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Case Report

Diverting transverse colostomy in a midline incision, a case report

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ABSTRACT

A diverting ostomy to increase the safety or treat complications of a colorectal anastomosis is a time honored surgical procedure. Most surgeons choose to construct a diverting loop ileostomy. Under some clinical conditions a diverting transverse colostomy may be advantageous. The transverse colostomy may be placed in the midline abdominal incision.

A patient who required an emergency fecal diversion on his 19th postoperative day had a loop transverse colostomy through the midline abdominal incision. A diverting loop transverse colostomy was performed with ease. The transverse colon crossed the abdomen at the level of the apex of the midline abdominal incision. It was brought to the skin level with minor dissection and exteriorized by a plastic rod. Construction of a diverting loop ileostomy was not possible because of extensive adhesions from multiple prior surgeries.

When a diversion of the fecal stream is needed in a patient with extensive adhesions, a loop transverse colostomy in the apex of a midline incision should be considered. This procedure has not been previously reported.

1. Introduction

Diverting the lower gastrointestinal tract using an ileostomy or colostomy is a time honored surgical procedure. The diverting ostomy can be placed at the time of a low colorectal anastomosis in order to prevent or mitigate the adverse events associated with a colorectal anastomotic leak. Also, it may be required when anastomotic insufficiency has been demonstrated and fecal diversion is used to allow healing of the anastomotic site in the absence of progressive pelvic or intraabdominal sepsis. In most instances, the prophylactic or therapeutic fecal diversion occurs using a loop ileostomy which is placed on the right side of the abdomen. A mound of skin and subcutaneous tissue is selected as an optimal site for the ostomy placement. If a therapeutic diverting ostomy is needed in a patient with extensive adhesions several weeks after a colorectal anastomosis, elevation of the terminal ileum to the anterior abdominal wall may be difficult or impossible. In this situation alternative sites for fecal diversion must be considered for a safer and less invasive procedure.

In this manuscript we report the use of the mid-transverse colon through the superior aspect of a midline incision as a successful diverting ostomy in a patient with demonstrated colorectal anastomotic insufficiency. The addition of this type of ostomy placement to the limited options available can prevent problematic consequences as a result of technical difficulties. This manuscript was constructed in compliance with consensus-based surgical case report guidelines (SCARE) [1]. This case report is registered as first-in-man study on the www.researchregistry.com website with UIN 4433.

2. Presentation of case

A 43-year-old man was diagnosed with a ruptured appendicitis on March 21, 2016. This was drained percutaneously and treated with systemic antibiotics. On March 30, 2016 he was taken to the operating room for a laparoscopic appendectomy. The appendiceal mass was surrounded by mucoid material that involved the greater omentum, small bowel and small bowel mesentery. A laparotomy and a right colectomy was performed. Pathology showed a moderately differentiated adenocarcinoma of the appendix. Zero of 13 lymph nodes were positive for cancer. The patient was placed on the chemotherapeutic agent capecitabine. Over the course of the next 9 months, the patient's CEA assay increased from normal to 37. A CT performed on March 26, 2017, revealed a mass associated with loops of small bowel. A colonoscopy was negative.

With a diagnosis of peritoneal dissemination of a recurrent malignant mucinous appendiceal neoplasm he was again taken to the operating room on May 17, 2017. An 8-h procedure required a

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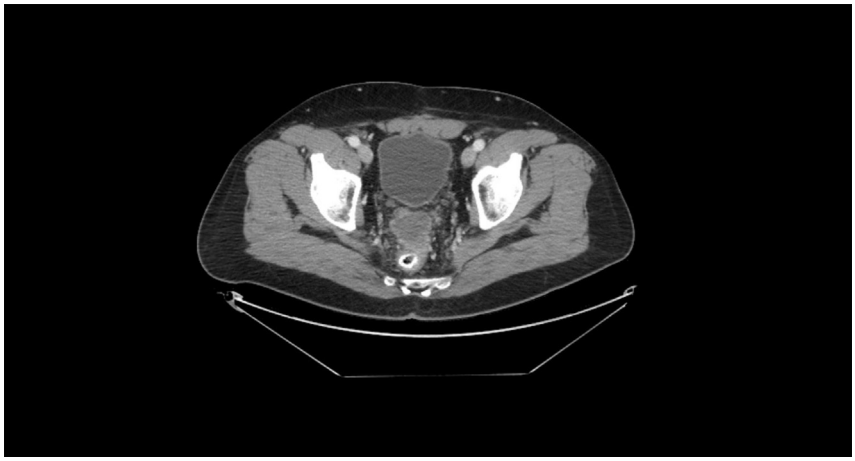

Fig. 1. CT slice through the mid-rectum showing a 6 cm mass immediately adjacent to the anterior aspect of the mid-rectum and infiltrating the seminal vesicles.

greater omentectomy, small bowel resection with anastomosis, and hyperthermic intraperitoneal chemotherapy (HIPEC) with mitomycin C, doxorubicin, and intravenous fluorouracil with leucovorin [2]. At the time of this procedure an intraperitoneal port was placed [3].

