Stomal Mucocutaneous Dehiscence as a Complication of a Dynamic Wound Closure System Following Laparostomy: A Case Report

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Abstract
Dynamic retention suture techniques that allow gradual reapproximation of abdominal midline muscles and fascia as well as sufficient freedom of movement for breathing and patient care commonly are used to prevent lateral retraction of the abdominal fascia in patients whose abdominal wound closure must be delayed. A 58-year-old otherwise healthy man was admitted with severe abdominal sepsis and following surgery, which included the creation of a stoma, a dynamic wound closure system was applied. Mucocutaneous stomal dehiscence was observed a few days after starting the treatment. The complication was believed to have occurred as a result of traction on the proximal end of the stoma (the bowl inside the abdomen) due to tension on the sutures of the small part of the bowel outside the abdomen. Definite, primary closure of the abdominal fascia was achieved after 16 days, at which point the stoma was reinserted with good results. Since using a modified procedure that involves cutting a groove in the protective drape and carefully placing two flaps around the stoma, this complication has not been observed with similar patients in the authors’ facility. This complication is not unique to this wound closure system; it also has been reported with other treatment modalities such as negative pressure wound therapy. The relatively small number of patients requiring delayed closure of the abdomen, coupled with the uniqueness of each case due to a wide variety of indications and comorbidities, hampers the development of evidence-based guidelines of care for these patients. A worldwide data exchange that includes patient experiences and descriptions of successful and failed attempts to address problems and complications in these patients is necessary. In the meantime, experiences with these types of wounds need to be shared in the literature.

Key Words: stoma, laparostomy, dynamic wound closure, complications

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Extensive abdominal infection and/or trauma may necessitate postponing definitive abdominal closure for several days or weeks after laparostomy until the patient has stabilized. Trauma, abdominal sepsis, and abdominal compartment syndrome (ACS) are common reasons for such a delay in abdominal closure.1 Bowel and retroperitoneal edema resulting from hypoperfusion and resuscitative efforts also frequently prevent reapproximation of the abdominal fascia.1 Progressive infection and/or necrosis may necessitate removal of fascia and make it technically impossible to approximate the abdominal fascia.1 Laparostomy also provides a fast and practical way to manage patients with an open abdomen because it facilitates repeat exploration of the abdominal cavity, fluid drainage, and/or debridement of intra-abdominal infection and necrosis.2,3

In the immediate postoperative setting, the abdominal wall can be temporarily closed using skin approximation, various meshes, plastic visceral retainers, or topical negative pressure dressings (TNP).1 The Bogotá bag uses a large IV bag to cover the abdominal viscera and is an example of one such plastic visceral container. However, if abdominal wall closure is delayed, the fascia may retract laterally, preventing future fascial...
closure and resulting, if untreated, in a ventral hernia. Once a ventral hernia has formed, delayed repair is more complex and requires techniques such as tissue expansion, flaps, and component separation. Therefore, it is preferable to prevent the lateral retraction of the abdominal fascia.

Several techniques using dynamic retention sutures are designed to facilitate gradual reapproximation of abdominal midline muscles and fascia while allowing sufficient freedom of movement for breathing and patient care. The Abdominal Reapproximation Anchor system (ABRA®, Canica Design Inc, Ontario, Canada, distributed in the Netherlands by Promotion Medical) is one such dynamic wound closure system. This abdominal wall closure system is indicated for the management of retracted, full-thickness, midline abdominal closure after laparotomy; ACS; abdominal hernia; mesh removal; abdominal aortic aneurysm; and abdominal trauma, as well as to retain abdominal wall closure.

According to the manufacturer’s instructions, the elastomer retention suture should be inserted through stab incisions starting approximately 5 cm from the wound edge and across the defect, preferably passing below the fascia and above the protective drape that covers the bowels. The elastomer then exits at an equal distance from the wound edge on the contralateral side. Individual elastomers are placed roughly 3 cm apart, as close as possible to the wound edge, along the full length of the wound. This configuration allows for the padding of the carefully placed and connected button anchors into which the elastomers are inserted. Tension on the elastomer then is increased to about twice the tension-free length (as indicated by the markings on the sutures), corresponding to 290 g. To prevent skin tears, the closure force is evenly distributed over a large section of healthy skin by adhesive button tail. Figure 1 shows an abdomen with elastomers, button anchors, and button tails in situ. This system allows for traditional wound débridement and dressing regimens to be performed by nursing staff and surgical consultants. Tension strength is reviewed daily and can be adjusted as deemed necessary to maintain a constant force to approximate the abdominal fascia.

In a retrospective, single-center observational study (n = 23 patients), Reimer et al reported 61% delayed primary closure an average of 18 days after initial laparotomy using this abdominal wall closure system.

