

# Composite Anterolateral Thigh–Tensor Fascia Lata–Vastus Lateralis Flap with Synthetic Mesh Reconstruction for Giant Ventral Hernia Repair

Kengkart Winaikosol, MD\*  
Suriya Punchai, MD†

**Summary:** Dealing with a giant ventral hernia can be a complex situation because it involves a considerable loss of space within the body. Although various surgical techniques are available for treating this condition, the recurrence rate remains high, making it challenging. This article presents a surgical treatment for a giant ventral hernia using synthetic mesh and a composite anterolateral thigh–tensor fasciae latae–vastus lateralis free flap. The average size of the hernia ring was 375.83 cm<sup>2</sup>, and all procedures were successful with minimal complications. After a follow-up period of 28 months, there have been no reports of recurrence. The technique is an effective option for treating patients with giant ventral hernias, particularly in cases where the component separation technique is not feasible. (*Plast Reconstr Surg Glob Open* 2024; 12:e5994; doi: 10.1097/GOX.0000000000005994; Published online 18 July 2024.)

## INTRODUCTION

Repairing giant ventral hernias can be challenging because they are intricate to correct through herniorrhaphy. Primary repair also has a high recurrence rate, ranging from 20% to 50%,<sup>1</sup> which can sometimes be unmanageable. Although using prosthetic material for repair has shown reduced failure rates, recurrence is still observed in 25% of cases.<sup>2</sup>

The component separation technique is a commonly used method for correcting midline closure of incisional hernias. Despite its popularity, various literature sources report recurrence rates ranging from 3.9% to 53%. This technique has been reported to close the defect up to 10 cm above the umbilicus, 20 cm at the level of the umbilicus, and 6 cm below the umbilicus.<sup>3,4</sup>

This research aimed to demonstrate the surgical solution for a giant ventral hernia through hybrid reconstruction, which combines synthetic mesh repair and a

composite anterolateral thigh–tensor fasciae latae–vastus lateralis (ALT-TFL-VL) free flap.

## SURGICAL TECHNIQUE

Between November 2019 and February 2023, six patients (age: 19–71 years) underwent surgery to correct giant ventral hernias through combined synthetic mesh repair and composite ALT-TFL-VL free flap reconstruction. Four patients developed incisional hernias after emergency abdominal surgery, including two cases of abdominal trauma, one case of a ruptured thoracoabdominal aortic aneurysm, and one case of bowel obstruction. Another patient developed an incisional hernia after colorectal surgery due to obesity, and one patient developed an incisional hernia following inguinal herniorrhaphy with underlying multiple focal neuropathies. All patients were evaluated with a preoperative computed tomography (CT) scan (Fig. 1). There were two patients for whom the intraperitoneal onlay mesh repair technique was unsuccessful. On average, hernia repair was performed 55.3 months after diagnosis, with an average defect size of 375.83 cm<sup>2</sup> (Table 1).

The incision was made vertically, and the hernia sac was opened. Any previous skin graft or low-quality skin was removed from the omentum and intestines, releasing the hernia ring from peritoneal adhesion. Next, the abdominal cavity was explored, and any adhesion bowel

*From the \*Plastic and Reconstructive Unit, Department of Surgery, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand; and †Minimally Invasive Surgery Unit, Department of Surgery, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand.*

