Diseases of the Colon & Rectum

Original Contributions

Laparoscopic Repair of Parastomal Hernias: A Single Surgeon's Experience in 66 Patients

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INTRODUCTION: The repair of parastomal hernias represents a surgical problem with high complication and failure rates. A basic principle is the necessity of mesh-based techniques. The study was performed to evaluate a laparoscopic approach, primarily based on the intraperitoneal on lay mesh technique. METHODS: Sixty-six patients with a symptomatic parastomal hernia were enrolled in the prospective study between November 1999 and February 2006. After complete adhesiolysis, the mesh was introduced to cover the fascial defect of the hernia and the original midline incision. In special cases, a two-mesh technique was used. First, an incised mesh was placed around the stoma sling. The second mesh was used to cover the abdominal wall with the first mesh; the stoma sling was placed between the two meshes for at least 5 cm. RESULTS: The two-mesh technique proved to be superior in terms of recurrence rate especially in cases with a lateral fascial defect. CONCLUSIONS: The laparoscopic repair of parastomal hernias is a surgically challenging procedure with promising results when using the two-mesh technique. Therefore, two meshes should be used in all cases of parastomal hernias. Polyvinylidene fluoride was revealed to be the most suitable material for the sandwich repair in terms of possible ingrowth and infection resistance. [Key words: Laparoscopy; Colostomy; Ileostomy; Parastomal hernia; Mesh]

Parastomal hernias are common problems after ostomies.[1–5] The frequency is so high that sometimes it is no more regarded as a complication of the procedure itself. Patients suffering from parastomal hernias may develop acute problems, such as incarceration or obstruction, as well as difficulties with handling of the stoma, which may exclude these patients from social activities. The surgical approaches include local repair by suture, stoma relocation, and mesh-based techniques. Suturing the fascial gap will lead to recurrence as shown for parastomal and incision hernias.[1,6,7] The relocation is again followed by herniation at the new stoma site as well as at the original gap.[7] These disappointing results are based on the fact that parastomal and incision hernias represent a biologic disease rather than a simple mechanical rupture.[5,8,9] Therefore, only mesh-based techniques proved to be effective in terms of reducing recurrence rates to sometimes less than 10 percent at least in cases of incision hernias.[10–15] However, wound complications occur in up to 30 percent.[12,16] For incision hernias, the laparoscopic approach using the intraperitoneal onlay mesh (IPOM) technique is clearly shown to be superior compared with the open techniques concerning the infection rate.[17,18] In 1985, Sugarbaker[19] described an open IPOM-technique for the repair of parastomal hernias with no recurrence. Similar promising results were published by Stelzner *et al.*,[20] using a comparable open technique. LeBlanc *et al.* and other authors described between 2000 and 2005 some small series of patients treated laparoscopically with different techniques.[21–25] This prospective study was designed to evaluate the original IPOM-technique described by Sugarbaker performed laparoscopically by a single surgeon.

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PATIENTS AND METHODS

Since November 1999, every patient with a symptomatic or rapidly growing parastomal hernia was treated laparoscopically. Sixty-six patients were enrolled in a prospective study until February 2006. Until April 2004, ePTFE-meshes (Dual mesh; W. L. Gore *et al.*, Flagstaff) were generally used. Since May 2004, a real mesh structure made by polyvinylidene fluoride (PVDF), 88 percent, with a small amount of polypropylene (PP), 12 percent, on the parietal side (Dynamesh-IPOM, FEG-Textiltechnik, Aachen, Germany) was exclusively used. It is a noncoated synthetic textile structure of two components (PVDF and PP), which is warp-knitted as an open-pore monofilament mesh. More than 80 percent of the pores are >1 mm. The weight amounts to 60 g/m^2. PVDF, a highly fluorinated polymer, prevents adhesions between the intestine and the mesh, whereas PP enables incorporation of the mesh by tissue ingrowth from the parietal side.[26]

