

Incorrect End Colostomy Formation Using the Distal Bowel Limb: A Rare but Serious Complication

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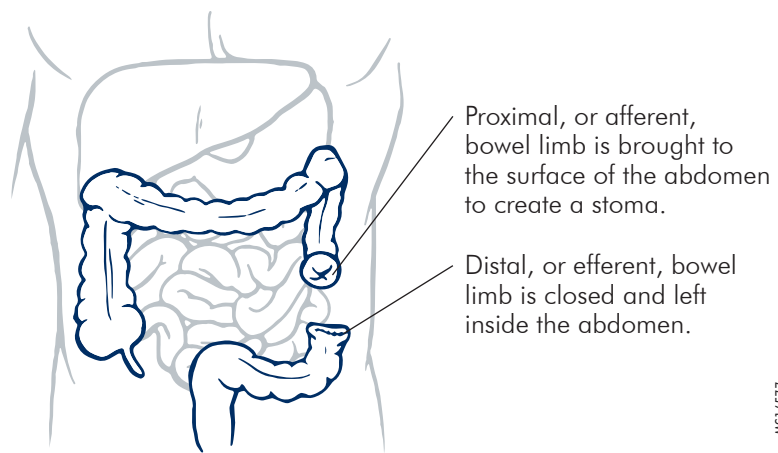
Colectomy and surgical formation of an end colostomy involves bringing the proximal, or afferent, bowel limb to the surface of the abdomen to create a stoma. The distal, or efferent, bowel limb is either removed, or surgically closed and left inside the abdomen (Figure). Failure to accurately identify the correct bowel segment intraoperatively results in incorrect end colostomy formation using the distal bowel limb to create a stoma. Closing the proximal limb creates a blind pouch, which results in bowel obstruction that requires surgical correction. The frequency of this complication is not established in the literature,^{1,3} but is believed to be rare.^{4,5} Still, this error warrants attention because it can result in serious harm to patients, at a minimum allowing exposure to the risk of undergoing an additional surgical procedure, and at a maximum leading to bowel ischemia, perforation, sepsis, shock, and death.⁶

“This is a technical error that is very easy to make if you are not paying attention, and it is the one error that no colorectal surgeon wants to make,”⁷ explained Steven Fassler, MD, Chief of Colorectal Surgery at Abington Hospital—Jefferson Health, and former president of the Pennsylvania Society of Colorectal Surgeons.

Colectomies can be performed using either an open or laparoscopic surgical approach. Laparoscopic colectomies have been steadily increasing since the 1990s, with nearly one-half of all colectomies in the United States performed using this approach.⁸ While this error can occur using either surgical approach, “It is much easier to make this mistake if you are performing the surgery laparoscopically,” said Fassler. “With an open case, you can visualize both ends. With a laparoscopic colectomy, it is easier to get turned around and pull up the wrong end.”

Strategies exist to prevent this complication, but even when steps are taken to ensure proper end colostomy formation, this error can occur. Because of this, postoperative physical assessment of the stoma site and bowel function is key to recognizing this error, and prompt intervention is vital to ensure a viable, properly functioning colostomy. Bowel sounds should return within 24 to 72 hours of surgery, and drainage of

Figure. Anatomy of Colostomy Formation



Note: This illustration shows a descending colostomy. Colostomies may be created at other points along the length of the colon.

ostomy effluent from a properly formed stoma should be seen within several days.⁹ Prolonged postoperative ileus (>36 hours) requires further evaluation.⁵

DATA OVERVIEW

Pennsylvania healthcare facilities reported eight events involving incorrect end colostomy formation using the distal bowel limb through the Pennsylvania Patient Safety Authority's Pennsylvania Patient Safety Reporting System (PA-PSRS) over a 10-year period, from January 2006 through December 2015. Five of these events have been reported in the most recent four years.

All events were reported as Serious Events resulting in temporary harm, requiring treatment or intervention, and/or prolonged hospitalization.

Three of the event reports indicate that the initial surgery was performed laparoscopically. The remainder do not indicate whether the colostomies were created using an open or laparoscopic approach.

Analysis of PA-PSRS event reports reveals variation in the time intervals between the initial colectomy procedures and subsequent surgical revisions. (See Table.)

The following is an example of an event reported through PA-PSRS.* Details included in the event-report narrative illustrate the harm to patients resulting from this complication and describe the physical assessment findings that helped the healthcare team to identify that this technical error had occurred:

Postoperatively, the patient's bowel function failed to resume and the abdomen became progressively distended. The patient developed fevers and hypotension prompting transfer to the intensive care unit. Diagnostic testing revealed that the distal rather

* The details of the PA-PSRS event narratives in this article have been modified to preserve confidentiality.

Table. Time from Initial Procedure to Surgical Revision for Colostomies Formed Using Distal Bowel, as Reported through the Pennsylvania Patient Safety Reporting System, 2006–2015

TIME INTERVAL	EVENTS
Less than 7 days	1
7 days	2
8 to 14 days	1
More than 14 days	1
Not specified	3
Total	8

than the proximal end of the colon was used to create the stoma. The patient was returned to the operating room for revision of the colostomy.