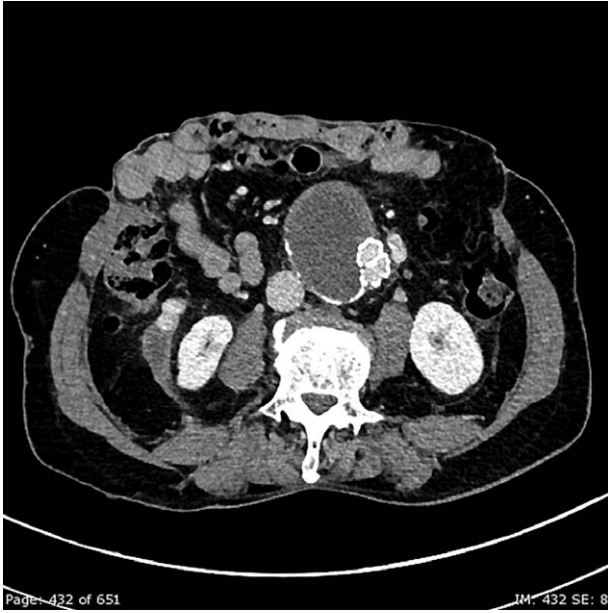
*Received for publication February 13, 2024; accepted May 31, 2024.*

*Copyright © 2024 The Authors. Published by Wolters Kluwer Health, Inc. on behalf of The American Society of Plastic Surgeons. This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.*

DOI: 10.1097/GOX.0000000000005994

Disclosure statements are at the end of this article, following the correspondence information.

Related Digital Media are available in the full-text version of the article on [www.PRSGlobalOpen.com](http://www.PRSGlobalOpen.com).



**Fig. 1.** The preoperative CT scan of patient 1 revealed a large area of intraabdominal contents protruding outside their usual compartment after reconstructing a giant ventral hernia with synthetic mesh repair and composite ALT-TFL-VL flap.

loops were released. A synthetic mesh called Symbotex (Covidien, New Haven, Conn.) is a monofilament polyester barrier-coated synthetic mesh that was placed intraperitoneally, extending beyond the hernia ring by at least 5 cm. (See figure, Supplemental Digital Content 1, which displays a synthetic mesh placed intraperitoneally, extending beyond the hernia ring by at least 5 cm. <http://links.lww.com/PRSGO/D357>.)

The vessels receiving the anastomoses (deep inferior epigastric vessels, deep circumflex femoral vessels, and lateral circumflex femoral vessels) were carefully prepared and assessed for proper arterial flow and venae comitantes patency.

A handheld Doppler was used to locate perforators. Considering the defect's dimensions, the skin paddle was designed to center the perforator in the flap. The medial border was incised, followed by subfascial dissection. The fascia was included throughout the flap's length, and the perforators were confirmed reliable. The posterior border was incised for complete flap harvesting. Three anastomoses were done, one arterial and two venous.

The TFL was sewn around the hernia ring's anterior rectus sheath using no. 1 polyglactin in an interrupted manner. Two closed suction drains were placed: one intraabdominal and another underneath the flap. (See figure, Supplemental Digital Content 2. After making arterial and venous anastomoses, the TFL was sewn around the hernia ring's anterior rectus sheath using no. 1 polyglactin in an interrupted manner, and two closed suction drains were placed, one intraabdominal and another underneath the flap. <http://links.lww.com/PRSGO/D358>.)

Furthermore, skin grafting from the excised abdominal wall area closed the donor site defect.

### Takeaways

**Question:** How can we manage giant ventral hernias that are not correctable by the component separation technique in patients?

**Findings:** This retrospective study included six patients and demonstrated successful correction of giant ventral hernias using synthetic mesh and a composite anterolateral thigh-tensor fascia lata-vastus lateralis free flap technique, which is effective for both midline and lateral defects.

**Meaning:** The synthetic mesh underlay with composite anterolateral thigh-tensor fascia lata-vastus lateralis free flap soft tissue reconstruction can be one option for treating giant ventral hernia, especially in cases where component separation is insufficient.

Patients were admitted to the hospital until they could eat a regular diet, pass stool regularly, and do daily activities independently. The drains were removed once the content was less than 20 mL. Patients were encouraged to begin ambulation as soon as possible after surgery, but because the surgery was extensive, pain often limited their ability to do so. Typically, patients could start walking around the fifth day after surgery. After two weeks, all suture stitches were removed, and abdominal bandaging was applied. The exercises were limited to a duration of three months.