Surgical Procedure

The one-mesh technique was originally described by Sugarbaker[19] and was adopted to the laparoscopic approach. The pneumoperitoneum was established by using the Verres-needle in cases of untouched right or left subcostal area. In all other cases, a mini laparotomy was performed and the first trocar (10 mm) was placed under direct vision. Two to three more trocars were inserted in the flank opposite the stoma and in the left subcostal area, again under visual control with a 30° optic routinely used throughout the procedure. The complete adhesiolysis of the abdominal wall was performed only by sharp dissection without any energy-driven devices. Figure 1a shows the parastomal fascial gap completely freed from greater omentum and intestine usually protruding into the hernia. The hernia sac is left in place. Fatty tissue, such as the falciform ligament, was removed as well as the space of Retzius was opened to provide safe fixation of the mesh at the costal arch and the symphysis and pubic bones, respectively. The mesh was marked with nonresorbable stay sutures at the corners and between them and introduced in the abdominal cavity by a 10-mm trocar. The ventral abdominal wall with the fascial gaps of the stoma site and the original incision was covered by one mesh placing the stoma loop between mesh and abdominal wall providing a 5-cm channel to the flank. The two-mesh technique, or sandwich technique, is based on a usually 15-cm×

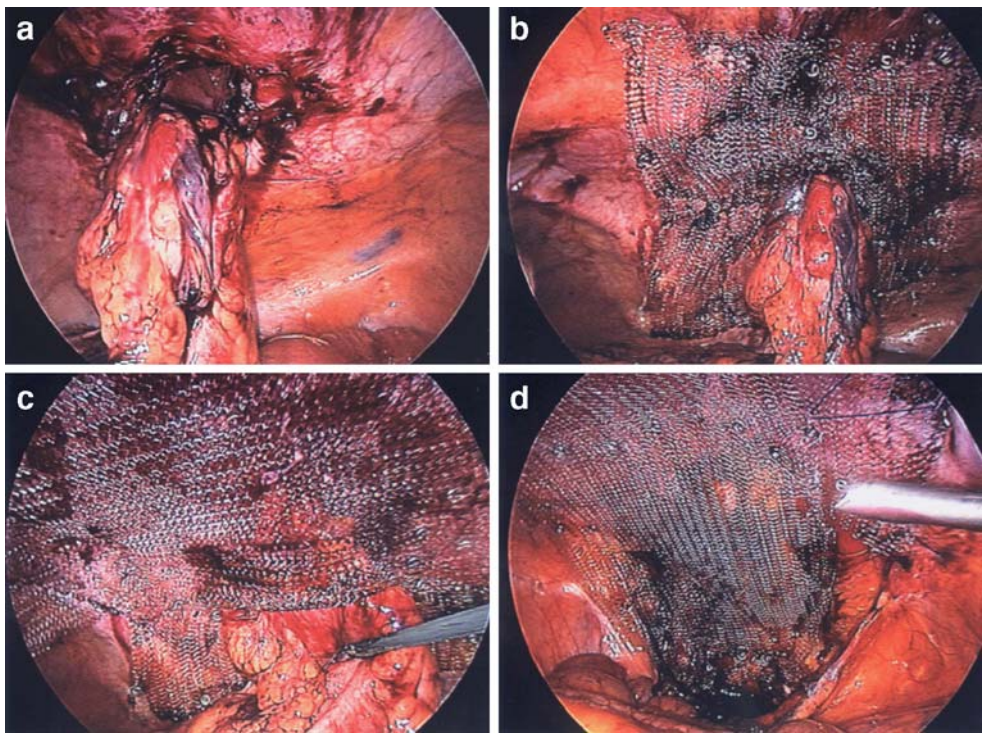

Figure 1. The fascial defect (a) was shown as well as the first (b) and the overlying mesh (c). A further mesh is used for overlap down to the space of Retzius (d).

15-cm mesh incised to the center, leaving a gap of 2 cm. This mesh was wrapped around the stoma loop covering the fascial gap with the intact part. The incised parts of the mesh were medially closed by two transfascial sutures and spiral tacks, which also were used for the complete fixation of the meshes (Fig. 1b). A further mesh with nonresorbable stay sutures at the corners and between them covered the first mesh and the whole abdominal wall. The stoma loop was placed between both meshes providing the desired lateralization of at least 5 cm (Fig. 1c). Routinely the original incision and the fascial gap around the stoma were covered by the mesh, which should reach the preperitoneal space of Retzius. Sometimes a further mesh is needed for that overlap (Fig. 1d).

