

XCM Biologic Tissue Matrix.

Components separation using sandwich technique for reconstruction of abdominal wall defect.

Case Report



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Despite advances in modern surgery and in hernia techniques as well as the use of various mesh materials, the management of large abdominal hernias remains a challenge for even the most experienced hernia surgeons. Components separation is a widely accepted technique used to manage these large midline defects. In addition, the use of both prosthetic and biologic mesh products has allowed surgeons to better treat these giant hernias. The sandwich technique, initially described by Guarnieri et al,¹ was an approach used to isolate prosthetic mesh from the bowel to prevent adhesions by placing a single sheet of mesh between the peritoneum and abdominal wall. This case presents a modification of the sandwich technique using two pieces of mesh, combining components separation closure of the midline to reconstitute the abdominal wall, with a biologic underlay as well as biologic onlay to reconstruct the abdominal wall and reinforce the midline repair. This provides both an anatomic and physiologic repair of the abdominal wall defect, which recreates both form and function.²

References

¹ Guarnieri A, Guarnieri F, Nicolò E. (1999). The "Sandwich" Technique in Incisional Hernias. *Inguinal Hernia and Physiological Hernioplasty* (pp. 71-72). Rome: Centro Studi Clinica Guarnieri.

² Dardano A. (2011) "Recreating Form and Function: Repair of Ventral Hernias Using the Sandwich Technique." (2011) *Plastic Surgery Pulse News*. Vol. 3, No. 2.

Patient history

The patient is a 48 year-old healthy male with recurrent large ventral hernia. He developed a ventral hernia status-post emergent splenectomy 3 years prior. His first hernia repair was accomplished using a bridge technique with biologic mesh. His post-operative course was complicated with a MRSA infection and the wound was allowed to heal with VAC therapy. This resulted in a large ventral weakness. He presented with loss of abdominal wall function and bulging, as seen in the preoperative photos.

**Surgical plan**

- Reconstruction of the large abdominal defect through a fleur-de-lis incision to allow access to the entire abdominal wall
- Components separation technique to provide primary midline repair
- Reinforcement of midline repair using XCM biologic material as both an onlay and an underlay (sandwich technique repair)



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Operative technique

To reconstruct the abdominal wall with primary midline repair, components separation technique (CST) was used. The ventral hernia sac is identified and the hernia contents are reduced. The external oblique fascia is released longitudinally just lateral to the rectus abdominis muscle (Figure 1a). Manual palpation is used to determine the junction between the rectus muscle and external oblique. A cautery is used to open the fascia. A hemostat helps dissection of the external oblique fascia in a bloodless plane. Once released, Kocher clamps are used to place tension on the muscle/fascia complex together toward the midline (Figure 1b).

Upon completion bilaterally, the bipediced rectus muscle flaps are released so that they may be approximated in the midline.

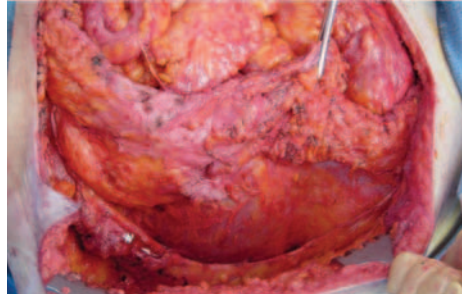


Figure 1a: CST release of external oblique fascia lateral to rectus abdominus

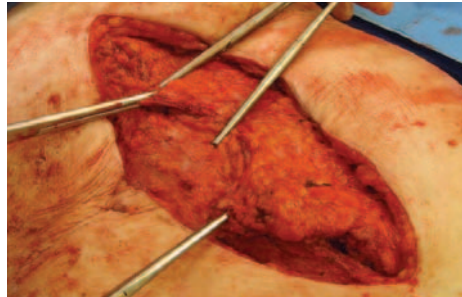


Figure 1b: After CST release the rectus muscle fascia is approximated in the midline without tension

When it is determined that the muscles are able to be approximated in the midline with minimal tension, the underlay portion of the hernia repair is performed using XCM Biologic Tissue Matrix (Figures 2a and b). For this patient, a 20 cm x 30 cm piece was used. To secure the tissue matrix with evenly distributed tension, interrupted sutures of #1 Nurolon (Ethicon) "pop-offs" on a CT-X needle are used to place a full thickness abdominal wall suture from the cut edge of the external oblique and into the tissue matrix. The suture is placed 1 cm in and parallel to the edge of the tissue matrix, then back out through the abdominal wall (Figures 3 and 4). This is done with a 6 cm underlay margin circumferentially from the hernia defect. This is the most important step in reconstructing the hernia defect.

