

Laparoscopic stoma formation with a prophylactic prosthetic mesh

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Abstract

Background One year after stoma formation with an open technique, the rate of parastomal hernia is almost 50%. The herniation rate can be reduced to 10% with the use of a prophylactic mesh in a sublay position. For stomas formed with a laparoscopic technique, a surgical method with the use of prophylactic mesh should be sought.

Methods Patients with a sigmoidostomy created with a laparoscopic technique were provided with a prophylactic large-pore, low-weight mesh in a sublay position. Follow-up examination was carried out after at least 12 months.

Results Between March 2003 and May 2007, a sigmoidostomy was created in 25 patients. The patients' mean age was 65 years (range 31–89), the mean body mass index was 26 (range 21–32) and 15 were female. One stoma necrosis and two minor wound infections occurred. Parastomal hernia was present in 3 of 20 patients (15%) available for follow-up examination after 11–31 months (mean 19). No fistulas or strictures had developed. No mesh infection was noted and no mesh was removed.

Conclusion In laparoscopic stoma formation, a prophylactic large-pore, low-weight mesh in a sublay position is an easy and safe procedure associated with a low rate of parastomal hernia.

Keywords Laparoscopic stoma · Sigmoid stoma · Parastomal hernia · Ventral hernia · Stoma complications · Prosthetic mesh · Mesh complications

Introduction

Parastomal hernia is a major clinical problem. Herniation after an open surgical technique is reported to be present in almost 50% of patients one year after stoma formation and the rate increases during the following 5 to 10 years [1–7]. One-third of patients with herniation may require surgical repair, which is associated with a very high recurrence rate unless a mesh is used [7–11].

In open surgery, two randomised trials have shown that a prophylactic large-pore, low-weight mesh with a reduced polypropylene content and a high proportion of absorbable material placed in a sublay position reduces the rate of parastomal hernia from 45 to 10% [12–14]. In these trials, no mesh infection, fistula formation or stricture appeared.

A sigmoidostomy may also be formed with a laparoscopic technique. A method for utilising a prosthetic mesh with a laparoscopic technique was developed and experiences with this technique are reported.

Methods

Between March 2003 and May 2007, a prophylactic prosthetic mesh was placed in a sublay position in patients operated on with a laparoscopic technique receiving a sigmoidostomy. The patient and operative characteristics were recorded. An UltraPro® (Ethicon, Norderstedt, Germany) mesh was used. In elective cases, prophylactic

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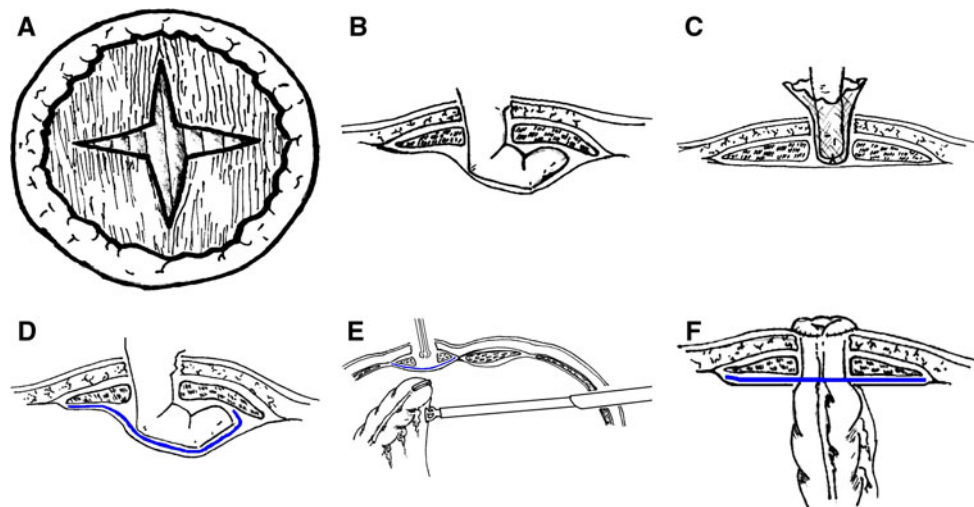


