Management of Abdominal Wound Dehiscence with Porcine Dermal Collagen Implant: Report of a Case

Anastasios Bounovas, MD; George A. Antoniou, MD; Prodromos Laftsidis, MD; Athanasios Bounovas, MD; Stavros A. Antoniou; and Constantinos Simopoulos, MD

Abdominal wound dehiscence is a major postoperative complication with a high mortality rate. Although the mainstay of management is immediate operative reclosure, critically ill patients are better served by conservative temporary measures and delayed operative closure. The evidence in the literature regarding the use of biosynthetic implants in abdominal wound dehiscence is limited. To expand knowledge of management options, a case of abdominal wound dehiscence post hysterectomy in a critically ill 69-year-old woman managed with placement of a porcine dermal collagen implant is described. The porcine dermal collagen implant was placed in an infected field for the repair of the fascial defect under local anesthesia. No additional surgery was required and, 9 months post surgery, the patient remained healthy without evidence of residual hernia. Biosynthetic implants may be an effective alternative for the acute management of fascial dehiscence in critically ill patients.

KEYWORDS: wound dehiscence, surgery, complications, infection, biosynthetic implant

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Abdominal wound dehiscence is a major postoperative complication with high morbidity that may exceed 50% of patients and mortality rates ranging between 15% and 44%.1-3 The mainstay of management is immediate reclosure of the abdominal wall with retention sutures, performed under general anesthesia. Critically ill patients for whom general anesthesia is risky and patients with wound or intra-abdominal sepsis in whom reclosure of the abdominal wall would be unsafe are better served by conservative temporary measures and delayed operative closure when their condition improves.4-11 Several attempts to temporarily cover the open abdomen with synthetic meshes have been described in the literature; however, high complication rates are reported.4-11 Although case studies describing the use of biosynthetic mesh implants for abdominal wall reconstruction suggest they can be used safely in contaminated wounds,4,12-14 evidence in the existing literature for their use in the emergent management of abdominal wound dehiscence is scant. To expand knowledge of management options, the case of sepsis-associated abdominal wound dehiscence managed with placement of a porcine dermal collagen implant under local anesthesia is presented.

Case Report

Ms. N, a 69-year old female patient, was referred
with an acute abdomen, presenting with severe abdominal pain and tenderness, accompanied by absence of bowel sounds and mild generalized abdominal swelling 1 month after a hysterectomy had been performed. On admission, she was receiving oral corticosteroids for idiopathic thrombocytopenic purpura. Exploratory surgery revealed multiple abscesses, which were drained. Ms. N’s peritoneal cavity was lavaged with saline and antiseptic solution. Drains were placed within the abdominal cavity and the abdomen was closed with nylon sutures in a mass closure technique. Cultures of the abscesses showed *Escherichia coli*.

Seven days postoperatively, Ms. N developed a wound infection and fascial dehiscence (see Figure 1). Because of her poor general condition (persistent sepsis, thrombocytopenia, and intravenous steroid use), physicians determined surgical reclosure of the abdomen under general anesthesia was not judicious. Instead, they decided to repair the abdominal wall defect under local anesthesia using a porcine dermal collagen implant. Subcutaneous tissues of the wound were infiltrated with a local anesthetic solution (1% lignocaine), the loose fascial sutures were removed, and the subcutaneous tissues were undermined — ie, the subcutaneous tissues on either side of the wound were dissected to accommodate a single piece of porcine dermal collagen implant measuring 10 cm x 15 cm, which was placed over the aponeurotic layer that covered the abdominal viscera but was not sutured to it (see Figure 2). The skin edges were approximated and the wound was left to close by secondary intention (see Figure 3). The patient received intense supportive treatment postoperatively, which included fluid resuscitation, intravenous antibiotics (metronidazole, cefuroxime, netilmicin sulphate), intravenous corticosteroids (methylprednisolone), nutritional support, meticulous wound care, that included daily change of dressings under sterile precautions and close monitoring. As a result of this management approach, the sepsis abated over the next several days and the wound demonstrated evidence of healing, with healthy tissues, no signs of infection, and epithelialization of the wound surface. Ms. N was well enough to be discharged 3 weeks later; district nursing wound care, which consisted of daily dressing changes, meticulous

**Figure 1.** Wound dehiscence with evidence of infection and evisceration.

**Figure 2.** Wound appearance immediately after placement of the porcine dermal collagen implant.

**KEY POINTS**

- When immediate surgical closure of a dehisced abdominal wound is not an option, temporary measures to cover and protect the open abdomen are usually employed until the wound can be closed.
- The authors of this case report describe the use of a biosynthetic mesh implant in a critically ill patient with an infected and dehisced abdominal wound whose wound healed without requiring additional surgery.
- Comparative studies to ascertain the optimal management of these challenging wounds are needed to help develop guidelines of care.
hygiene, and close supervision, was arranged. On follow-up 9 months post-discharge, Ms. N remained healthy with no evidence of wound infection or hernia (see Figure 4). Computed tomography (CT) noted no fluid collection and the mesh was well incorporated into the abdominal wall.