The closure is divided into quadrants and the mesh is sutured in place starting from the 12 o'clock to 3 o'clock positions, and then 12 o'clock to 9 o'clock position. Then it is sutured from the 6 o'clock position back to the 3 o'clock and 9 o'clock positions (Figure 5). This ensures equal tension is placed on the mesh at all stages of the repair.

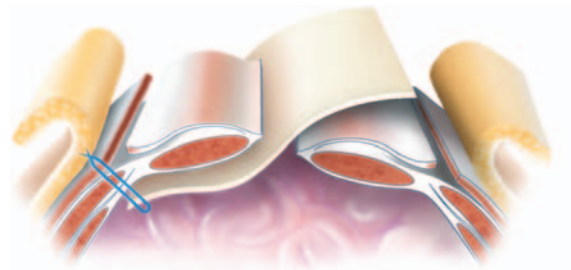


Figure 2a: Placement of underlay XCM mesh*

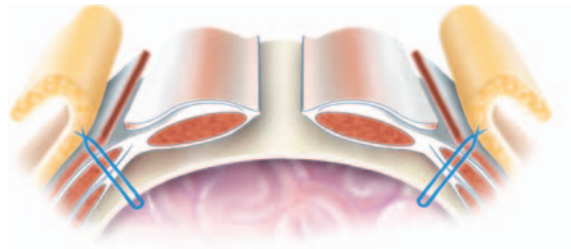


Figure 2b: Underlay XCM mesh secured to external oblique fascia*

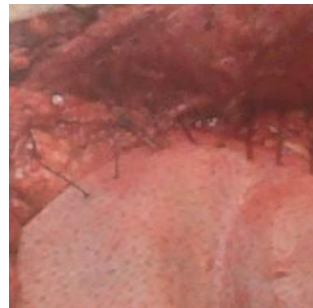


Figure 3: Suture placement technique using XCM

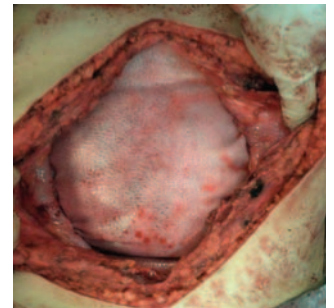


Figure 4: XCM biologic underlay sutured in place

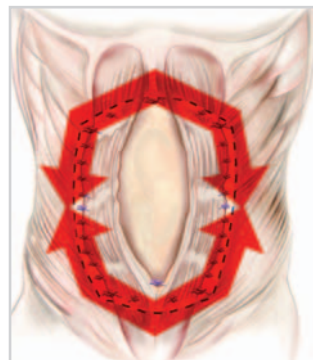


Figure 5

* Reproduced from Dardano AN. Recreating Form and Function: Repair of Ventral Hernias Using the Sandwich Technique. St. Louis: Quality Medical Publishing, Plastic Surgery Pulse News 3:2, 2011.

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The midline is then closed primarily in a tension-free repair, using interrupted figure of eight #1 Nurolon (Ethicon) on a CT-X needle. A #10 flat Jackson-Pratt drain should be placed between the underlay mesh and the abdominal wall prior to closing the fascia. The cut edge of the external oblique fascia naturally retracts laterally when the midline repair is closed, leaving a weakness between the rectus muscle and the cut edge. An onlay of XCM Biologic Tissue Matrix is used to reinforce the midline repair and to reconstitute the tension on the external oblique fascia by spanning the defect from cut edge to cut edge. This is accomplished with the same suture in a running fashion. Upon completion, the abdominal wall is reconstructed in a "sandwich" fashion (Figures 6a and b).

