Bowel Evisceration After Use of Rectus Abdominis Transposition Flap for Sternal Wound Reconstruction: A Case Report
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Citation

Abstract
Rectus abdominis muscle transposition (RAMT) flaps can be successfully used for coverage of sternal defects caused by mediastinitis in poststernotomy patients. Information regarding abdominal wall morbidities associated with the use of this particular flap is scarce. We hereby present a rare case of spontaneous rupture of the posterior rectus fascia leading to bowel evisceration in a patient who had previously undergone sternal reconstruction with a RAMT flap. We hypothesize that certain high-risk factors present in this patient, such as morbid obesity, inadequate nutrition, and chronic cough may have had a direct impact on the integrity and strength of the abdominal wall after surgery, eventually leading to evisceration. Based on recent studies, we also suggest the consideration of allograft reinforcement to the abdominal wall fascia after RAMT flap elevation in high-risk patients, even in the presence of a concomitant infection.

INTRODUCTION
Since described by Jurkiewics et al in 1980, RAMT flaps have proved to be effective and safe for reconstruction of deep or lower sternal defects due to mediastinitis in poststernotomy patients (1). We hereby report the first case of bowel evisceration due to spontaneous rupture of the posterior rectus fascia after RAMT flap reconstruction of the sternum. We discuss various clinical risk factors that may be associated with the development of this complication, and review therapeutic modalities that could be considered to prevent such poor surgical outcomes in similar clinical scenarios.

CASE REPORT
A 62 year-old woman presented to the hospital with an unstable sternum and serosanguinous discharge from her sternal incision, after undergoing elective coronary artery bypass grafting fifty days prior to this presentation. Her past medical history was significant for morbid obesity, coronary artery disease, type-two diabetes mellitus and chronic renal insufficiency.

Following admission, she was diagnosed with methicillin-resistant Staphylococcus aureus mediastinitis, and was subsequently treated with intravenous vancomycin. Surgical debridement with sternal wire removal was performed immediately thereafter. Seven days following debridement, she had sternal reconstruction with a right RAMT and bilateral pectoralis major advancement flaps. The postoperative and hospital course was complicated by pulmonary and acute renal failure requiring prolonged endotracheal mechanical ventilation, continuous hemodialysis, and percutaneous gastrostomy for nutritional support.

Approximately six weeks after sternal reconstruction, she developed recurrent and paroxysmal coughing spells, while still on assisted mechanical ventilation. During one of these episodes, she sustained evisceration of the bowel through the abdominal surgical incision. On emergent exploratory laparotomy, a longitudinal fascial defect was identified extending above and below the arcuate line, and affecting both the anterior and posterior layers of the rectus fascia. The surgical intervention was well tolerated and consisted of bowel reduction and rectus fascia repair with polypropylene mesh (Marlex). Upon six month follow up, clinical examination showed a healthy scar and no weakness of the abdominal wall. The patient developed no additional surgical complications, but remained in intensive care with significant ongoing medical problems.
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DISCUSSION

Abdominal wall-related complications encountered with the use of the transverse rectus abdominis myocutaneous (TRAM) flaps have been extensively studied in the context of postmastectomy breast reconstruction (2,3). Currently, the incidence of abdominal hernias in patients who have undergone TRAM flap reconstruction varies from 2.1% to 8.8%, depending mostly on the technique used to reinforce the fascia after harvesting the rectus abdominis myocutaneous island (4). Despite numerous studies describing the clinical features of the TRAM flap, little data exists regarding the morbidities associated with the less common RAMT flap used for sternal wound reconstruction.

Over a 15-year period, approximately 300 sternal reconstructions have been performed at our institution utilizing the rectus abdominis muscle flap in approximately 20% of those cases. The technique uniformly used for reinforcement of the rectus fascia after transposition of the muscle has been primary approximation of the incised anterior rectus fascia with a running suture of #1 prolene. In all instances, the posterior rectus fascia is left intact after obtaining hemostasis from perforators using electrocautery or suture ligation. Generally, we have noticed good results from this repair in our patient population, and no major abdominal wall complications had been encountered until the case of this patient.

The integrity of the abdominal fascia appears to be the main concern when analyzing the possible mechanism of action of this unusual complication. Our surgical technique calls for reapproximation of the anterior rectus sheath without removal of any of the anterior fascia, after harvesting the rectus abdominis muscle. This is different in the TRAM flap, where some of the anterior fascia is transposed with the muscle, and only the edges of the anterior sheath remain after flap elevation, placing more tension on the repair. The repair we perform on the anterior sheath is further supported by a posterior sheath that is never violated, and is only exposed to minimal perifascial cauterization during flap elevation. These steps are taken to minimize the possible development of herniations along the abdominal wall.

Although the definite etiology of the fascial rupture remains unclear in this case, several high-risk factors for poor surgical outcomes can be retrospectively identified in this patient at the time of evisceration. Obesity has been identified as a risk factor for the development of abdominal hernias in patients who have had TRAM flaps for breast reconstruction (5). With a prehospitalization weight of 82 kilograms, and a body-mass-index of 35.1 kg/m², this patient certainly falls within this high-risk group. She was also chronically malnourished, with a noted prealbumin level of 7mg/dL two days after the bowel evisceration. The importance of an adequate nutritional status for proper wound healing and repair has been well established, and may have had a role in this case (10,11). Another factor that may have contributed to the weakening of the abdominal wall fascia in this patient is the frequently elevated intra-abdominal pressures resulting from chronic coughing. Cases of abdominal wall herniation solely due to cough have been previously described in the literature in patients with chronic obstructive pulmonary disease (12,13). Given these observations, it might be possible to extrapolate that prompt evaluation and optimization of certain high-risk factors in patients undergoing this particular type of reconstruction may prevent serious postoperative complications. Improving the nutritional status of patients, for example, is an exercise that can usually be accomplished in the perioperative period by the surgeon. Other variables such as obesity and chronic cough are unfortunately less amenable to short-term correction.

More importantly, in order to prevent the development of abdominal wall morbidities, preservation of the abdominal wall in a tension-free manner is a critical, and technically difficult treatment modality in this patient population. Several authors have reported decreased incidence of abdominal wall hernias after reinforcement of the anterior rectus sheath with mesh in patients that have undergone TRAM or RAMT flap reconstruction of the breast (4,14). Since abdominal repairs with mesh are usually contraindicated in patients with serious underlying infections such as mediastinitis, surgeons rarely consider them for patients that require RAMT flap reconstruction of the sternum. However, recent data published by Kolker and colleagues on the use of allograft (Alloderm) for repair of complicated abdominal wall defects suggests that acellular dermal allografts provide for a “biocompatible matrix” that is well tolerated in infected fields (16). These findings certainly open new plausible treatment options for high-risk, infected patients who require a more secure abdominal wall closure after RAMT flap elevation.

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