DISCUSSION

Primary and secondary strategies exist to prevent incorrect end colostomy formation using the distal bowel limb. Primary prevention strategies are those that can be taken intraoperatively to prevent the wrong bowel limb from being used to create the stoma, and secondary strategies are those that can be taken postoperatively to recognize that the error has occurred and intervene in a timely fashion to correct the problem.

Primary Prevention

Fassler emphasizes the importance of checking multiple times throughout the procedure that the proximal and distal limbs are accurately identified. "I usually identify the proximal and distal limbs at least six times during the procedure," he said. Fassler uses several different techniques to identify the distal and proximal bowel limbs intraoperatively. One is to make a mark on the distal limb using cautery. The second involves inserting a red rubber or urinary catheter into the distal limb, infusing fluid, and checking to see whether the fluid drains from the patient's anus. And the third option, used during a laparoscopic procedure,

is to leave the camera port in place, re-insufflate the abdomen, and re-insert the camera to perform a final check just prior to maturing the stoma.

Engaging other surgical team members to perform an independent double-check of the surgical site and mark is a principle encouraged by the Authority to prevent wrong-site surgery.¹⁰ Asked whether this could be done during this procedure, Fassler said, "I always have a second person scrubbed—another surgeon, a surgical resident, or a first assistant—in addition to myself and the scrub nurse. During the procedure I verbally say, 'This is the distal limb,' and ask if they agree. It is not part of a standardized protocol, but more of a common-sense conversation with the people involved."

Secondary Prevention

Postoperative physical assessment is key to recognizing that an end colostomy has been incorrectly formed using the distal bowel limb. Delayed recognition and failure to correct the resultant bowel obstruction in a timely fashion can result in serious harm to patients, up to and including death.⁶ Although no deaths were reported through PA-PSRS, it is concerning that half of the event reports describe situations in which the time that elapsed between the initial procedure and surgical revision was seven days or greater



(see Table). More information is necessary to understand why these delays occurred.

Reporting to Learn

Learning from event reporting is a fundamental patient safety principle¹¹ and the foundation of the Authority's work. Fassler agrees, explaining that he sees the value in reporting surgical errors such as the one described in this analysis. "Everyone thinks that reporting these errors and complications is punitive, but we need to report and talk about these situations so that we can learn from them and prevent this from happening to other patients." In fact, Fassler would encourage reporters to include as many details as possible, particularly in complicated cases. "Surgeons would like to know exactly what factors contributed to the mistake. Because what we are really trying to do is say 'Hey, I may be facing a similar situation in the future, and I want to know what I could do to prevent something like this from happening for me and my patient.'"

RISK REDUCTION STRATEGIES

The following are actions colorectal surgeons, nurses, and other surgical team members can consider to prevent and/or identify and correct this technical error:

- Maintain vigilance when completing the finer technical steps involved in stoma creation, and do not delegate this task to junior or inexperienced members of the surgical team without proper supervision.^{2,3}

- Ensure that novice surgeons gain proficiency in end colostomy formation through supervised direct clinical experience, including during laparoscopic training programs.⁵
- Mark the distal (or proximal) bowel limb intraoperatively using either a suture⁵ or cautery.⁷
- Use the same method and mark the same bowel limb (i.e., either proximal or distal) each time the procedure is performed.⁵
- Ask surgical team members to confirm identification of the proximal and distal bowel limbs whenever possible.⁷
- Before closing the distal bowel limb, insert a red rubber or urinary catheter into the distal limb, infuse fluid, and check to see whether the fluid drains from the patient's anus.⁷
- Toward the end of a laparoscopic procedure, reinsert the camera through the camera port, re-insufflate the abdomen, and check to ensure that the proximal bowel limb is being pulled up to create the stoma.⁷
- After closing the distal bowel limb, insert a flexible sigmoidoscope or colonoscope through the rectum to visualize the staple/suture line and confirm creation of a blind pouch.^{2,5}
- Once the stoma has been formed and opened at the end of the operation, instill water or air into the distal bowel limb through the rectum. If colonic contents are

expressed through the stoma, the colostomy has been incorrectly formed using the distal bowel limb.^{2,5}

- Monitor the patient postoperatively to confirm the return of bowel sounds within 24 to 72 hours and the production of ostomy effluent within the first several days.⁹
- Aside from absent or diminished bowel sounds and lack of ostomy effluent, assess the patient for additional signs and symptoms of bowel obstruction, including abdominal distension and pain.⁶
- In patients with postoperative ileus lasting more than 36 hours, consider instilling a contrast enema through the stoma to identify errors in colostomy formation or other causes for obstruction.^{4,5}

CONCLUSION

Incorrect end colostomy formation using the distal bowel limb is a technical error that is believed to occur rarely. Events in which this error has occurred have been reported to the Authority. Though rare, this error has the potential to result in serious harm to patients, up to and including death. Colorectal surgeons, nurses, and other surgical team members can take action to prevent this error from occurring and/or recognize the error and intervene in a timely fashion to protect patients from serious harm.

NOTES

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