

Tissue Expanders in Skin Deficient Ventral Hernias Utilizing Component Separation

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Summary: Skin deficient complex ventral hernias are complicated surgical cases that have multimodal approaches. There is no current consensus on the management of those patients who also have concomitant stomas or enterocutaneous fistula. We present 2 cases in which the senior authors were able to apply tissue expanders above and between the abdominal wall in patients with an enterocutaneous fistula or stoma. After expansion and final closure, the patients did not experience recurrent hernias. (*Plast Reconstr Surg Glob Open* 2015;3:e563; doi: 10.1097/GOX.0000000000000515; Published online 19 November 2015.)

Complicated hernias usually include those in patients with obesity, diabetes, smokers, and other comorbidities or in the presence of enterocutaneous fistulas (ECFs), multiple recurrent hernias, mesh infection, and hernias after trauma or tumor resection.¹⁻³ One of the most significant challenges in abdominal wall reconstruction are patients with a large abdominal wall defect in conjunction with an ECF or stoma.⁴ An extensive literature review performed by the authors up to January 2015 revealed only 6 publications on the use of tissue expanders to reconstruct ventral hernias, none of which discussed the importance of specific anatomic placement of tissue expanders during simultaneous repair of the hernia with underlying ECF or stomas.^{1,5-9} We report 2 patients with skin deficient incisional ventral hernias with these underlying conditions.

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CUI Tissue Expanders (Allergan, Newport, Calif.) were strategically placed in different anatomic loca-

tions because of underlying ECF in patient 1 and a stoma in patient 2. After 10 weeks of expansion to a final volume of 1000 mL per expander, the patients underwent definitive closure by removal of the tissue expander, excision of split thickness skin graft (STSG), restoration of bowel continuity, ventral hernia repair utilizing biologic mesh underlay, bilateral component separation technique (CST), and primary skin closure.

Case 1

A 64-year-old man who had undergone previous laparoscopic bilateral inguinal hernia repair experienced complications from bowel perforation. After several subsequent surgeries and the development of an acute abdomen, he developed a chronic ECF and flank abscess. The patient subsequently received an STSG to the chronic open abdominal wound and fistula. At 3-month follow-up, it was noted that a low output fistula developed in the right lower quadrant after incision and drainage of an abscess in this location. He also had a hernia that extended from the pubis up to the xyphoid, and the costal margins formed the upper borders of the hernia. Four tissue

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expanders were placed above the abdominal wall fascia in close proximity to the ventral defect. They were expanded weekly until they reached their final volume. Expansion process was tolerated well (Fig. 1).

Closure was planned 9 months later. The fistula was identified as 20 cm proximal to the terminal ileum and removed by a segmental enterectomy. The tissue expanders were removed, and the $30 \times 20 \text{ cm}^2$ STSG was excised. After colonic anastomosis was achieved, the hernia was repaired utilizing the bilateral CST and a $20 \times 40 \text{ cm}^2$ Permacol biological mesh underlay (Covidien, New Haven, Conn.). Complete rectus muscle approximation was obtained with complete closure. The stretched skin reached the midline, and there were no surgical complications. At 3-year follow-up, the patient did not have any complications or recurrence (Fig. 2).

Case 2

A 59-year-old woman presented with perforated diverticulitis and subsequently experienced a complicated hospital course that led to the development of an ECF, open abdomen, and a colonic stent to obtain fecal diversion through a left upper quadrant colostomy. Physical examination revealed a large

ventral hernia with a $25 \times 20 \text{ cm}^2$ wound managed by negative pressure therapy. Once the ECF was controlled, an STSG was applied to the granulated wound.

Sixteen months later, tissue expanders were placed in the presence of a colostomy. Two expanders measuring 500 mL on the left and 700 mL on the right were placed in each lateral abdominal wall, between the external and internal oblique. After 10 weeks of expansion (Fig. 3), the $25 \times 18 \text{ cm}^2$ STSG was excised and the tissue expanders were removed. The hernia was repaired utilizing the bilateral CST and underlay Strattice mesh (LifeCell, Bridgewater, N.J.). A more acceptable midline scar was obtained with complete approximation. No recurrence at 22-month follow-up (Fig. 4).

DISCUSSION

Reconstruction of the abdominal wall in patients with underlying medical issues can interfere with the sterility of surgical repair and also present with unique challenges.¹⁰ The use of prosthetic or biological mesh in conjunction with tissue-expanded skin provides a durable abdominal closure for these patients.¹¹ Biological meshes have shown success in decreased risk of



Fig. 1. Preoperative appearance after tissue expansion.



Fig. 2. Postoperative appearance after 12 months.



Fig. 4. Postoperative appearance after 22 months.

recurrence in contaminated operation fields.¹² In our study, our patients did not experience any complications from the use of biologic mesh nor infectious complications with the use of tissue expanders.



Fig. 3. Preoperative appearance.

We believe that specific anatomic positioning and presurgical planning determines success of reconstruction in this setting. The tissue expanders were placed between the external and internal oblique muscles in patient 2, which allowed expansion of skin and abdominal wall musculature. This subsequently allows for successful dissection and completion of a components' separation at the time of expander removal, never interfering with a stoma, which lies within the rectus, and avoiding inadvertent enterotomy. In the absence of a colostomy, patient 1 was treated with expanders above the muscle to capitalize on maximum skin expansion. Pocket dissection on the right was limited to avoid communication with the ECF. Because these are clean-contaminated cases, the risk of infection or expander contamination is greater. We used standard perioperative antibiotic protocol and extended oral antibiotics while the drains were in place.

What is unique about the experiences described in this article is the use of tissue expanders to successfully close skin deficient, complicated ventral hernias both arising from an infected abdomen, further complicated by the development of a subsequent ECF and stoma. Previous reports have rec-

ommended that closure of all abdominal stomas and ECF should precede attempts at abdominal reconstruction.¹³ Further studies should aim to clarify the best anatomical position of the tissue expanders in these situations using an evidence-based approach to improve patient outcomes and quality of life.

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