60 Lumbar Artery Perforator Flap

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Summary
The lumbar artery perforator flap is a difficult but viable option in breast reconstruction. It tends to be a flap of last resort due to its difficulty and short pedicle. It is used only when other options in the form of the upper medial thigh or buttock have been exhausted or are not available.

Keywords: lumbar artery, perforator flap, breast reconstruction

Key Teaching Points
- Preoperative imaging is helpful.
- This is a difficult flap to raise.
- The pedicle is short—2 to 3 cm.
- The vein is frequently much larger than the artery.
- Fat necrosis is common if flap harvest is taken too laterally around the flank.

60.1 Anatomy

60.1.1 Surface Anatomy

Landmarks
The lumbar area, defined by the lumbar spinal bodies, from the midline to the midaxillary line.

Composition
Fasciocutaneous.

Size
Size is 15 × 24 cm maximally. As with most flaps of the back, in most patients, primary closure can be obtained with a width of 10 cm or less. In patients with skin laxity, this can be greater.

60.1.2 Arterial Anatomy

Dominant Pedicle
Lumbar perforating arteries.
- Regional source: Aorta (L1–L4); iliolumbar arteries (L5).
- Length: 2 cm.
- Diameter: 1 mm.
- Location: Perforators from the upper three lumbar vertebral bodies run between the erector spinae and the quadratus lumborum muscles. The last two pairs of perforators run in front of the quadratus lumborum muscles just lateral to the erector spinae musculature. Each lumbar artery gives off a perforating vessel. The second and fourth perforators generally are the largest.
60.1.3 Venous Anatomy
Accompanying venae comitantes with the perforators.

Nerve Supply
Sensory
Superior cluneal nerves (L1–L3) (Fig. 60.1).

60.1.4 Vascular Anatomy
See Fig. 60.2.

60.2 Indications
The flap is a third- or fourth-tier option in breast reconstruction. It is used when the abdomen, upper medial thighs, or gluteal regions have been exhausted or are unavailable or unsuitable.
Fig. 60.2 (a) Arterial system and (b) artery and bone are shown in these posterior views of three-dimensional reconstructions of the pelvic region from a human cadaver angiographic injection specimen (1, lumbar artery; 2, superior gluteal artery). (c) Interior view and (d) angiogram of the soft tissues of the gluteal region (L3 and L4, third and fourth lumbar arterial perforators; 1, anterior branch of the fourth lumbar arterial perforator; 2, posterior branch of the fourth lumbar arterial perforator; 3, ascending branch of the superior gluteal artery; IGA, inferior gluteal artery; SGA, superior gluteal artery; green arrow, anterior superior iliac spine; red arrow, greater trochanter; blue arrow, gluteal fold). (From Zenn M, Jones G. Reconstructive Surgery. New York, NY: Thieme Medical Publishers; 2012)
60.3 Surgical Technique

60.3.1 Planning

Doppler examination, cross-referenced with angiography (computed tomography angiography [CTA]/magnetic resonance imaging angiography [MRA]), provides accurate determination of the location of the lumbar perforators (Fig. 60.3).

60.3.2 Design and Markings

Lumbar artery perforators are first localized using Doppler ultrasound. The flap design then encompasses this Doppler point. The margins of the flap can run from midline to midaxillary line, depending on the reconstructive need. Elliptical patterns are most common, since they aid in closure (Fig. 60.4). The skin pattern and associated bevel of the underlying fat may be tailored accordingly (Fig. 60.5).

60.3.3 Patient Positioning

The patient is placed prone or in the lateral decubitus position.

60.3.4 Flap Dissection

Dissection begins laterally at the distal end of the flap (Fig. 60.6).

The incision is deepened down to lumbar fascia, which is not elevated with the flap so as to prevent lumbar hernia formation. As the dissection proceeds through the subcutaneous fat, I prefer to elevate the flap superficial to the fascia.
underlying the fat. Although this makes the identification and skeletonization of the perforators more difficult, it avoids removing the lumbar fascia with the flap. Removing the fascia in this region introduces the potential of a lumbar hernia, which despite being a rare phenomenon, is best avoided. I prefer
to think of this flap as an adipocutaneous rather than a fasciocutaneous flap. As the dissection progresses around the perimeter of the flap, the superior cluneal nerves will be encountered over the superior border. These nerves are of impressive size, and in my experience, transection of them at their penetration point causes substantial numbness across the donor site.

### 60.3.5 Perforator Dissection

With identification of the perforator, the entire flap may then be incised and dissection proceeds completely around the perforator. The muscle can then be split and further dissection of the pedicle can be performed 2 to 3 cm to aid in mobilization and the arc of rotation of the flap. Since the vessels travel obliquely and anteriorly from the lateral edge of the rectus spinae muscle, excessive skeletonization of the pedicle does not lengthen the flap reach. When the perforating vessels are encountered, they will be tightly bound in fascial tissue, and the dissection plane under the flap will be somewhat difficult to navigate. Working through these challenges allows skeletonization of the pedicle, which can be impressive in its overall size. As the surgeon will soon discover, the majority of this size is a consequence of the vein's diameter rather than that of the artery. Preserving the fascia and splitting it around the perforator's surface allows the vessel to be followed through the underlying musculature (▶ Fig. 60.7). Careful dissection in these tight confines will allow the operator to acquire a pedicle 2 to 3 cm long with an arterial component of 1 to 1.5 mm diameter (▶ Fig. 60.8).