### DISCUSSION

Surgeons often encounter the issue of ventral hernias, which can affect many patients. Up to 13% of laparotomy incisions may eventually develop hernias.<sup>5</sup> This can cause patients to experience limitations in their work and daily activities as the hernia grows. A giant ventral hernia is a complicated condition involving significant loss of domain problems. This means some abdominal contents remain outside their usual compartment, creating a second abdominal cavity.<sup>6</sup>

In 1990, Ramirez et al<sup>3</sup> presented their effective component separation techniques for repairing the ventral hernia, which marked the beginning of a new era in herniorrhaphy. By making incisions to release fascia, they achieved tension-free midline closure. Several modifications have been reported to preserve the blood supply to the skin edges by endoscopic dissection or sparing the peri-umbilicus perforators.<sup>7</sup> A 10%–15% recurrence rate was reported with postoperative complications, including cardiac, respiratory, and renal complications, and abdominal compartment syndrome.<sup>4,7,8</sup> This technique may be limited to sizeable ventral hernia with loss of domain and nonmidline hernia.

The synthetic mesh was used to reinforce hernia repairs to improve outcomes.<sup>2</sup> Surgeons commonly use both open and/or laparoscopic methods, along with different types of mesh, techniques for securing the mesh, and locations for placing the mesh (such as inlay, onlay, or intraperitoneal underlay). Compared with

**Table 1. Patient Data**

Patient	Age (y)	Sex	Primary Disease (Cause of Abdominal Hernia)	Timing for Hernia Repair (mo)	Defect Size (cm <sup>2</sup> )	Recipient's Vessels	Operative Time (min)	Blood Loss (mL)	Length of Hospital Stay (d)	Follow-up Time (mo)	Complications and Treatment	Recurrent
1	53	Male	Thoraco-abdominal aortic aneurysm	25	31 × 25	DCIA	480	700	12	44.4	Atelectasis → physical therapy	No
2	71	Male	Bowel obstruction	47	21 × 12	DIEA	390	450	18	41.1	—	No
3	68	Female	Rectal cancer, failed IPOM	26	20 × 14	DIEA	386	550	19	31.7	Seroma → percutaneous drainage	No
4	56	Male	Inguinal hernia, multiple focal neuropathies	60	21 × 15	DIEA	360	200	15	31.3	—	No
5	51	Male	Abdominal trauma, failed open mesh repair	140	19 × 12	LCEA	495	200	12	13.8	Seroma → percutaneous drainage	No
6	19	Male	Abdominal trauma	24	27 × 15	DIEA	390	200	17	5.8	—	No
Mean	53			55.33	375.83		416.83	383.33	15.5	28.0		

DCIA, deep circumflex iliac artery; DIEA, deep inferior epigastric artery; IPOM, intraperitoneal onlay mesh repair; LCEA, lateral circumflex femoral artery.



**Fig. 2.** A 71-year-old man developed a large incisional hernia due to abdominal compartment syndrome following a gut obstruction. The preoperative photographs depicted the extensive size of the hernia sac, which contained herniated abdominal content.

open repair, the laparoscopic approach offers benefits such as the reduced risk of mesh infection and eliminating the need for large subcutaneous flaps.<sup>9</sup> This approach may have limitations for a giant ventral hernia.

ALT and TFL flaps were commonly used in pedicle and free tissue transfer for abdominal wall reconstruction. Most of the perforators are derived from the descending branch of the lateral circumflex femoral artery, with the musculocutaneous type in the majority.<sup>10</sup> This series focuses on a surgical technique involving synthetic mesh and composite ALT-TFL-VL free flap for reconstructing giant abdominal hernias. By combining these two methods, we can rebuild the abdominal wall with tension-free repair, achieve immediate strength through directed fascial repair to the remaining edge of the abdominal wall, and provide long-term strength through mesh repair. With this approach, we successfully operated on the most significant defect, which measured 31 × 25 cm<sup>2</sup>. Moreover, this technique increases the dimensions of the abdominal wall through the added tissue flap. It prevents an increase in intraabdominal pressure that can lead to abdominal compartment syndrome and replaces the nonhealthy skin of the hernia sac with the skin from the thigh. It is worth noting that this method is not limited to midline defects, as it can also be applied to lateral hernia defects.