Fig. 1 **a** Through a circular opening in the skin at a preoperatively marked site, the anterior rectus aponeurosis was reached by dissection through the subcutaneous tissues. A cross was cut in the aponeurosis with dimensions 2.5×2.5 cm. **b** The rectus muscle was split and, with the index finger, a space was created bluntly in the avascular plane dorsal to the rectus muscle. **c** A mesh of dimensions 10×10 cm was inserted via the skin opening. **d** The mesh was spread out and positioned with the index finger into the sublay position in the retro

muscular space. **e** The mobilised and cut sigmoid colon was held with a laparoscopic clamp close to the peritoneum at the intended stoma site. The peritoneum was opened and, as the abdomen exsufflated, the colon was taken with a clamp inserted through the skin opening. **f** The sigmoid colon was gently pulled through the mesh and the layers of the abdominal wall. A running monofilament absorbable suture was used for attaching the bowel to the skin

antibiotics consisted of a single oral dose of tetracycline and metronidazole.

Standard laparoscopic technique and port settings were used. The sigmoid colon was mobilised and transected with a linear cutting stapler. At a preoperatively marked location, a circular opening was made on the skin and then dissected through the subcutaneous tissues down to the anterior rectus aponeurosis (Fig. 1). A cross was cut in the anterior rectus aponeurosis with dimensions 2.5×2.5 cm. The rectus abdominis muscle was split bluntly, down to the posterior rectus aponeurosis. By inserting the index finger through the opening in the skin, the anterior aponeurosis and the muscle, a space was made bluntly in the avascular plane dorsal to the rectus muscle. A mesh cut into a square of size 10×10 cm was inserted via the skin opening. The mesh was placed in the retro muscular space and spread out into the sublay position with the index finger. The positioning of the mesh could be monitored laparoscopically, as it was clearly visible through the peritoneum, assuring its correct and even placement (Fig. 2). The mesh was laparoscopically anchored to the posterior rectus sheath with tacks placed through the peritoneum into the lateral corners of the mesh.

Through the skin opening, a cross was cut in the mesh, the posterior rectus aponeurosis and the peritoneum just large enough to let the bowel through. At the moment the peritoneum was opened, the abdomen exsufflated. The mobilised and cut sigmoid colon that was held with a laparoscopic clamp close to the peritoneum at the intended

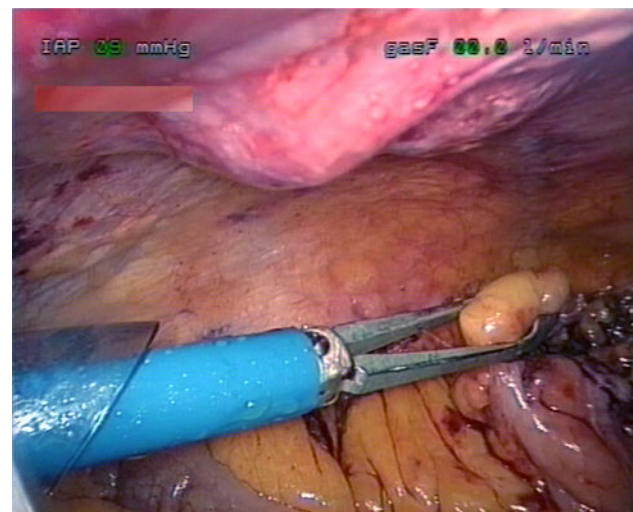


Fig. 2 An intra-abdominal view of the mesh spread out and positioned with the index finger into the sublay position. The mesh is seen through the peritoneum and the posterior rectus sheath. The mobilised and cut sigmoid colon is held with a laparoscopic clamp

stoma site was then taken with a clamp inserted through the skin opening and was gently pulled through the mesh and the layers of the abdominal wall. A running monofilament absorbable suture was used for attaching the bowel to the skin, but the bowel was otherwise not fixed.

Patients were examined for the presence of parastomal hernia after at least 12 months of being relaxed, and straining in both an erect and a supine position. Any

protrusion in the vicinity of the stoma was considered to be a parastomal hernia. Wound infection, mesh infection, fistula formation, stricture formation, reoperation and parastomal hernia repair were recorded.

Results

During the study period, 25 patients received a sigmoidostomy with a prophylactic mesh by a laparoscopic technique. Three surgeons performed 10, 12 and 3 operations, respectively. The operation was emergent in two patients because of severe perineal rupture at child birth. In six patients, the indication for a stoma was intractable anal incontinence or bowel dysfunction because of paraplegia. In 17 patients, a stoma was required prior to radiation therapy of a rectal malignancy or as palliative treatment in malignant disease. The patients' mean age was 65 years (range 31–89), the mean body mass index was 26 (range 21–32) and 15 were female.