Discussion

Abdominal wound dehiscence is a dreaded complication of major abdominal surgery and associated with significant morbidity and mortality.1-3 Despite significant advances in perioperative care over recent years, wound dehiscence continues to be a major complication of abdominal surgery and has been reported to occur in up to 7.8% of patients.1,3 Several local and systemic factors have been associated with an increased risk of wound dehiscence; large retrospective studies1,2 have shown that wound infection was one of the most important independent variables for wound healing disruption and dehiscence. Treatment of fascial dehiscence involves emergent restoration of the abdominal wall integrity, usually by re-suturing the aponeurotic layers and placing retention sutures. Frequently, local wound factors or the patient’s general condition do not allow primary fascial reconstruction, necessitating delayed closure of the wound. Temporary management techniques of the open abdomen include plastic or silicone drapes covering the abdominal viscera, absorbable or nonabsorbable meshes sutured to either the skin or fascia, or vacuum-assisted closure.4 This delay allows the general condition of the patient to improve and the local wound and intra-abdominal conditions to resolve before definite closure is safe.

The role of absorbable and nonabsorbable synthetic meshes in abdominal wall closure in the emergent setting has been the topic of several retrospective case studies.6-11 Although polypropylene mesh provides an effective alternative for abdominal wall closure in a septic field, the results of a study that retrospectively reviewed five patients in which a polypropylene mesh was used for abdominal closure following celiotomy for intra-abdominal sepsis suggest it is associated with an unacceptably high complication rate, most commonly involving mesh extrusion and enterocutaneous fistula. On the other hand, absorbable mesh materials are better tolerated in a contaminated wound; however, retrospective case studies8,10 have shown that long-term follow-up reveals a predictably high rate of incisional hernia. In particular, Dayton et al10 reported development of abdominal wall hernias in six out of eight patients with contaminated abdominal wall defects managed with placement of absorbable polyglycolic acid mesh in the acute setting; whereas, Buck et al9 reported that all survivors who had an absorbable mesh placed and returned for follow-up had evidence of incisional hernia.

In an attempt to circumvent these problems, new biosynthetic materials have been developed. One is the porcine dermal collagen implant, which has been reported to be used in several different surgical procedures since 1998.13 It is prepared from porcine dermis that is processed to remove all cellular elements and cross-linked, leaving a three-dimensional material
consisting of collagen and elastin. Several animal studies\textsuperscript{16-18} have demonstrated a milder inflammatory response as compared with polypropylene mesh and a comparable tensile strength, suggesting optimal characteristics for situations that require strength and permanency. Clinical case studies involving a total of 11 patients also have demonstrated the implant’s resistance to infection when used in a potentially contaminated or contaminated field for abdominal wall reconstruction.\textsuperscript{12-14}

In Ms. N’s case, use of the dermal collagen implant in the management of fascial dehiscence was important for three reasons. First, her poor general condition precluded primary surgical closure. Placement of the dermal collagen implant was a minor procedure performed under local anesthesia that avoided a major surgical operation to reconstruct the fascial dehiscence under general anesthesia, as well as its associated risks. Second, most of the temporary closure techniques previously described require additional operative intervention. Placing a porcine dermal collagen implant offered definite management of the fascial defect without the need for delayed reconstruction. Third, the wound was contaminated, requiring a treatment that would not increase the risk of infection.

Porcine dermal collagen implants have reportedly been used for abdominal wall reconstruction such as incisional hernia repair, often in an infected field.\textsuperscript{12-14} Biologic materials also have been used as a delayed closure technique of the open abdomen — they were used as a bridge to definite abdominal closure when septic conditions settled and the patient’s general state allowed.\textsuperscript{4} However, this is the first known case report about the use of biosynthetic implants in the acute management of fascial dehiscence.

**Conclusion**

A critically ill 69-year-old woman with complications post hysterectomy that included wound infection and abdominal dehiscence did not develop any local complications associated with the biosynthetic implant used to manage her wound and no delayed abdominal wall reconstruction was required. This experience suggests the use of porcine dermal collagen implant for the management of abdominal dehiscence could be an effective alternative to temporary closure.
techniques in selected patients who are at high risk for another major operation. However, this is a single case and the outcome should be approached with caution. Further studies comparing the use of biosynthetic implants with immediate operative reclosure and other temporary measures for the acute management of fascial dehiscence in critically ill patients are required. - OWM

References

CORRECTIONS
A Letter to the Editor that appeared in the May 2008 issue of Ostomy Wound Management should have read: I commend Clinical Editor Lia van Rijswijk, for her editorial, “First, Do No Harm,” that appeared in the March 2008 issue of Ostomy Wound Management. While she focused on the doctor’s (un)cleanliness, I focused on his “certification.” It seems to me that wound care credentialing is rolling out of Cracker Jack boxes — you too can be a wound-only-certified, woc-in-a-box. An ad in a recent Advance for Nurses reads, “It only takes one week to become certified in wound care.” When I mentioned this to a colleague, he sarcastically responded, “Oh, I thought it only took a weekend.” How low will we go? How long will it take before we put on the brakes and realize the impossibility of instant certification? And most importantly, how many patients will receive substandard care from these poorly prepared “experts”? — Nancy Faller, RN, PhD

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