**Fig. 3.** Postoperative treatment results.

Two cases of experienced seroma were found to have postoperative complications, which were successfully treated through percutaneous drainage. Additionally, one patient displayed atelectasis of the lungs postsurgery. The mean follow-up period was 28 months, and no recurrent incisional hernias were reported (Figs. 2–4). This technique is a simple, reliable, and effective option for giant ventral hernias when the component separation technique is not applicable.

### CONCLUSIONS

The synthetic mesh and composite ALT-TFL-VL free flap approach is a safe and effective way to repair large ventral hernias with minimal complications. It is suitable for midline or lateral hernia defects.

*Kengkart Winaikosol, MD*

Department of Surgery, Faculty of Medicine  
Khon Kaen University  
123 Mittraparp Highway, Muang District  
Khon Kaen 40002, Thailand  
E-mail: [kengkawi@kku.ac.th](mailto:kengkawi@kku.ac.th)  
Instagram: [kopkap\\_kengkart](https://www.instagram.com/kopkap_kengkart)

### DISCLOSURE

*The authors have no financial interest to declare in relation to the content of this article.*



**Fig. 4.** The 4-year postoperative CT scan of patient 1 demonstrated the successful treatment without signs of hernia recurrence.

### ACKNOWLEDGMENT

*The authors thank Dr. Kanjanapan Jiwaramanee for the medical illustrations of this article.*

### REFERENCES

1. Anthony T, Bergen PC, Kim LT, et al. Factors affecting recurrence following incisional herniorrhaphy. *World J Surg.* 2000;24:95–100; discussion 101.
2. Burger JWA, Lujendijk RW, Hop WCJ, et al. Long-term follow-up of a randomized controlled trial of suture versus mesh repair of incisional hernia. *Ann Surg.* 2004;240:578–83; discussion 583.
3. Ramirez OM, Ruas E, Dellon AL. “Components separation” method for closure of abdominal-wall defects: an anatomic and clinical study. *Plast Reconstr Surg.* 1990;86:519–526.
4. Lowe JB, Lowe JB, Baty JD, et al. Risks associated with “components separation” for closure of complex abdominal wall defects. *Plast Reconstr Surg.* 2003;111:1276–1283.
5. Regnard JF, Hay JM, Rea S, et al. Ventral incisional hernias: incidence, date of recurrence, localization and risk factors. *Ital J Surg Sci.* 1988;18:259–265.
6. Goodney PP, Birkmeyer CM, Birkmeyer JD. Short-term outcomes of laparoscopic and open ventral hernia repair: a meta-analysis. *Arch Surg.* 2002;137:1161–1165.
7. Nguyen V, Shestak KC. Separation of anatomic components method of abdominal wall reconstruction—clinical outcome analysis and an update of surgical modifications using the technique. *Clin Plast Surg.* 2006;33:247–257.
8. Libberecht K, Colpaert SDM, Van Hee R, et al. New developments in abdominal wall reconstruction after abdominal compartment syndrome decompression. *Acta Clin Belg.* 2007;62:220–224.
9. Forbes SS, Eskicioglu C, McLeod RS, et al. Meta-analysis of randomized controlled trials comparing open and laparoscopic ventral and incisional hernia repair with mesh. *Br J Surg.* 2009;96:851–858.
10. Jenwitheesuk K, Sukprasert P, Winaikosol K, et al. Knee reconstruction using a distally based anterolateral thigh flap: an anatomical cadaveric study. *J Wound Care.* 2018;27(Sup9a):S28–S31.