

Anterolateral Chest Reconstruction Using a Posterior Intercostal Artery Perforator–Based Latissimus Dorsi Musculocutaneous Flap

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Summary: Latissimus dorsi (LD) flaps are ideal for reconstructing deep and complex anterolateral chest defects because they provide both coverage and volume with relatively short surgery and acceptable donor-site morbidity. The LD flap is suitable for patients who have undergone lung surgery and should avoid prolonged or invasive reconstruction surgery. However, the LD main pedicle, the thoracodorsal artery (TDA), is often damaged in these patients. A hitherto poorly known alternative is an LD flap that is based on a posterior intercostal artery perforator (P-ICAP). Here, we present the case of a 65-year-old man with a postpleurectomy anterolateral chest defect involving exposed lung tissue who was planned to undergo reconstruction with an ipsilateral TDA-pedicled musculocutaneous LD flap. In preoperative imaging and intraoperative exploration, the TDA was found to be damaged, but the eighth dorsal branch P-ICAP was identified and shown to have a strong Doppler signal. Thus, it served as the pedicle, and the entire LD muscle was elevated. The cutaneous part of the flap was designed as a superoposteriorly based transposition flap that maintained a skin bridge to reduce the risk of venous congestion. The donor site was closed primarily. The postoperative course was uneventful. This case supports the use of a P-ICAP-based LD musculocutaneous flap for reconstructing anterolateral chest defects in cases where the TDA is damaged. (*Plast Reconstr Surg Glob Open* 2025;13:e6589; doi: [10.1097/GOX.0000000000006589](https://doi.org/10.1097/GOX.0000000000006589); Published online 12 March 2025.)

Large, deep, and complex chest defects are challenging to reconstruct. For anterolateral defects, reconstruction with a pedicled latissimus dorsi (LD) flap provides both large coverage and volume, with relatively short operation and acceptable donor-site morbidity. This approach is particularly suitable for patients who have undergone lung surgery because prolonged or invasive reconstruction surgery in such patients can hamper treatment success. However, the LD main pedicle, the thoracodorsal artery (TDA), is often damaged in these patients. Alternative regional options such as

an omental flap or vertical rectus abdominis muscle flap can result in diaphragmatic or ventral hernia, respectively. Other regional options may not match the reconstruction demand. The serratus anterior muscle flap may not be large enough. The parascapular fasciocutaneous flap can cover a large area but may lack the bulkiness needed to fill deep complex defects. Free flaps require prolonged surgery.

A possible alternative is a pedicled LD flap that is based on a posterior intercostal artery perforator (P-ICAP).¹ Several groups have reported using P-ICAP-pedicled LD flaps for reconstructing lateral chest, intrathoracic, and lower back defects^{2–5} (Table 1). Here, we present our reconstruction of a deep and extensive anterolateral defect by using the entire LD muscle as a musculocutaneous flap that was pedicled by a single P-ICAP.

CASE REPORT

The 65-year-old man provided written consent for the publication of this case report. He had a history of

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Table 1. Previous Reports of Reconstruction With the P-ICAP-based LD Muscle Flap

Author	Year	No. Cases	Defect Location	Type of Flap	Part of Muscle Being Used	Pedicle	Complications/Comments
Presented case	2024	1	Anterolateral chest	Pedicled musculocutaneous flap	Entire muscle	Eight P-ICAP	
Cherukuri et al ⁵	2023	3	Intrathoracic fistulas	2 pedicled muscle flaps; 1 chimeric flap composed of separate muscle and fasciocutaneous flap	Inferior part post posterolateral thoracotomy	Sixth, seventh, and eighth lateral branch P-ICAPs	Seroma in one of the cases
Geierlehner et al ⁴	2021	1	Lower back	Musculocutaneous propeller flap	Entire muscle	Ninth P-ICAP	IO ICG was used
Kuriyama et al ²	2015	11	Posterolateral thoracotomy wound infection located in the lateral chest	Pedicled muscle flap	Inferior part post posterolateral thoracotomy	Two 6th to 10th P-ICAPs	IO ICG was used Combined with superior part of the LD, trapezius, or both
Amin et al ³	2015	1	Lateral chest	Musculocutaneous propeller flap	Partial according to the photograph	10th P-ICAP	Minimal winging of the scapula

IO ICG, intraoperative indocyanine green.



Fig. 1. Preoperative photograph showing the right anterolateral chest defect, with exposed lung tissue and the thoracotomy scar.

empyema and pleurectomy and presented with a 9 × 5 cm-deep wound on the right anterolateral chest that exposed the lung tissue and a 6-cm-long horizontal thoracotomy scar that reached beyond the posterior axillary line (Fig. 1). He had no signs of infection and was referred to reconstructive surgery.

The reconstructive plan was to use an ipsilateral pedicled musculocutaneous LD flap. Preoperative computed tomography angiography and Doppler ultrasound

suggested a possible TDA discontinuity and the need to use 1 or more of the P-ICAPs as the pedicle.

