Stoma Retraction in Super-Morbidly Obese Patient Leading to Class IV Midline Wound: A Cautionary Tale

Ryan D Morgan, BS\textsuperscript{1}\textsuperscript{,} Albin John, MBA\textsuperscript{1}, Brandon Youssi, BS\textsuperscript{1}, Shirley McReynolds, FNP-C\textsuperscript{1}, Yana Puckett, MD\textsuperscript{2}, and Catherine Ronaghan, MD\textsuperscript{1}

Abstract

Stoma creation is often necessary for fecal diversion in general surgery. The creation of stomas involves mobilization of either the large or small intestine through the abdominal wall to allow for the passage of waste that traverses the intestinal tract. Among the complications of stoma creation, particularly in obese patients, is stoma retraction, whereby the stoma retracts greater than 5 mm from the skin. This is often accompanied by extensive dermal dehiscence, which can lead to significant leakage resulting in infection. Here, we present the case of a super-morbidly obese female patient with an end ileostomy following total colectomy in which abdominal closure was not initially achieved. The stoma became retracted and dehisced leading to continued contamination of the open abdomen, necessitating multiple abdominal washouts. Injection of 300 units of botulinum toxin A (BTA) was administered into the abdominal wall muscles later the day of her index operation. An Abdominal Wall Reapproximation Anchor (ABRA) dynamic tissue system (DTS) was utilized successfully in subsequent operations for primary myofascial closure. Heavy continuous contamination of the midline wound through the subcutaneous cleft between the retracted ileostomy and midline surgical wound was treated with intensive wound care, strict bed rest, nothing to eat or drink (NPO), and total parenteral nutrition (TPN). Post-operative stoma complications occur frequently, and stoma retraction is commonly encountered, especially in the obese. The patient presented in this case study had multiple risk factors which led to a complicated treatment course. Successful primary myofascial closure and complete healing of the midline surgical wound highlights the importance of a patient-tailored multimodal approach.

Keywords

ABRA, stoma retraction, botulinum toxin A, obese, open abdomen

Introduction

A stoma is the mobilization of a segment of large or small bowel externally through the abdominal wall. Surgeons often create stomas following major abdominal surgeries as it allows fecal contents to exit the gastrointestinal tract diverting flow from diseased or resected bowel. While some stomas can be permanent, some are temporary, allowing recent anastomoses to heal. The 2 most common types of stomas are ileostomies, in which the small intestine is mobilized for stoma creation, and colostomies, in which the colon is utilized.\textsuperscript{1-3}

An ideal stoma site is bounded by the anterior superior iliac spine, pubic tubercle, and umbilicus. When placing the ostomy, the site should be located greater than 5 cm from the edge of any large incisions. Stoma creation generally has a complication rate between 30% and 70%, leading to increased overall patient morbidity and decreased quality of life.\textsuperscript{3,5}

One of the most frequently encountered complications following the creation of a stoma is retraction. A stoma is considered retracted when the mobilized bowel is sitting beneath the skin by greater than 5 mm, leading to infection from the spillage of enteric contents into the subcutaneous tissue. Stoma retraction is seen more frequently in obese populations due to traction placed on the bowel wall from a large, heavy pannus and decreased bowel mobilization as a
result of fatty foreshortened mesenteries. Studies show that patient body mass index (BMI) is an independent predictor of postoperative stoma complications.3,6,7

Case Presentation

Here, we present a 52-year-old woman with a medical history of morbid obesity (BMI) 58 kg/m², diverticulitis, and a surgical history of tubal ligation presented with abdominal pain and peritonitis. Abdominal computed tomography (CT) imaging noted a moderate amount of free air in the anterior abdomen, suspicious of bowel perforation. The patient was taken for an exploratory laparotomy during which ischemic bowel, involving the entire right colon and proximal transverse colon, was identified. The free air was secondary to a cecal perforation. Due to the patient’s hemodynamic instability, an extended right hemicolecctomy was performed. The bowel remained in discontinuity and the skin was temporarily whip stitched closed. Subsequent abdominal reoperations identified a colonic mass adherent to the uterus. The patient ultimately underwent a total colectomy with the creation of an end ileostomy. Afterward, the patient developed an acute incisional hernia with loss of domain.

A total of 300 units of botulinum toxin A (BTA) was injected into the abdominal oblique and transversus abdominis muscles bilaterally to temporarily chemically paralyze/weaken the flat muscles to aid in primary myofascial closure. This injection was done in a sterile manner at the bedside in the surgical intensive care unit (SICU). The patient was draped in the normal sterile fashion and 1% lidocaine was utilized as a local anesthetic. Using ultrasound guidance, a 20-gauge spinal needle was advanced into the abdominal flat muscles (external obliques, internal obliques, and transversus abdominis muscles) and 50 units of BTA were injected into each muscle. This was performed bilaterally for a total of 300 units injected.

