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REVIEW

Parastomal hernia

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Parastomal herniation is a common complication after stoma formation. The incidence can be reduced by using an extraperitoneal technique, limiting the size of the trephine to 1.5–2.0 cm or by strengthening with a mesh. If an intraperitoneal technique is used the intestine should be brought out through the rectus muscle.

Generally, the symptoms are easily controlled with a support belt. Various techniques have been advocated for surgical repair. Fascial repair alone should no longer be performed owing to an unacceptably high recurrence rate, but should be combined with a prosthetic mesh. Relocation of the stoma should be performed for primary repairs.

Parastomal herniation is a common event after the formation of a cutaneous enterostomy. It has even been suggested that some degree of herniation adjacent to a colostomy is so common that this complication can be regarded as inevitable *(1)*. Herniation adjacent to an ileostomy or a urinary ileal conduit are less common, although likely to be more symptomatic. Stomal revision has been reported as being necessary in up to 90% of ileal conduits owing to poor fitting of the collecting appliance causing urine leakage and peristomal dermatitis *(2)*.

Although a parastomal hernia is often little more than an inconvenience, it represents a setback for a patient trying to come to terms with the psychological morbidity that a stoma produces.

Incidence

The reported incidence varies considerably depending on the definition, a minor degree of parastomal weakness being present in many patients but not representing a true hernia. Some authors only cite those patients who seek or require surgical repair. Todd states "most patients with a long-standing colostomy have a hernia associated with it," *(3)* and Maingot also suggests that herniation is one of the most common complications of a colostomy *(4)*. However, Whittaker and Goligher *(5)* give a low incidence of 14%, a figure similar to Kronberg *et al. (6)* who reported 42 paracolostomy hernias in 362 patients (12%). Marks and Ritchie *(7)* reported 23 hernias in 227 patients (10%), although the cumulative risk by the 6th year was 32%. The incidence of parastomal herniation increases with time, although most occur within 2 years of stoma formation *(8)*. One review found 1% of patients had acquired a hernia in the immediate postoperative period *(9)*.

The incidence of paraileostomy hernias is generally believed to range from 0.8% to 10%, although one study found 13 of 46 patients (28%) with a hernia, three patients being unaware of the condition, which had not been diagnosed at previous outpatient appointments *(10)*.

Symptoms

Most parastomal hernias are relatively asymptomatic, many patients complaining only of the cosmetic appearance. However, approximately 10–20% have symptoms severe enough to seek operative correction.

As with any hernia, a loop of bowel may become trapped in the sac, resulting in obstruction or strangulation. Some degree of pain or discomfort around the stoma site is frequently present as a result of stretching of the abdominal wall and peristomal skin. As the neck of the sac is generally wide, the contents may reduce when the patient is recumbent. This causes a variation in the size of the abdominal skin around the seal of the collecting bag, often leading to disruption and leakage, with the risk of associated peristomal dermatitis. This is more trouble-

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some with ileal conduits and ileostomies as their effluent is far more irritating to the skin.

Although parastomal hernias are in the main asymptomatic, they may cause psychological distress to a patient already trying to adopt to a change in body image.

Aetiology

The aetiology is unclear. Obesity, wound infection, corticosteroid use and retention of urine have been suggested as risk factors *(1,7,11–13)*, along with chronic cough, malnutrition and distension. The development of many hernias is probably operator dependent.

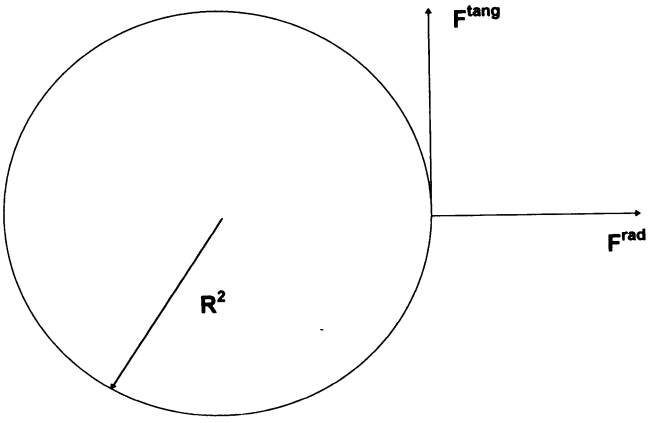

Figure 1. $F_{tang} = F_{rad} \times R_2$.

Stoma formation

All patients in whom a stoma is planned should be evaluated by the surgeon as well as a specialist stoma nurse, the stoma site being marked away from bony prominences, skin folds, scars and belt lines, the patient having been examined standing, lying and sitting. A stoma should not be brought out through the laparotomy incision *(1)*.

Both intraperitoneal and extraperitoneal techniques of construction are commonly performed. The intraperitoneal method would seem more popular, a survey of 245 American surgeons showing 83.8% using this technique *(14)*.