For free tissue transplantation, the length and diameter of the pedicle limit this flap’s utility. The short pedicle length means that it must be located somewhere near the periphery of the flap to allow for reach to the recipient vessels.

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**Fig. 60.7** Surgical exposure of the lumbar perforator. (From Zenn M, Jones G. Reconstructive Surgery. New York, NY: Thieme Medical Publishers; 2012)

**Fig. 60.8** Flap with both lumbar and superior gluteal perforators dissected out in its base. (From Zenn M, Jones G. Reconstructive Surgery. New York, NY: Thieme Medical Publishers; 2012)
The risk of fat necrosis in the areas farther away from a peripheral feeding perforator is, of course, a resultant concern. Lumbar artery perforator flaps have been described for autologous breast reconstruction, especially when abdominal tissues are not available. In this setting, the dissection of the pedicle is continued until a large enough vessel diameter can be exposed for coaptation in the chest. A position change is also required, because the flap is harvested in either the prone or lateral decubitus position, and the flap must be inset and shaped with the patient supine. Preoperative CTA or MRA studies can often be helpful to determine whether dominant vessels are available in this area for such procedures.

### 60.3.6 Flap Transfer

Flaps are transposed into the defect to be reconstructed. Although they may be tunneled subcutaneously, it is recommended to connect the donor site and the recipient site to take any unnecessary pressure off the pedicle of smaller perforating vessels and to allow for postoperative edema that could compromise flow in a subcutaneous tunnel.

### 60.3.7 Flap Inset

Lumbar flaps should be inset with a tension-free closure. All tension should be borne by the closure at the donor site. Drains are recommended for a few days to prevent seroma formation. The flap has a relatively narrow, inelastic skin envelope which can be challenging to inset, particularly in delayed reconstruction.

### 60.3.8 Donor Site Closure

Primary donor site closure should be possible in flaps 10 cm in width and possibly wider. In some patients, undermining of the donor site will allow further subcutaneous advancement and help minimize tension on closure. Because of the lumbar lordosis, it should be borne in mind that closure of this donor site is akin to a drum head pulled taut over a deep valley and seroma formation is common if this subcutaneous dead space is not closed adequately. Long-term drainage is imperative to prevent seroma.

### 60.4 Clinical Examples

This 56-year-old woman had a history of lobular carcinoma of the left breast and had undergone bilateral mastectomy with tissue expander–implant reconstruction 7 years earlier. Her complaints included chronic discomfort associated with her implants and recurrent low-grade cellulitis on the left. Additional concerns included poor central projection, asymmetry, lack of inframammary fold definition, and an overall poor aesthetic. Both breast implants were removed and capsulectomies performed, and her breast volume was reconstituted with an initial lumbar artery perforator flap. She subsequently underwent deep inferior epigastric perforator flap addition on both sides as a stacked overlay to her lumbar artery perforator flaps for added volume and skin paddle increase (Fig. 60.9).

This 40-year-old woman had a strong family history of breast carcinoma. She was seen in consultation for autologous reconstructive options before...
undergoing bilateral prophylactic mastectomies. Lumbar artery perforator flaps were used for immediate reconstruction to reconstitute her breast volume (Fig. 60.10a, b).

**Technical Pearls**

- The second or fourth intercostal perforator should be used preferentially, because these tend to be the largest perforators.
- Gluteal perforator flaps may be appropriate in cases in which a good lumbar perforator cannot be found on Doppler examination.
- Sensate flaps are possible by preserving the cutaneous nerve that travels with the perforator.
- Because of variable anatomy and small vessel size, the use of the lumbar perforator flap as a free tissue transfer is a distant third or fourth choice for reconstruction.
The lumbar artery perforator flap is rarely used in the clinical setting. Its anatomy tempts with the promise of a large composite of fatty tissue, but the underlying vascularity is challenging to deal with. Employing the lumbar perforator flap as a free tissue transfer is made difficult by the short pedicle (2–3 cm) and the fact that the artery remains small (~1 mm) throughout its length.

With respect to the use of the flap for breast reconstruction, it has the potential to provide a relatively large amount of fatty volume, even in individuals with a slight build. This fact may draw the breast reconstructive surgeon to consider its use. The lordotic curvature of the low back in this area provides a depressed deep surface to the flap harvest site and the convexity of the “love handle” on the superficial aspect means that the fatty depth is substantial in most patients at this level. Despite this, the overlying skin tends to be thick and inelastic, so the ratio of skin to fat is low. This can limit utility for breast reconstruction, particularly for delayed reconstructions. An attempt to harvest 10 cm or more of skin width with this flap will be met with a closure that is
akin to a drumhead over an underlying valley. The need to maintain a drain tube in place for a significant period and the likelihood of chronic seromas are other significant considerations.

### 60.6 Conclusion

The benefits of keeping the donor site higher up on the buttock and using the love handle in the breast reconstruction arena are favorable considerations (see Clinical Examples cases, Fig. 53.9, 53.10), but the technical limitations of this flap make it a less practical procedure than an SGAP flap, which is positioned high on the buttoc. The SGAP’s pedicle length, associated increased arc of rotation, and ease of pedicle dissection, compared with the lumbar perforator flap, make it a more favorable pedicled flap for defects in its periphery as well.

### Suggested Reading