Since the index operation, the patient had a difficult postoperative course, whereby she returned for an end ileostomy with an unsuccessful abdominal wall closure. There was subsequent removal of the adnexal mass without hysterectomy, ileostomy revision, and the installation of an Abdominal Wall Reaproximation Anchor (ABRA) dynamic tissue system (DTS). During the patient’s surgical course, a 100% mucocutaneous dehiscence and retraction at the ostomy site was appreciated secondary to the heavy pannus lateralizing the patient’s abdominal wall as seen in Figures 1 and 2.

Secondary to the stomal mucocutaneous dehiscence and retraction, heavy wound contamination of the large midline wound was noted as seen in Figures 3 and 4. The patient’s heavily contaminated, large open abdominal wound was successfully closed via a multimodal approach that included the use of BTA in combination with ABRA DTS which facilitated primary myofascial closure. Following definitive abdominal closure, the patient remained in the hospital for 70 days. This extended hospital stay was due to continuous enteric contamination of the midline wound. With time, extensive wound care, bed rest, nothing to eat or drink (NPO) status, and total parenteral nutrition (TPN), the subcutaneous cleft between the retracted ileostomy and midline wound healed. The ileostomy could then be adequately isolated eliminating ongoing wound contamination. The patient was
Morgan et al

discharged home with a wound that was manageable by her family. Her wound healed completely, and she returned to work. As of a CT obtained 5 months from her initial presentation, her midline myofascial closure is intact with no evidence of midline incisional hernia; however, she is developing a peristomal hernia.

Discussion

Suboptimal stoma setting secondary to abnormal skin folds in obese patients can lead to stoma retraction.7 In the non-emergent scenario, there is ample time for appropriate setting of the ostomy; however, in the emergent scenario, often there is not enough time for such considerations. Furthermore, anatomical landmarks used for ostomy placement are often obscured in obese patients.3,6

Stoma retraction is a postoperative complication by which the matured segment of the intestine is pulled below the surface of the skin by more than 5 mm.4 Stoma retraction is often caused by tension placed upon the mucocutaneous junction. Studies have shown that stoma retractions occur in 32.2% to 40.1% of cases. Stoma retractions can lead to enteric content leakage into the subcutaneous tissues, which can cause an infection of the open wound, skin irritation, and higher overall morbidity.2 Studies have demonstrated that a panniculectomy following stoma retraction can be a successful method of managing the retraction when paired with a local revision of the stoma. Removal of the large pannus decreases the length of skin and underlying fat traversed by the mature bowel. This decreases the tension placed upon the bowel and improves the siting of the stoma. It should be noted that multiple plastic surgeons were consulted on this case though none thought a panniculectomy was feasible.5,8

In addition to the management of stoma retraction, achieving definitive abdominal wall closure in patients with large open abdominal wounds can significantly reduce morbidity and mortality.9 Injection of BTA into the lateral abdominal muscles is a novel technique used as a treatment adjunct for primary myofascial closure of the open abdomen. In the absence of an intact linea alba, the flat muscles are in a state of constant contraction which lateralizes the rectus myofascial units resulting in a acute open abdomen with or without loss of domain. Paralysis of the abdominal flat muscles via BTA injection theoretically temporarily decreases muscle function which thereby decreases lateral pull and increases the available muscle length for primary rectus myofascial closure (recreation of the linea alba). The successful use of BTA as an adjunct has been described with the use of negative pressure devices and prolene bridge mesh for abdominal closure.10,11

Much is published about the closure of the open abdomen; the majority are temporizing procedures that often accept an incisional hernia.12,13 At our institution, frequent use of the ABRA DTS has resulted in a paradigm shift toward definitive primary myofascial closure. The ABRA DTS provides dynamic tension that facilitates relaxation of the flat muscles, thus allowing for the medialization of the rectus myofascial units utilizing elastomers and anchoring buttons (Figure 5).9

The patient presented in this case study differs from those in previous literature due to the constellation of risk factors that complicated the patient’s postoperative course. In addition to morbid obesity and stoma retraction, the patient had continuous wound contamination that necessitated multiple abdominal washouts which complicated her recovery. Furthermore, the stoma in our patient became significantly

![Figure 3. Demonstration of heavily contaminated midline wound in close proximity to ostomy site.](image1)

![Figure 4. Demonstration of midline contamination with evidence of tract from ostomy site.](image2)
retracted. Through this multimodal approach that included BTA injection of the flat muscles and the ABRA DTS device, definitive closure of an acute incisional hernia with loss of domain was accomplished.