Goligher *(15)* described the extraperitoneal construction of an end stoma in 1958 after experiencing sepsis around the non-absorbable sutures used to close the lateral space in three patients undergoing proctocolectomy for ulcerative colitis. In each case the sepsis persisted until the suture was removed, but subsequent scarring around the ileostomy made a collecting appliance difficult to fit. In an attempt to eliminate the lateral space without using a suture he devised the technique of bringing the stump through the extraperitoneal tissues round the outer edge of the peritoneum. He concluded that a further advantage of this technique may be that it would reduce the incidence of parastomal herniation owing to the oblique passage of the bowel through a tunnel. He later reviewed his results of extraperitoneal and intraperitoneal colostomies in 251 patients who had undergone abdominoperineal excision of the rectum, with a minimum follow-up of 2 years *(5)*. In 162 patients the colostomy was intraperitoneal and in 89 patients extraperitoneal. Of these patients, 28 (17%) with an intraperitoneal stoma developed a hernia compared with eight patients (9%) with an extraperitoneal construction. A lower incidence of prolapse and retraction was also noted in the extraperitoneal stomas, the results being statistically significant.

Marks and Ritchie *(7)* also found a significant reduction in the incidence of parastomal herniation if the colostomy was extraperitoneal and advocated that all end colostomies should be formed this way.

If an intraperitoneal stoma is constructed, there is debate as to whether the trephine should be made lateral to or through the rectus abdominis muscle, it having been stated that stomas emerging through the rectus muscle have a lower incidence of herniation *(8,16,17)*. Sjodahl *et al. (8)* studied 130 patients and found the stoma had been brought out through the rectus in 107 patients and lateral to it in 23 patients. The incidence of parastomal hernia in these groups was 2.8% and 21.6%, respectively. However, Marks and Ritchie *(7)* failed to find any reduction in herniation if the stoma was brought out through the rectus muscle. Another study *(10)* also found the rate of herniation to be similar whether the stoma emerged lateral to the rectus (6/16, 37%) or through it 4/12, 33%). Problems of routing the stoma through the rectus muscle may be that it is too close to the laparotomy incision or the umbilicus, causing difficulties with attachment of the collecting appliance, or there may be stomal oedema caused by impaired venous flow from compression by the muscle.

Whether the stoma is constructed using an extra- or an intraperitoneal technique, lateral or through the rectus muscle, it is important that the trephine made in the abdominal wall is of the correct size and not too large *(1,16,18)*. This was elegantly explained by de Ruiter and Bijnen *(19)*, working with physical engineers (Fig. 1).

They explained how the trephine is stretched open by tangential forces working on the circumference of the opening. According to the law of Laplace, the radial force (F_{rad}) on a normal abdominal wall is related to the pressure *(P)* in the abdominal cavity and the radius (R_1) of the abdominal cavity according to the formula:

$$F_{rad} = P \times R_1/2$$

After construction of a trephine opening in the abdominal wall the tangential force (F_{tang}) on the edge of the opening is related to the radial force (F_{rad}) and the radius of the trephine opening (R_2) according to the formula:

$$F_{tang} = F_{rad} \times R_2$$

Therefore, the trephine opening should be constructed as small as will safely transmit the intestine to the skin surface.

Current teaching suggests that the skin opening should be 2.5 cm in diameter or just large enough to admit the

tips of two fingers. However, this does not take into account the skin retraction which occurs later and we agree with Todd *(18)* and Celestin *(20)*, both of whom advocate the diameter of the trephine to be 2 cm for ileostomies and 1.5 cm for colostomies, later retraction resulting in the stomas becoming 0.5 cm larger. Using this method Todd *(21)* states that slight cyanosis of the stoma with oedema the following day indicates that a correctly sized aperture has been formed.

Resnick *(22)* described a mechanical device for ensuring the correct size of opening in the anterior abdominal wall consisting of three different sized disposable heads (17, 25 and 32 mm) with a cartridge, which included an annular knife and conical anvils. The device allowed the excision of an exact circular skin disc and formation of a precise abdominal aperture. He used the device to construct both colostomies and ileostomies in 18 patients and found no cases of herniation, stenosis or prolapse up to 2 years after operation.

Another approach to stoma formation was described by Bayer *et al. (23)*, who argued that as the underlying mechanism in parastomal herniation was enlargement of the internal fascial wall opening, this should be reinforced at the original operation, rather than waiting for a hernia to occur and then reinforcing the resultant defect. They performed this using a ring of polypropylene mesh, the bowel being brought out through an aperture in the mesh. In all, 43 patients had their stoma constructed in this way and no hernia or prolapse occurred during follow-up.

Management and repair

In the majority of patients the initial management should be non-surgical, a well-made stomal support usually controlling symptoms *(1)*.

