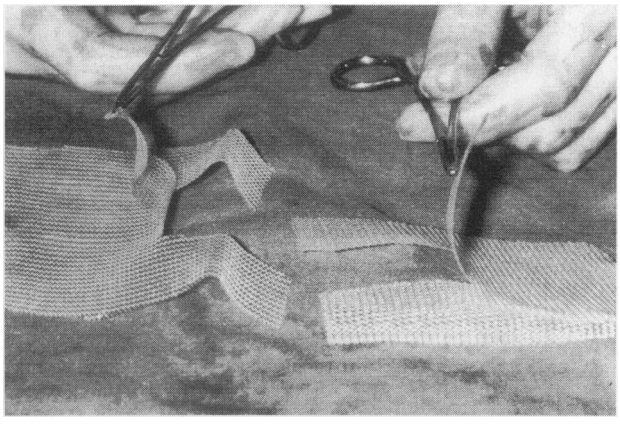

Figure 1. Construction of polypropylene sheath from two sheets of mesh each cut with three 'fingers'.

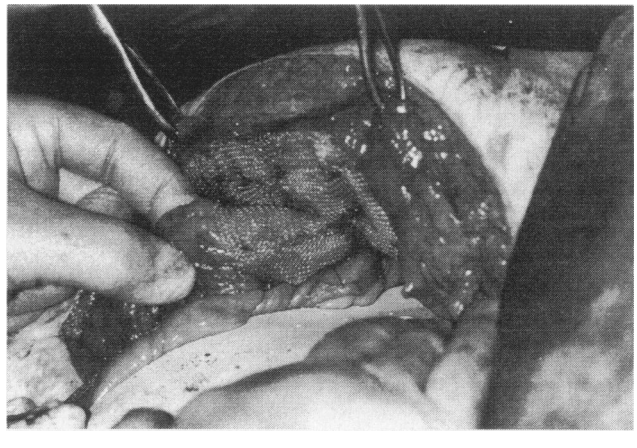

Figure 2. Parastomal hernia repaired with polypropylene mesh with fingers of mesh extending inwards into the peritoneal cavity around the exiting bowel.

Results

The study population consisted of four males and three females with a median age of 65 years (range 31–88 years). As of August 1997, the median follow-up was 81 months (range 60–89 months).

The indications for and results of mesh repair are summarised in Table I. There was a single early postoperative complication, a wound seroma which settled after aspiration. There was no case of wound infection.

Three patients developed dense adhesions leading to an emergency admission with bowel obstruction, and a fourth patient was noted to have dense adhesions at the time of repair of a recurrent hernia.

Patient 1 has had recurrent small bowel obstruction with non-function of the stoma commencing 5 years after repair and continuing to the present. Investigations have shown recurrent Crohn's disease and no mesh-related complications.

Patient 4 developed intestinal obstruction 4 months after operation, and was found to have dense adhesions of bowel to the polypropylene mesh at the time of laparotomy.

One patient (Patient 6) developed intestinal obstruction with an intra-abdominal abscess 3 years after operation. At laparotomy, there was an extensive infection related to the mesh, with dense adhesions between mesh and bowel. The mesh was removed with great difficulty and the hernia recurred.

A third patient (Patient 7) developed a recurrent parastomal hernia 3 years after operation. At laparotomy, adhesion of bowel to the mesh was so dense that an attempt at further repair was abandoned.

Discussion

The failure of prolonged follow-up to confirm the promising early results of this technique is disappointing, as are the complications encountered with the use of polypropylene mesh placed within the peritoneal cavity. The high prevalence of adhesion-related complications cannot be emphasised strongly enough. This is of particular importance given the increased use of non-absorbable meshes in both the open and laparoscopic repair of abdominal wall hernias.

As with many surgical conditions, the heterogeneity of the literature available on the subject makes it difficult to draw firm conclusions regarding an optimal management policy. Even the incidence of the condition varies greatly in different publications, but it is likely that some degree of herniation occurs in one-third of ileostomies and one-half of colostomies.

The standard method usually advocated has been to bring the bowel through a small (2 cm) defect traversing the rectus sheath. Sjödahl *et al. (1)* found that siting the stoma through the rectus sheath reduced the incidence from 26.1% to 2.6%, as opposed to a defect lateral to the rectus, but other workers have not been able to confirm this. Computerised scanning, which shows the site of the defect accurately, provides definitive evidence that there is no difference between the two sites *(6)*. Nevertheless, bringing the bowel through the rectus muscle is generally recommended.

The results of surgical repair are equally confusing. Three main approaches have been reported: simple translocation to a new site; a local repair; and a variety of more complicated procedures aimed at preventing recurrence.