The retracted stoma continued to heavily contaminate the midline wound after primary myofascial closure. The subcutaneous connection is demonstrated in Figure 6. As a result of this continued contamination, the patient was placed on strict bed rest to reduce midline wound contamination during ambulation, NPO to reduce ostomy output, and TPN for nutrition. The ileostomy and midline wound were assessed and attended to with appropriate dressing changes daily. Through intensive wound care, the midline wound healed as seen in Figure 7. This intensive, staged approach importantly addressed the issue of ongoing intra-abdominal contamination and the acute incisional hernia with loss of domain, by achieving primary myofascial closure. The resulting complex subcutaneous midline wound which connected to the retracted ileostomy site necessitated the multimodal approach including TPN and bed rest until that connection between the midline wound and ileostomy was healed. Multiple attempts at mobilization and enteral feeds resulted in a marked increase in ileostomy output and increased contamination of the midline wound causing regression of healing.

**Conclusion**

Via the use of a multimodal approach that involved both surgical and non-surgical interventions, we were able to achieve successful and safe closure of a large acute incisional hernia with loss of domain associated with a severely retracted ostomy with 100% mucocutaneous dehiscence. Unique to this case was the continuous heavy contamination of the midline wound with succus entericus due to a subcutaneous cleft between the ileostomy site and the midline wound. The epidemic of obesity and the declining overall health of the population are resulting in these types of scenarios becoming...
much more common. This successful outcome highlights the need for a patient-centric multimodal approach.

**Authors' Note**
This case was presented as an abstract at The Symposium on Advanced Wound Care (SAWC), Las Vegas, NV, on October 29, 2021.

**Declaration of Conflicting Interests**
The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: At the time of this case report, Dr Ronaghan was a KOL/Abdominal Wall reconstruction cadaver lab faculty for ACell which was the distributor of ABRA DTS.

**Funding**
The author(s) received no financial support for the research, authorship, and/or publication of this article.

**Ethics Approval**
Our institution does not require ethical approval for reporting individual cases or case series.

**Informed Consent**
Written informed consent was obtained from the patient for their anonymized information to be published in this article.

**ORCID iD**
Ryan D Morgan https://orcid.org/0000-0002-0220-2314

**References**
1. Whitehead A, Cataldo PA. Technical considerations in stoma creation. Clin Colon Rectal Surg. 2017;30(3):162-171. doi:10.1055/s-0037-1598156
2. Kwiat M, Kawata M. Avoidance and management of stomal complications. Clin Colon Rectal Surg. 2013;26(2):112-121. doi:10.1055/s-0033-1348050
3. Braumann C, Müller V, Knies M, et al. Complications after ostomy surgery: emergencies and obese patients are at risk—data from the Berlin OStomy Study (BOSS). World J Surg. 2018;43:751-757. doi:10.1007/s00268-018-4846-9
4. Arumugam PJ, Bevan L, Macdonald L, et al. A prospective audit of stomas-analysis of risk factors and complications and their management. Colorectal Dis. 2003;5(1):49-52. doi:10.1046/j.1463-1318.2003.00403.x
5. Katkoori D, Samavedi S, Kava B, Soloway MS, Manoharan M. Synchronous panniculectomy with stoma revision for obese patients with stoma stenosis and retraction. BJU Int. 2010;105(11):1586-1589. doi:10.1111/j.1464-410X.2009.08988.x
6. Harilingam M, Sebastian J, Twum-Barima C, et al. Patient-related factors influence the risk of developing intestinal stoma complications in early post-operative period. ANZ J Surg. 2017;87(10):E116-E120. doi:10.1111/ans.13397
7. Beck SJ. Stoma issues in the obese patient. Clin Colon Rectal Surg. 2011;24(4):259-262. doi:10.1055/s-0031-1295689
8. Ito E, Kosaka M, Kawaguchi C, et al. Stomaplasty with panniculectomy in an obese patient with stoma retraction: a case report. Int J Surg Case Rep. 2016;28:9-14. doi:10.1016/j.ijscr.2016.05.035
9. Suarez-Grau JM, Guadalajara Jurado JF, Gómez Menchero J, Bellido Luque JA. Delayed primary closure in open abdomen with stoma using dynamic closure system. Springerplus. 2015;4:519. doi:10.1186/s40064-015-1316-9
10. Zielinski MD, Goussous N, Schiller HJ, et al. Chemical components separation with botulinum toxin A: a novel technique to improve primary fascial closure rates of the open abdomen. Hernia. 2012;17:101-107. doi:10.1007/s10029-012-0995-1
11. Laurens JR, Foster A, Hardley A. Closing difficult laparostomies with the aid of botulinum toxin A: an audit of 12 cases. Cureus. 2021;13:e14066. doi:10.7759/cureus.14066
12. Fernández LG. Management of the open abdomen: clinical recommendations for the trauma/acute care surgeon and general surgeon. Int Wound J. 2016;13(suppl 1):25-34. doi:10.1111/iwj.12655
13. Atema JJ, Gans SL, Boermeester MA. Systematic review and meta-analysis of the open abdomen and temporary abdominal closure techniques in non-trauma patients. World J Surg. 2014;39:912-925. doi:10.1007/s00268-014-2883-6