A vertically oriented 14 × 6.5-cm skin island was designed above the lateral side of the LD muscle. (See figure, Supplemental Digital Content 1, which displays the preoperative markings [left] with the original skin island [red ellipse], intraoperative view [middle] with the pedicle location [red dot], and postoperative view [right], <http://links.lww.com/PRSGO/D893>.) The operation was performed in the left decubitus position. After wound debridement and scar removal, a lateral incision was made on the planned skin island. Exposure of the lateral LD border revealed extensive scarring, including along the course of the TDA. To search for an alternative pedicle, the deep medial part of the muscle was exposed. This revealed the eighth dorsal branch P-ICAP, which entered the muscle in the paravertebral region and had a strong Doppler signal. The entire LD muscle was elevated based on this P-ICAP (Fig. 2). The cutaneous part of the flap was modified as a posterosuperior-based transposition flap with the perforator at its center. The distal part of the flap, composed of de-epithelialized skin and muscle tissue, filled the defect without tension and appeared viable with satisfactory capillary bleeding. The surgery was completed by closing the donor site primarily and inseting the flap. The postoperative course was uneventful, and the patient was discharged to rehabilitation 1 week later. Follow-up at 3 months revealed good recovery and full shoulder range of motion (Fig. 3).

DISCUSSION

This case of P-ICAP-pedicled LD musculocutaneous flap-based reconstruction showed good outcomes. The potential of this flap for reconstructing deep and complex anterolateral defects is supported by the literature. According to the Mathes–Nahai classification,⁶ the LD muscle has a type V blood supply. Its main pedicle is the TDA, but it also has minor pedicles consisting of segmental perfusion from P-ICAPs (T9–11) and lumbar perforators (L1–2). Anatomical studies showed that there

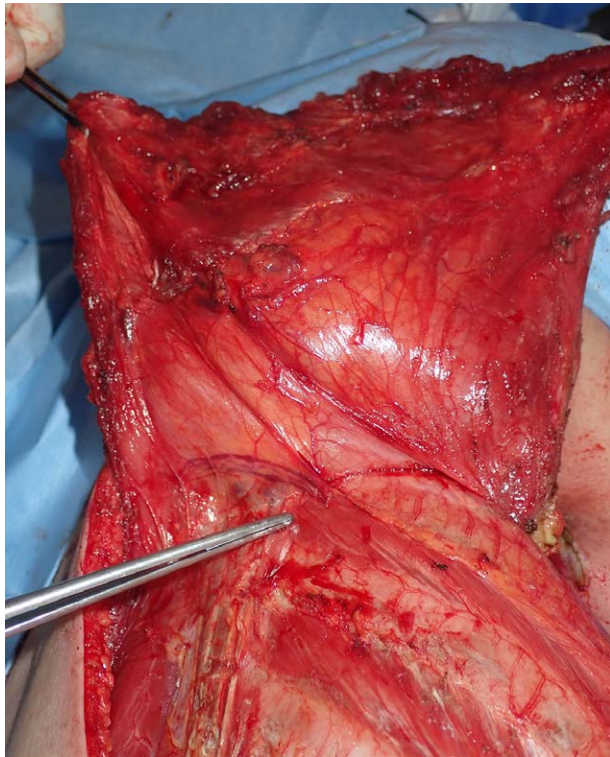


Fig. 2. Intraoperative photograph showing the elevated LD musculocutaneous flap that was based on the eighth dorsal branch P-ICAP. The perforator is indicated by the forceps.

are 4–6 true anastomoses between the TDA branches and P-ICAPs in the proximal muscle⁷ as well as anastomoses between adjacent P-ICAPs.⁸ Notably, Watanabe et al⁹ described 3 separate vascular zones in the LD muscle that are connected by choke vessels: the first runs from the TDA to the 10th P-ICAP branches; the second runs from the 11th P-ICAP branches to the subcostal artery; and the third runs caudal to the first lumbar artery perforating branches. If the vascularity of any of the zones is eliminated, the pressure gradient causes choke vessels to flow from adjacent zones. This anatomy suggests that it is possible to elevate the entire LD on the basis of not only the TDA but also a dominant P-ICAP that relies on shared perfusion in the proximal part of the muscle and the opening of choke vessels distally. However, Watanabe et al did suggest that the most distal muscle zone may be prone to ischemia when relying on perfusion from the proximal zone.

In 1980, Bostwick et al¹ first described using the LD muscle based on segmental perfusion from P-ICAPs. This was for reconstructing posterior defects.⁵ Four reports from 2015 to 2023 then described using part or all of the LD muscle based on a P-ICAP for lateral chest, intrathoracic, and lower back defects. In 2 of those cases, intraoperative indocyanine green was used to select the dominant perforator and to evaluate flap perfusion (Table 1). In our case, the defect was in the anterolateral chest. Therefore, we designed a flap with a long vertically oriented cutaneous part that reached the iliac crest and used the entire



Fig. 3. Postoperative photograph 3 months after surgery. The surgical wounds had recovered well, and the defect was fully closed.

LD muscle, enabling the flap to reach the defect with the selected dominant P-ICAP as the pivot point. The flap was also designed as a transposition flap, and a skin bridge was maintained to reduce the risk of venous congestion; the latter is an important additional route for venous drainage.¹⁰ Donor-site closure assisted in advancing the flap toward the defect, and the flap reached the chest area beyond the anterior axillary line without tension.

CONCLUSIONS

Our case, previous reports, and anatomical studies support the use of the LD muscle as a pedicled flap that is based on a single dominant P-ICAP for reconstructing anterolateral chest defects where the TDA is damaged. This helps avoid using alternative flaps that harbor potential donor-site morbidity or longer operation times. When possible, a skin bridge should be maintained to provide additional venous drainage. Intraoperative use of indocyanine green can help choose the dominant perforator in questionable cases.

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DISCLOSURE

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

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