Translocation of the stoma together with closure of the original defect has been reported from numerous centres, usually with poor results. For instance, Allen-Mersh and Thomson *(8)* reported 86% failure when resiting to another trephine defect on the same side, and 57% failure rate when relocating to the opposite side or umbilicus. A series from Boston *(11)* found that relocation gave a 33% recurrence after the first repair and 71% after a repeat repair.

Local repair of the defect by non-absorbable sutures leaving the stoma *in situ* was described by Thorlakson *(10)*, although he reported no results. While this technique has the attraction of simplicity, reported results have been unsatisfactory, with recurrence rates of up to 76% *(8,9,11)*.

In view of these poor results, it is not suprising that many surgeons have used non-absorbable mesh to strengthen local repairs, to support relocated stomas, or prophylactically at the time of initial stoma formation *(11–21)*. In the simplest form *(13,14)* a cuff of mesh is placed on the external oblique around the emerging bowel and sutured in place. A variation of this technique is to place the mesh over the defect from the peritoneal aspect, suturing the mesh to the edge of the defect *(15)*. With this technique, Sugarbaker *(15)* leads the bowel out lateral to the mesh, and had no recurrences in seven cases followed for 4–7 years. Byers *et al. (16)* place the mesh around the emerging bowel, and report no recurrence in nine cases, while 50% of patients in the same centre repaired by other techniques recurred. However, not all reports have been satisfactory and, in our experience, this technique did not eliminate recurrence. A similar technique has been used prophylactically at primary colostomy formation *(17)*. More recently, a prosthetic ring placed external to the abdominal wall has been reported with good results *(18)*, although one ring has required removal.

What conclusions can one draw from these reports? They fall broadly into two groups: those with excellent results and no complications, usually but not always small numbers and short-term; and those reporting generally unsatisfactory results. Our own experience falls clearly into the second group. Our experience with many of the current techniques leads us to the conclusion that the defect between bowel and abdominal wall presents a weakness that intra-abdominal pressure will exploit to produce a hernia and that none of the currently reported techniques, including our own, can prevent this.

Complications of non-absorbable mesh, intra- or extraperitoneal, provide a second group of complications. Extraperitoneal placement gives few complications, but that is not our experience in the peritoneal cavity, in spite of few complications described by other authors.

The literature on repair of parastomal hernias with non-absorbable synthetic meshes is still surprisingly limited. Of the total of 52 patients described in 11 papers *(11–21)*, the complications included six superficial wound infections, only one of which required removal of the mesh. There were three reports of hernia recurrence and one of stomal stenosis, but no report of adhesion or intestinal obstruction. In our small series we have had one late case of serious mesh infection requiring removal, and each of three patients requiring re-exploration has shown adhesions so dense between bowel and mesh as to preclude or make dissection very difficult.

Conclusion

We conclude, in common with Martin and Foster *(22)*, that the results of treating parastomal hernia by all techniques are still associated with a considerable recurrence rate and a significant morbidity, and the most effective techniques, those using intra-abdominal mesh, are associated with a higher incidence of long-term complications than is recorded in the literature. What then should be the approach to treatment?

Any policy should take into account the considerable likelihood of recurrence, and the considerable complications associated with mesh placed in close contact with bowel. It is clear that small and asymptomatic hernias are best left alone, with the patient given instruction regarding the symptoms of intestinal obstruction. For those where intervention is required, the least invasive approach should be used. The method of Stephenson and Phillips *(12)* has the advantages of avoiding laparotomy and intraperitoneal mesh, so minimising complications, although in the longer term probably only half the patients will avoid recurrence.

The results of repair of recurrent hernias are even less satisfactory. While operation may again be avoided if possible, some with large and severely symptomatic hernias will require further surgery. We can only speculate regarding the management of such cases. Our experience would be against using intraperitoneal mesh in patients with Crohn's disease, who should perhaps have a simple resiting to the other side of the abdomen. With other pathology, a mesh repair may be justified, but with minimal suturing of mesh to bowel. Perhaps a modification of the Sugarbaker technique *(15)* is most likely to give an optimal balance between control and complications. A very large piece of mesh, firmly sutured to the abdominal wall and widely overlapping the defect, would simulate the extraperitoneal technique of stoma formation devised by Goligher, possibly associated with a lower incidence of hernia than other techniques *(2)*, although obviously only where symptoms are sufficiently severe to outweigh the risk of adhesions.

We are not aware of any accurate data on complications of intraperitoneal mesh, despite the long period over which it has been used, and the increasing frequency of its use. The paucity of detailed, long-term follow-up of these patients is disappointing. Perhaps the manufacturers should be responsible for a prospective study of all patients in whom it is used.

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Received 11 September 1997