Pathology from the cytoreductive procedure showed mucinous adenocarcinoma in the laparoscopic port sites, in the resected portion of small bowel, in the greater omentum and in a cancer nodule invading the jejunum. All margins were negative. The cancer had infiltrated full thickness into the lumen of the small bowel. The patient received early postoperative intraperitoneal 5-fluorouracil chemotherapy [4]. He also received adjuvant treatment consisting of intraperitoneal 5-fluorouracil through his intraperitoneal port combined with systemic oxaliplatin [2].

Over the course of the next year, his CEA again began to elevate reaching level of 119.1 ng/ml. CT scan on May 16, 2017 showed a normal liver, abdomen, and pelvis except for a mass in its greatest diameter, intimately associated with the mid-rectum and invading the seminal vesicles (Fig. 1).

On March 14, 2018 the patient underwent a third operative procedure. The abdomen and pelvis showed no residual peritoneal metastases except deep in the rectovesical space. A resection of pelvic peritoneum, rectosigmoid colon, and the seminal vesicles was required in order to achieve a complete cytoreduction [5–7]. At the time of this surgery no HIPEC was used. A colorectal anastomosis at the junction of middle and lower rectum was performed using a second layer of silk sutures covering the stapled anastomotic site [8]. A diverting ostomy was not placed.

Postoperatively, the patient recovered well for 17 days but then developed feculent drainage from a closed suction drain that had been placed at the time of surgery in the pre-sacral space. Because the patient was afebrile with a normal white count, it was thought that conservative management of the colorectal anastomotic leak was possible. A CT scan demonstrated a small amount of air in the perirectal space posteriorly and minimal contrast extravasation from the rectum at the posterior aspect of the colorectal anastomosis. The patient was treated conservatively but on repeat CT scan performed on April 2, 2018 free air was seen within the subcutaneous space above the old abdominal incision around the spleen and beneath the liver. Although the patient was stable, it was thought that the conservative management of the colorectal anastomotic leak had failed. He was taken back to the operating room on April 2, 2018. His midline abdominal incision was reopened. Purulent material was suctioned out of the pre-sacral space and copious irrigation of the abdomen and pelvis was performed. The small bowel was fixed in place by extensive adhesions. Mobilization of the distal small bowel to perform an ileostomy at 19 days after the extensive pelvic surgery and after right colon resection was thought to be impossible. Additional drains were placed, especially in the presacral space. A diverting transverse colostomy

Fig. 2. Diverting transverse colostomy at the apex of the long midline abdominal incision. The incision beneath the ostomy has healed well without a wound infection.

Table 1
Credits and debits of a diverting loop transverse colostomy.

Credits	Debits
Small bowel dissection and elevation not required	Peristomal wound infection
No additional incision for ostomy construction or closure	Possible damage to marginal artery along transverse mesocolon as bowel is elevated
No possibility of a hernia at ileostomy closure site	
Less volume of ostomy output	

was brought out through the top of the midline abdominal incision with the colon being placed over a plastic rod. Minimal dissection was needed to elevate the transverse colon up to the skin level. The abdomen was closed in a routine manner and the ostomy matured around the plastic rod. An ostomy appliance was carefully positioned in order to avoid leakage of colonic contents onto the midline abdominal incision (Hollister Premiere Drainable Pouch #8631, 2 ½ inch, Hollister Inc., Libertyville, IL).

Fig. 2 shows the transverse colon exteriorized at the top portion of the midline abdominal incision. The picture was taken on the 10th postoperative day. Following placement of the ostomy the patient's postoperative course was uncomplicated. He was maintained on antibiotics. The presacral drains were not removed until the 14th postoperative day because of persistent purulent drainages.