Surgical treatment is indicated when symptoms of impending obstruction occur. These put the patient at risk of strangulation which, although uncommon, has been reported by several authors *(24–26)*. Other indications for elective repair are local pain, poor fitting of the appliance, associated prolapse or stenosis, incarceration, difficulty of evacuation and cosmesis *(13)*.

No absolute contraindication exists for repair, though patients who are grossly obese or have known metastatic disease should be deferred if possible.

The median incidence of operative repair is 27% *(6,8,10,27,28)*. The techniques used may be categorised into stoma relocation, fascial repair and fascial repair with prosthetic mesh. No consensus exists regarding the method of choice and there have been no randomised trials on this subject. The largest study so far reported looked retrospectively at 68 repairs in 55 patients *(13)*.

Stoma relocation

This is the easiest solution, the incisional hernia at the previous stoma site being closed in the usual manner. It has the advantage that if the original stoma site was suboptimal an improved site can be chosen. However, a laparotomy is required in a patient who may have dense intra-abdominal adhesions and some patients may have multiple scars from previous surgery making relocation of the stoma difficult if not impossible.

Fascial repair

Without prosthetic mesh

Thorlakson *(26)* suggested that resiting was only necessary if the stoma was incorrectly sited and described a local fascial repair. The hernia, which is often lateral to the stoma site, is opened, the sac is dissected away and the fascial edges repaired using non-absorbable sutures. However, the fascial defect is often so big that repair in this way leads to excessive tension and subsequent failure.

With prosthetic mesh

Rosin and Bonardi *(17)* described a technique of using a polypropylene mesh to strengthen the defect after reduction of the hernia, work later repeated by Abdu *(29)*. The stoma is mobilised with a minimum of peristomal skin, the hernia reduced and repaired and the bowel brought through the mesh which had a 2 cm hole cut in the centre. The mesh is then sutured to the fascia and a mucocutaneous suture performed. Variations in this technique have since been described. Leslie *(12)* split the mesh and fitted it around the emerging bowel, forming a spout which he believed protected against retraction and prolapse. De Ruiter and Bijnen *(19)* welded together two identical halves of a polypropylene ring through the centre of a mesh, after which the mesh inside the ring was removed.

Local repair is attractive because it avoids the need for a laparotomy and the possible development of an incisional hernia at the original stoma site. However, the operations are technically difficult and the proximity of the stoma to prosthetic material increases the possibility of infection and hence recurrent herniation. To try and reduce the incidence of infection, methods have been described using prosthetic mesh intraperitoneally, thus decreasing the risk of operative contamination as the stomal opening is not disturbed *(23,30)*. These techniques necessitate a laparotomy but may be indicated in patients with recurrent herniation, the reported results being excellent.

Results of operation

A review of surgical treatment of colostomy complications at St Mark's Hospital, London, between 1954 and 1984 showed 42 patients had undergone 53 operations for parastomal herniation *(31)*. The interval between constructing the stoma and hernia repair was significantly longer in patients who had a good result compared with those who did not. The most frequent operation was local repair with non-absorbable sutures, but this was only successful in 53% of cases (17/32). Relocation was

performed in 21 patients where local repair had failed or the hernia was too large to be repaired in this way. Results were better if the stoma was resited to the right of the abdomen or to the umbilicus (3/7 successful cases) rather than above and medial to the original stoma site (2/14 successful cases).

A small series of paraileostomy hernia repairs *(10)* found two local repairs recurring 2 and 2.5 years later, the stomas then being relocated with no further recurrence. One patient had a local repair using a mesh technique with no recurrence at 12 months. Six patients had their stomas transposed to the left iliac fossa, three developing further hernia in the new site.

The largest review of hernia repairs has been published by Rubin *et al. (13)* detailing 68 repairs in 55 patients. The results again make disappointing reading. Thirty-six patients had a local fascial repair, 25 a stoma relocation and seven a fascial repair with a mesh. When all types of repair were considered together, hernias recurred in 43 of 68 cases (63%). For primary repairs, a recurrence occurred in 22 of 29 (76%) cases after fascial repair, only 6 of 18 (33%) patients experiencing recurrence in the relocation group. For recurrent repairs, all seven fascial repairs failed, only two of seven relocations were successful, and two of three prosthetic repairs were judged a success. The morbidity rate was 63%, with complications being higher after stoma relocation. An abdominal-wall hernia occurred after 49 of 68 (72%) repairs, with no significant difference between the fascial repair group and the relocation group.

These studies show that:

1 No technique of parastomal repair gives satisfactory long-term results.
2 All repair techniques are associated with significant morbidity.
3 There is no consensus as to the best technique of repair.
4 Parastomal hernias are generally well tolerated, rarely cause life-threatening complications and repair should be avoided if possible.