There is an underlay intraperitoneal biologic tissue repair of the hernia defect, a primary midline repair to reconstitute the anatomy of the abdominal wall with autologous tissue, and an onlay biologic tissue to reinforce the midline repair and reconstruct the external oblique fascia. All the layers of the abdominal wall are reconstructed, and the physiology maintained. With this method, tension is distributed equally across the abdominal wall. The excess skin is trimmed, the operative site is irrigated with a pulse lavage irrigation system, and the skin edges closed in layers over two #10 flat Jackson Pratt drains.

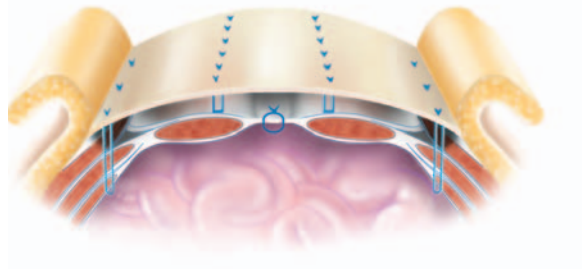


Figure 6a: Onlay XCM sutured in place*

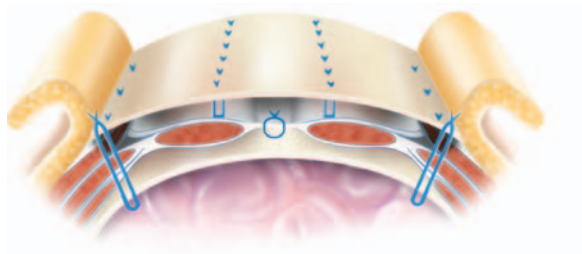
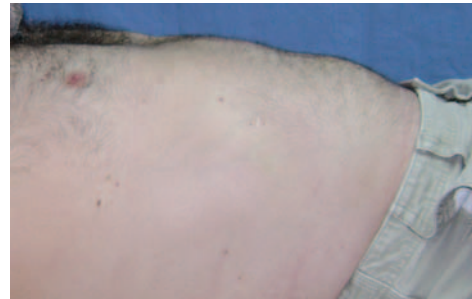
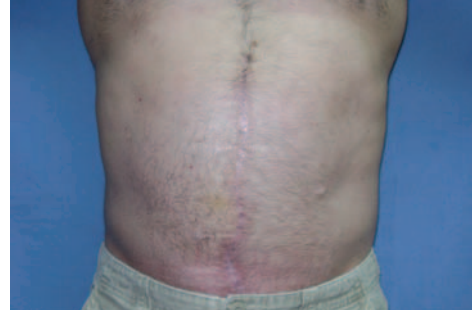


Figure 6b: Onlay XCM sutured in place, underlay XCM sutured in place and primary repair (the sandwich repair)*

* Reproduced from Dardano AN. Recreating Form and Function: Repair of Ventral Hernias Using the Sandwich Technique. St. Louis: Quality Medical Publishing, Plastic Surgery Pulse News 3:2, 2011.

Postoperative treatment

Following these procedures, the patient wears an abdominal binder for 4–6 weeks postoperatively. Drains are left in until drainage is clear and measures 30 cc over 24 hours for two to three consecutive days. If there is any sign of drain site redness, they are removed earlier. If the drainage output remains high, they are left in until the drainage decreases.



Summary

The modified sandwich technique is an excellent method of repair for both primary giant ventral hernias and recurrent ventral hernias. Limitations of this technique include those patients with loss of abdominal wall anatomy such as the rectus muscle or corresponding fascial layers. It is preferred to use biological materials, such as XCM Biologic Tissue Matrix, which allows tissue ingrowth and host incorporation.

“While I have used many other biologic tissue mesh products, I have found XCM to be easy to use in the O.R., with no hydration time or orientation to worry about. I’ve seen that it incorporates rapidly, and I like its thickness and pliability, along with the way the sutures hold in the tissue.”

– Anthony N. Dardano, DO, FACS

Results from case studies are not necessarily predictive of results in other cases.
Results in other cases may vary.

Surgeon profile

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