Case Report

Mr. K, a 58-year-old, nonobese man, was referred to the authors’ emergency department with septic shock caused by necrotizing fasciitis of the perineum and abdomen, the result of neglected appendicitis. Otherwise healthy with no comorbidities, Mr. K was transferred to the operating theater for resection of necrotic tissue of the perineum, groin, and scrotum. Intra-abdominally, a large abscess was noted around the appendix and the sigmoid; this necessitated resection of necrotic retroperitoneal tissue, an appendectomy, and a sigmoidectomy. Mr. K was given a stoma on the colon transversum. After surgery, Mr. K was admitted to the intensive care unit for resuscitation and stabilization. Due to his extensive abdominal infection, resection of necrotic retroperitoneal tissue, and edema of the visceral organs, abdominal closure was delayed. Initially, a Bogotá bag was sutured to the fascia. Six days following the initial surgery, the abdominal wound closure system was applied to manage the wound (see Figure 1). A few days after starting this treatment, he developed a stomal mucocutaneous dehiscence secondary to traction of the protective drape on the stoma. This caused fecal matter to contaminate the wound and led to problems with stoma care.

STOMAL MUCOCUTANEOUS DEHISCENCE

Key Points

- The authors describe a case of mucocutaneous stomal dehiscence in the management of a patient with an open abdomen and stoma.
- A modification to reduce tension on the sutures is described.
- Considering the unique nature and challenges presented by these patients, the authors propose development of a worldwide data exchange to help improve care.

Figure 1. Abdomen with elastomer sutures, button anchors, and button tails in situ 15 days after initial surgery.
However, the authors believe the creation of two flaps was gradually approximated (see Figure 2). After successful treatment of the protective drape on the stoma as the fascia is gradually approximated.

The protective drape had been cut before placing it between the fascia and the visceral organs to create two separate flaps that were folded around the proximal bowel of the stoma to facilitate the sliding of the proximal part of the stoma as the fascia is gradually approximated.

The authors initially chose to place a cut in the protective drape (left). For the future, they propose cutting a groove in the rigid protective drape that extends well over the drape’s midline (right) to facilitate the sliding of the proximal part of the stoma as the fascia is gradually approximated.

Challenges and Possible Solution

As the fascia was gradually approximated when the wound closure system was in place, the proximal part of the stoma slid underneath the protective drape. This created traction inside the abdomen on the proximal part of the stoma, which retracted the stoma back into the abdomen. The authors observed this phenomenon during definitive closure of the abdominal fascia and to their knowledge this problem has not been described before when using this wound closure system. This may have led to the sutures breaking and to a partial or total mucocutaneous dehiscence, allowing the stomal contents to run freely in the abdomen. To lessen the traction of the protective drape on the stoma, the authors already had cut the protective drape of the system to create two separate flaps that could be draped around the stoma. This technique was developed as a result of previously published similar experiences with topical negative pressure drapes causing stomal dehiscence. However, the authors believe the creation of two flaps was insufficient due to the rigidity of the protective silicone drape used in this wound closure treatment system. Therefore, they propose that, in the future, a groove should be cut out of the rigid protective drape to extend well over the midline of this drape (see Figure 3). This will facilitate the sliding of the proximal part of the stoma as the fascia is approximated medially over the protective drape. The authors have used this modification successfully in a subsequent case of dynamic wound closure involving this system after abdominal sepsis (see Figure 4).

Discussion

Regardless of which treatment modality is used, stomal complications occur in up to 72% of all cases of stomas and can range from total stomal loosening to mild mucocutaneous dehiscence. Although a single patient case report should not lead to the certain conclusion that the observed mucocutaneous stomal dehiscence was caused by the dynamic wound closure system used, the authors clearly observed the traction of the protective drape on the proximal bowel of the stoma during the delayed primary closure of the fascia. This led to the conclusion that complications were the result of the protective drape. Furthermore, since the introduction of the proposed modification technique, this specific complication has not observed in the authors’ other patients with colostomies and an open abdomen treated in the ICU.

This abdominal wound closure system seems to be a useful tool in achieving delayed primary closure of the abdominal fascia after extensive abdominal sepsis, trauma, or resections. However, as shown in this single case report, it may have complicated an already complex case. Although stomal dehiscence and subsequent leakage may have prolonged ICU length of stay and necessitated additional surgery, the exact influence of these complications on patient recovery cannot be ascertained. Calculating the number of additional operations, days in ICU, and costs is difficult; it...
is not known how long this patient would have stayed in the ICU had he not experienced the mucocutaneous dehiscence.

The relatively small number of patients requiring delayed closure of the abdomen, coupled with the uniqueness of each case due to a wide variety of indications and comorbidities, hampers the development of evidence-based guidelines of care for these patients. A worldwide data exchange that includes patient experiences and descriptions of successful and failed attempts to address problems and complications in these patients is necessary. In the meantime, it is hoped that experiences with these type of wounds will be shared in the literature.

Conclusion

This case report suggests that clinicians should be concerned about stomal mucocutaneous dehiscence when using this dynamic abdominal wound closure system in the management of patients with an open abdomen and a stoma. Based on the authors’ observations, a “groove and flap” modification of the protective drape is proposed. During treatment, this approach will accommodate the unhindered sliding of the proximal part of the stoma while the fascia is gradually approximated medially over the protective drape. Proactive approaches and ingenuity are necessary when treating patients with a laparostomy and concurrent conditions that may hinder successful secondary or tertiary wound closure.

References