References

1 Goligher JC. *Surgery of the Anus, Rectum and Colon*, 5th Edition. London: Baillière Tindall, 1985: 703–5.
2 Marshall FF, Leadbetter WF, Dretler SP. Ileal conduit parastomal hernias. *J Urol* 1975; **40:** 114.
3 Todd IP. *Intestinal Stomas*. London: William Heinemann Medical Books Ltd, 1978.
4 Maingot R. *Abdominal Operations*, 7th Edition. London: Lewis, 1980: 2114.
5 Whittaker M, Goligher JC. A comparison of the results of extraperitoneal and intraperitoneal techniques for construction of terminal iliac colostomies. *Dis Colon Rectum* 1976; **19:** 342–4.
6 Kronberg O, Kramhoft J, Backer O, Sprechler M. Late complications following surgery for cancer of the rectum and anus. *Dis Colon Rectum* 1974; **17:** 750–53.
7 Marks CG, Ritchie JK. The complication of synchronous combined excision for adenocarcinoma of the rectum at St Mark's Hospital. *Br J Surg* 1975; **62:** 901.
8 Sjodahl R, Anderberg B, Boin T. Parastomal hernia in relation to site of the abdominal stoma. *Br J Surg* 1988; **75:** 339–41.
9 Pearl RK, Prasad MC, Orsay CP, Abcarian H, Tan AB, Melze MT. Early local complications from intestinal stomas. *Arch Surg* 1985; **120:** 1145.
10 Williams JG, Etherington R, Hayward MWJ, Hughes LE. Paraileostomy hernia: a clinical and radiological study. *Br J Surg* 1990; **77:** 1355–7.
11 Devlin HB. Parastomal hernia. *Management of Abdominal Hernias*. London: Butterworths, 1988: 177–86.
12 Leslie D. The parastomal hernia. *Surg Clin North Am* 1984; **64:** 407–15.
13 Rubin MS, Schoetz DJ, Matthews JB. Parastomal hernia. Is stoma relocation superior to fascial repair? *Arch Surg* 1994; **129:** 413–18.
14 Pearl RK, Prasad MC, Orsay CP, Abcarian H, Tan AB. A survey of technical considerations in the construction of intestinal stomas. *Am Surg* 1988; **51:** 462.
15 Goligher JC. Extraperitoneal colostomy or ileostomy. *Br J Surg* 1958; **46:** 97.
16 Turnbull RB. Intestinal stomas. *Surg Clin North Am* 1958; **38:** 1361–72.
17 Rosin JD, Bonardi RA. Paracolostomy hernia repair with Marlex mesh: a new technique. *Dis Colon Rectum* 1977; **20:** 299–302.
18 Todd IP. *Intestinal Stomas*. London: Heinemann Medical Books Ltd, 1978.
19 de Ruiter P, Bijnen AB. Successful local repair of paracolostomy hernia with a newly developed prosthetic device. *Int J Colorectal Dis* 1992; **7:** 132–4.
20 Celestin LR. *A Colour Atlas of the Surgery and the Management of Intestinal Stomas*. London: Wolfe Medical Publications Ltd, 1987.
21 Todd IP. The resolution of stoma problems. In: Allen RN, Keighley MRB, Alexander-Williams J, Hawkins C eds. *Inflammatory Bowel Disease*. Edinburgh: Churchill Livingstone, 1983: 256–61.
22 Resnick S. New method of bowel stoma formation. *Am J Surg* 1986; **152:** 545–8.
23 Bayer I, Kyser S, Chaimoff Ch. A new approach to primary strengthening of colostomy with Marlex mesh to prevent parastomal hernia. *Surg Gynecol Obstet* 1986; **163:** 579–80.
24 Cuthbertson AM, Collins JP. Strangulated paraileostomy hernia. *Aust N Z Surg* 1977; **47:** 86.
25 Daniell SJ. Strangulated small bowel hernia with a prolapsed colostomy stoma. *J R Soc Med* 1981; **74:** 687.
26 Thorlakson RH. Technique of repair of herniation associated with colonic stomas. *Surg Gynecol Obstet* 1965; **120:** 347.
27 Baslev A. Kolostomitilvaerelsen. *Ugeskr Laeger* 1973; **135:** 2799–2804.
28 Burns FJ. Complications of colostomy. *Dis Colon Rectum* 1970; **13:** 448–50.
29 Abdu RA. Repair of paracolostomy hernia with Marlex mesh. *Dis Colon Rectum* 1982; **25:** 529–31.
30 Sugarbaker PH. Peritoneal approach to prosthetic mesh repair of paracolostomy hernias. *Ann Surg* 1985; **201:** 344–6.
31 Allen-Mersh TG, Thompson JBS. Surgical treatment of colostomy complications. *Br J Surg* 1988; **75:** 416–18.

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