RESULTS

Between November 1999 and February 2006, 40 female and 26 male patients underwent a laparoscopic repair of a parastomal hernia. In one patient access to the abdominal cavity was not possible and the procedure was continued conventionally. The conversion rate was 1.5 percent. Twenty-two of 66 patients suffered from recurrent hernias after up to 12 previously failed repairs. Sixty-two patients also had a concomitant incision hernia. In seven patients, the parastomal hernia developed around an ileostomy after proctocolectomy, in one patient around an ileum conduit, in one patient around a colostomy and an ileum conduit, and in 57 patients around a colostomy. Forty-one patients were treated according to the original method of Sugarbaker with a single ePTFE-mesh (Dual mesh). Since May 2004, a real mesh structure made by polyvinylidene fluoride (Dynamesh-IPOM) was available. The subsequent 25 patients underwent a modified procedure with two meshes. Further demographic and surgical data are summarized in Table 1.

The median follow-up was 24 months (range, 3–72) months. Eleven patients died during the follow-up because of unrelated reasons.

Recurrences were observed in eight patients corresponding to an overall recurrence rate of 12 percent. One patient underwent emergency laparotomy nine months after the original repair with an ileus, which was caused by interenteric adhesions independent from the mesh. The suture used for closing the mesh broke down and a giant incisional and parastomal hernia developed, which was repaired laparoscopically again. Three years later, there is no hint of any re-recurrence. The seven remaining patients developing a lateral recurrence had in common a primarily lateral defect of the fascia. One patient was retreated laparoscopically with one mesh and developed a further recurrence. Three other patients were successfully treated by the sandwich technique, whereas three further patients did not accept any surgical therapy. Since the introduction of the sandwich technique in the last 25 patients, no recurrence has been observed up to now. The median follow-up in that subgroup was 12 months.

Suspected infectious complications occurred in three patients. The intraperitoneally placed meshes were laparoscopically removed as a result of suspected infection in two patients but revealed sterile by bacteriology. Both patients were successfully retreated by laparoscopy. A major abscess developing in the hernia sac was opened in the third case and treated by VAC therapy. The mesh (polyvinylidene fluoride) was left in place and the wound could be closed after two months.

One patient, after the Sugarbaker technique, underwent laparotomy at Day 4 because of a paralytic ileus with uneventful further course. Anoth-

Table 1.
Demographic and Surgical Data

	Median	Minimum	Maximum
Age (yr)	70	34	92
Body mass index	28.2	19.8	40
Hernia size (cm2)	121	9	755
Mesh size (cm2)	623	84	1425
Operating time (min)	115	65	230
Postoperative Hospital stay (days)	10	5	67

er patient, again after Sugarbaker repair, developed a mechanical obstruction because a small-bowel loop slipped between mesh and abdominal wall as a result of a dislocated tack. He was treated by conventional revision and fixation of the mesh.

Two patients primarily treated by the sandwich technique developed a stoma obstruction. In both cases, the subcutaneous part of the stoma loop was very long, forming a lateral siphon-like curve. The fixation of the intra-abdominal part of the stoma loop between both meshes squeezed the bowel loop leading to a stenosis. One patient with underlying Crohn's disease underwent a local revision of the stoma with shortening the subcutaneous part, but unfortunately the intra-abdominal part was digitally perforated. A laparotomy was necessary with further shortening of the stoma loop and new insertion at the original place through the meshes. The postoperative course was complicated by a deep wound infection at the laparotomy and the stoma site, which was successfully treated by VAC therapy. The meshes could be preserved. The other patient underwent a local revision with shortening of the stoma loop at the third postoperative day followed by an uneventful course.

DISCUSSION

As outlined above, parastomal hernias are a challenging problem of hernia repair. Discouraging results of open techniques in terms of morbidity and recurrence rates[10–15] imply a laparoscopic IPOM repair, which is definitely associated with lower infection rates and overall morbidity than open procedures in cases with incision hernias.[16–18] Also the recurrence rates of laparoscopic incision hernia repair are at least as good as those obtained after open sublay techniques.[17,18] The laparoscopic adaptation of the open IPOM-technique originally described by Sugarbaker[19,20] seems to be a logical consequence. In the literature some minor series have been published dealing with the laparoscopic repair of parastomal hernias.[21–25] Urologic and enteric ostomies were included, and different techniques were used. However, the main limitation was the small number of patients included in the studies, which rarely exceeded ten patients. Therefore, a clear statement about the real value of the laparoscopic approach is impossible. However, most studies dealing with the open repair also suffer from small patient numbers and do not allow any evaluation or even a recommendation of the most suitable technique.[5,10–15] The same is true for the very recent description of the relocation of the stoma with a prophylactic mesh and the mesh-based repair of the original defect by Israelson,[27] implying the weakening of a second quadrant of the abdominal wall. Our primary goal, however, is preserving the stoma at its original site as long as possible, preventing weakening of further quadrants of the abdominal wall.