The patient's colostomy has not been closed. He required intermittent catheterization for a neurogenic bladder for 3 months postoperatively, but has now returned to normal urinary tract function and is being maintained on Tamsulosin. Complete erectile dysfunction as a result of resection of the seminal vesicles persists [6].

Comment: In this patient the original plan was a right lower quadrant diverting loop ileostomy. However, because of the late abdominal re-exploration (19th postoperative day) and the prior right colon resection and prior HIPEC, the adhesive process within the right lower quadrant was extensive. Efforts to dissect small bowel loops to bring out a diverting loop ileostomy at that site were not possible. The transverse colon was an easily accessible alternative choice for fecal diversion in this patient.

3. Discussion

In most instances fecal diversion after a low colorectal anastomosis is performed using a loop ileostomy in the most terminal portion of the ileum. In most cases, this provides for a complete fecal diversion and can be closed weeks or months postoperatively to restore normal bowel function. In some patients, especially those who have had extensive prior surgery and require a therapeutic fecal diversion because of a leaking colorectal anastomosis, the area of the terminal ileum may be difficult or impossible to access and to dissect out and exteriorize a single loop of small bowel. Also, the mesentery of the small bowel may be foreshortened and elevation of the distal ileum towards the abdominal wall may cause extensive trauma. In our patient the ready access of the transverse colon for ostomy placement was extremely obvious. The ostomy was placed without difficulty and without having to dissect the bowel extensively from the midst of an extensive postoperative adhesive process. In the patient presented construction of the transverse loop colostomy that avoided the struggle associated with an attempt to create the loop ileostomy, was a superior ostomy type. To our knowledge, a loop colostomy placed at the apex of an abdominal incision has not been previously reported.

The major contraindication to placing an ostomy through a midline incision is possible contamination of that incision immediately beneath the ostomy by fecal material. Careful placement of the ostomy appliance which has a non-rigid faceplate can prevent this potential surgical site infection. Also, use of an adhesive material on the skin is helpful. In this patient the midline abdominal incision healed without infection around the ostomy or along the long midline abdominal incision. Also, closure of the ostomy may be simplified with easy access to proximal and distal portions of the colon through the midline incision. In performing this ostomy, no additional incisions were necessary and the possibility of a hernia at the ostomy site may be reduced. Table 1 itemizes the potential credits and debits of a diverting ostomy in the transverse colon at the superior aspect of a midline abdominal incision.

An advantage of a transverse colostomy as compared to an ileostomy may be the reduced volume of ostomy drainage. Even though only a short portion of colon is proximal to the ostomy, water absorption will occur and thereby reduce the possibility of dehydration. The semi-formed stool from a colostomy as compared to liquid small bowel contents may be an additional advantage of the colostomy.

The transverse loop is elevated to the skin level. Care must be given not to damage the marginal vessels (marginal artery of Drummond). If the inferior mesenteric artery was resected as part of a radical left colon resection, the vascular supply to the descending colon may be limited to the marginal artery. Damage to this vessel could result in necrosis of the colon distal to the colostomy site.

Several retrospective studies to compare the utility of a transverse colostomy to a loop ileostomy have been reported. No prospective and randomized data is available for comparison of these two ostomies. Rutegard and Dahlgren retrospectively evaluated 29 transverse colostomies as compared to 32 loop ileostomies. Indications for a diversion were similar in the two groups. Using pertinent clinical features, these authors were not able to find significant differences between the two groups of patients. They comment that complications associated with diverting ileostomy appeared to be more serious than following transverse colostomy [9].

Another study performed by Armendariz-Rubio and coworkers was a literature review to compare these two stomas from construction to closure [10]. They found that a superiority of one diverting stoma over the other could not be established. They suggested that ileostomy may be better tolerated and may be technically easier to close.

Ethical approval

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Author contribution

Paul H. Sugarbaker, MD: study concept or design, data collection, data analysis or interpretation, writing the paper.

Conflict of interest statement

Paul H. Sugarbaker has no conflicts of interest to declare.

Guarantor

Paul H. Sugarbaker, MD.

Research Registration Number

Local IRB-approval for this case report was not required:

MedStar Health Institutional Review Board has determined that a case report of less than three (3) patients **does not meet the DHHS definition of research** (45 CFR 46.102(d)(pre-2018)/45 CFR 46.102(l)(1/19/2017)) **or the FDA definition of clinical investigation** (21 CFR 46.102(c)) and therefore are not subject to IRB review requirements and **do not require IRB approval**.

This case report is only of 1 patient.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this Journal on request.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijso.2018.11.007.

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