A superficial surgical site infection that did not require surgical intervention or the administration of antibiotics occurred in two patients. Because of stoma necrosis, one patient was reoperated after two days with an open operation and the stoma was resited. Before the 12-month follow-up, two patients had died of malignant disease and the two patients with perineal rupture at child birth had had their stomas reversed.

The remaining 20 patients were available for follow-up examination 11–31 months (mean 19) after stoma formation and parastomal hernia was present in 3 (15%). For the patients with herniation, follow-up was carried out after 23 months for one male (79 years) with a rectal malignancy and after 30 and 31 months for two women (81 and 85 years, respectively) with anal incontinence. No mesh infection was noted and no mesh was removed during the study period.

Discussion

In open surgery, a partially absorbable low-weight mesh placed in a sublay position at the index operation has reduced the risk of developing a parastomal hernia. Apart from two randomised trials, there are several non-randomised reports of a low rate of parastomal hernia with the use of a prophylactic mesh [15–17]. The rate of herniation with stomas formed by a laparoscopic technique has, without presenting the definition of parastomal hernia used at follow-up, been reported in very small series and with follow-up within less than 12 months [9]. Thus, the rate of parastomal hernia after laparoscopic stoma formation without a prophylactic mesh being used is not known.

There is, though, hardly any reason to assume the rate of herniation to be lower with a laparoscopic technique than with an open technique. A novel technique was, therefore, developed for placing a prophylactic mesh in laparoscopic surgery as well. The method was very standardised and was employed similarly by all three surgeons. The technique was easy to learn and with no technically difficult steps.

The method developed demanded no further skin incisions than the circular excision for the stoma, thus, retaining all of the benefits of laparoscopic surgery. Standard port settings and standard laparoscopic dissection was utilised. A prophylactic mesh could be placed in all patients.

In 25 patients, one stoma necrosis demanding reoperation and two minor wound infections occurred. The stoma necrosis was not related to the mesh but to the mobilisation of the bowel damaging the blood supply to a large segment of the sigmoid colon and the stoma had to be resited during an open operation.

Infection of the mesh, fistula formation or strictures did not occur and no mesh had to be removed. Placing the mesh in a sublay position was probably an important factor for this outcome. The mesh was placed entirely outside of the abdominal cavity and the bowel was in contact with the mesh only as it passed through the opening cut in the mesh. Another important factor was probably the choice of a light-weight, large-pore mesh, associated with a low degree of inflammatory response.

At follow-up, parastomal hernia was present in 3 of 20 patients (15%). In patients with herniation present, follow-up was continued for two years or more. Thus, the herniation rate may represent a somewhat higher figure than the actual rate after 12 months, as parastomal hernia rates will increase for several years [13]. In patients with parastomal hernia detected, recognised risk factors for herniation were present—old age, female gender and neurological disease with possible atrophy of the abdominal wall [7]. A prophylactic mesh at the index operation produced a similar rate of parastomal hernia with a laparoscopic technique as the rate found with an open technique [12]. It is probably sound to assume the rate of herniation to be similar with a laparoscopic and an open standard technique without a mesh. As this was not a randomised trial, it cannot be deduced, though, that a prophylactic mesh reduces the rate of herniation in laparoscopic surgery also.

Results with a prophylactic mesh in an onlay position [16] as well as a mesh specially designed for an intraperitoneal placement consisting of a flat portion and a funnel arising [15] have also been reported. The results seem similar, although a direct comparison is not possible because the time to follow-up was shorter than in the present report. A higher rate of parastomal hernia has been reported in some studies with a computed tomography

(CT) scan added to the clinical examination at follow-up [7]. The relation between herniation rates with the present clinical definition and the rate detected with a CT scan is currently being studied in our department. It might be argued that, by cutting the mesh, it loses some of its stability, as this has been the case when sutures are placed close to the cut edge of the mesh. This effect may not be as crucial, however, when a cross is cut in the centre of the mesh without sutures, since a prophylactic mesh utilised in this fashion reduces the rate of parastomal hernia from 81 to 13% 5 years after open stoma formation [13].

It is concluded that, in laparoscopic surgery, a prophylactic partially absorbable low-weight, large-pore mesh can be placed in a sublay position at the index operation. This produces low rates of parastomal hernia and complications which are similar to those found with a prophylactic mesh utilised in open surgery.

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