The present series comprises 66 patients with a median follow-up of 24 months. The original technique exactly followed the suggestions of Sugarbaker.[19] In contrast to the original results and those published by Stelzner *et al.*,[20] the recurrence rate in our early series was high. All patients who experienced recurrences had in common a laterally localized fascial defect. Patients with a medial defect did not develop a recurrence. Lateralization of the stoma loop, which is a crucial step of the Sugarbaker repair, implies that the lateral defect is covered by the stoma loop underlying the mesh. Obviously the defect was not stabilized and could grow laterally, which led to the lateral recurrence. We concluded that the lateral defect must be covered with a mesh providing ingrowth and stabilization of the abdominal wall. An incised mesh placed around the stoma loop and covering the lateral defect with the intact part of the mesh revealed to be effective. A second mesh was further inserted as originally described. The defect can be repaired and the crucial lateralization of the stoma loop is provided. However, a precondition of such a sandwich repair is the availability of a mesh with a major porous structure providing real incorporation by tissue growing through the pores.

In 25 patients who underwent the sandwich repair with Dynamesh-IPOM, we did not observe any recurrence. However, patients treated by the sandwich technique have been followed up only for 12 months compared with 24 months in the one-mesh group. All recurrences were detected during the first year after the repair. Therefore, it seems to be improbable that the sandwich technique will be associated with a comparably high recurrence rate. Although the original one-mesh technique may be sufficient for medially localized defects, it has been completely displaced by the sandwich technique because the latter proved to be effective and safe in all cases of parastomal hernias. The availability of a real mesh material, such as Dynamesh IPOM® (polyvinyli-

dene fluoride) provides incorporation of overlapping meshes, which is impossible for ePTFE meshes. To our knowledge, there is no information available concerning the behavior of overlapping covered polypropylene meshes. Furthermore, the shrinkage of ePTFE and polypropylene is more pronounced so that an incised ePTFE or polypropylene mesh placed around the stoma loop may lead to a stenosis in the long term.[28,29] Polypropylene meshes in direct contact with the viscera are known to erode the bowel producing enteric fistula.[30] Therefore, the mesh material is a crucial point for laparoscopic repair of parastomal hernias.

A further question concerns the use of spiral tacks for mesh fixation. Few reports demonstrate the occurrence of bowel lacerations as a result of that kind of mesh fixation.[31,32] However, the rate of such a complication seems to be negligible compared with the widespread use in most cases of laparoscopic repair of incision hernias. In our experience since 1999, comprising almost 800 patients with ventral (no inguinal) hernias, adverse effects have not been observed.

The present series demonstrates the superiority of the laparoscopic approach to the open techniques concerning the rate of infections and wound complications. One patient with suspected mesh infection had an infected subfascial mesh after previous open repair that had eroded the stoma loop. One patient was operated on again because of strong pain and suspected mesh infection. In both cases, the intraperitoneal mesh was revealed to be sterile. Only one primary infection occurred, which was successfully treated by vacuum therapy. One secondary infection also could be treated by VAC therapy. In both cases, the mesh (Dynamesh-IPOM) could be preserved, whereas infected ePTFE-mesh must be removed as it has been shown after laparoscopic incision hernia repair. Obviously, the promising results concerning the reduced wound complication rate after laparoscopic incision hernia repair[17,18] also are true for cases with parastomal hernias.

The main morbidity of the sandwich technique is clearly represented by two cases of stenosis. A long subcutaneous stoma loop producing a laterally extended siphon led to a stenosis at the fascia because the bowel coming from laterally must bend laterally at the fascial edge. Therefore, in the future we will primarily correct the lengthened stoma loop in the subcutaneous tissue during the laparoscopic repair.

CONCLUSIONS

The laparoscopic repair of parastomal hernias should be performed with the sandwich technique by using the most inert and infection-resistant material available today, which is polyvinylidene fluoride.

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