

Stacked Profunda Artery Perforator Flaps for Unilateral Breast Reconstruction: A Case Report

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Abstract

A patient with a severe case of Poland syndrome presented with a painful capsular contracture from a previous implant-based breast reconstruction. She desired the implant to be removed and to proceed with autologous reconstruction, sizeable enough to match the volume of her contralateral breast. A paucity of abdominal donor tissue combined with the patient's hesitancy to acquire an anterior scar excluded this location as a free tissue transfer option. As an alternative donor site, the profunda artery perforator (PAP) flap was chosen. Bilateral PAP flaps were harvested and stacked using anterograde and retrograde anastomoses to the internal mammary vessels. Enough volume was present to fill her chest wall concavity and provide adequate projection to achieve symmetry with her contralateral breast. Her donor sites healed well and remained inconspicuous, without generating difficulties sitting. In conclusion, stacked PAP flaps provide an excellent alternative to an abdominal donor site for achieving large volume unilateral breast reconstruction.

Keywords

- ▶ breast reconstruction
- ▶ profunda artery perforator flap
- ▶ Poland syndrome

When a paucity of abdominal soft tissue is available for unilateral autologous breast reconstruction, matching the projection and shape of a large contralateral breast is challenging. One strategy is to perform abdominal free tissue transfer in conjunction with a contralateral reduction mammoplasty, although this approach is undesirable for patients who want to keep their breast size or have insufficient abdominal soft tissue to adequately achieve symmetry, even when the breast volume is reduced. Another method to maximize volume is to use the entire abdominal flap and anastomose both pedicles, one retrograde and one anterograde.¹ A further extension of this concept is to perform the reconstruction with stacked flaps, a technique that fills the breast pocket in a layered fashion using two separate hemi-abdominal free flaps, each with its own pedicle. However, when abdominal tissue transfer is not an option because of the patient's wishes or a surgical contraindication such as a previous abdominoplasty, an alternative donor site may be chosen. A single superior or inferior gluteal artery perforator

(SGAP or IGAP) flap can sometimes provide ample tissue; however, an SGAP harvest may cause significant donor site asymmetry with the contralateral buttock, and an IGAP may cause difficulties with sitting.²

As an alternative nonabdominal donor site, the profunda artery perforator (PAP) flap has recently been described.³ This flap uses posterior thigh soft tissue based on the profunda artery perforators, preserves muscle, and results in a well-hidden scar with minimal donor site contour deformity. Here, we present the first report of using stacked PAP flaps for a unilateral breast reconstruction.

Case Report

A 24-year-old woman presented with a severe variant of Poland syndrome manifesting as a right-sided hypoplastic breast, as well as absence of the pectoralis major and minor muscles, serratus anterior muscle, and multiple costal cartilages. She was otherwise healthy, weighed 54 kg, and

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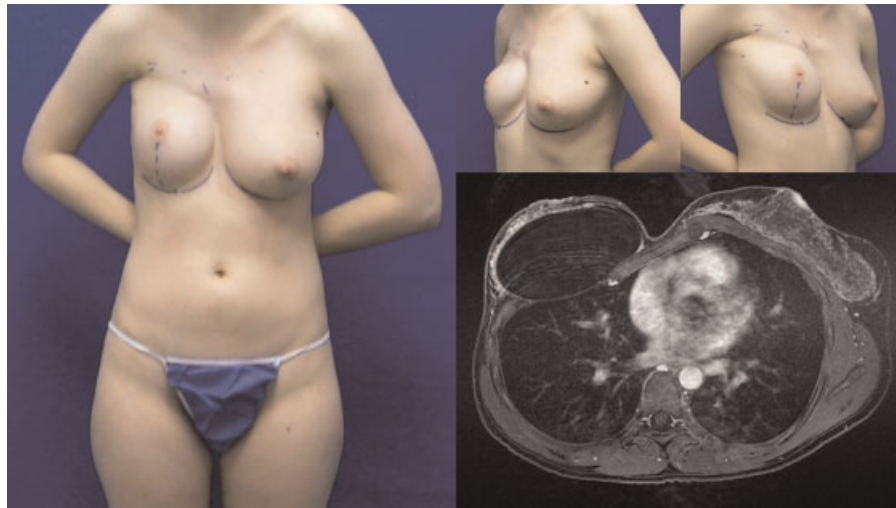


Fig. 1 (Left, top left, and top right) Preoperative photographs showing right breast capsular contracture and asymmetry. (Bottom right) Preoperative magnetic resonance images displaying muscle hypoplasia and absence of ribs. Note the chest wall concavity and excursion of the implant.

measured 5 feet and 4 inches tall, with only minimal abdominal adipose tissue. At the age of 18 years, she had undergone breast reconstruction with a tissue expander and subsequent saline implant placement filled to 320 cc, later on developing Baker grade IV capsular contracture, significant asymmetry, and pain (→**Fig. 1**). The nipple on the right was approximately 5 cm higher than the one on the left. Her left breast was normal and she wore a C-cup bra.

The patient sought treatment for the contracture and wished to have the implant removed, followed by breast reconstruction with autologous tissue. She expressed a desire to have the reconstruction match the size and shape of her normal breast. On the basis of her body habitus and desired breast size, it was decided to remove her implant and instead perform her reconstruction using bilateral PAP flaps in a stacked fashion. Nipple repositioning would be addressed at a later stage. Preoperative magnetic resonance angiography

demonstrated multiple perforating arteries through the gluteal and posterior thigh muscles. In the chest, her internal mammary and thoracodorsal vessels demonstrated normal anatomy and were patent bilaterally.

The recipient site was prepared by creating a vertical incision from the areola to the inframammary fold. After removal of the implant and completion of the capsulectomy, the medial remnant of the costal cartilage as well as some of the sternum was removed to expose the internal mammary vessels (→**Fig. 2**). Bilateral PAP flaps measuring 6.5 by 18 cm each were harvested without difficulty (→**Fig. 3**). Their combined weight was 522 g. Anastomoses to the right internal mammary artery and vein were performed. The right PAP flap was anastomosed retrograde and used to reconstruct the superior half of the breast. Implantable Doppler probes were placed on both the artery and vein for monitoring and the skin was completely deepithelialized so that the flap could be buried. The left PAP flap was anastomosed anterograde to reconstruct the inferior half. This flap was only partially deepithelialized so that external monitoring could be performed and that excess tension would not occur with closing the skin.

There were no complications during the case, and her postoperative course was unremarkable. She was discharged home on the fourth postoperative day. The skin paddle was later excised, and a scar revision and fat grafting was performed at 6 months, postoperatively. Her pain from the contracture resolved and good symmetry was achieved with the contralateral breast (→**Fig. 4**). Her donor incisions healed well and she did not experience difficulty sitting. Both the patient and surgeons were satisfied with her result.



Fig. 2 Intraoperative photograph demonstrating the breast pocket after explantation and capsulectomy. Note the outlined concavity of the chest wall, adding to the volume requirement of the reconstruction.

Discussion

Unsatisfactory implant-based breast reconstruction can compel patients to seek autologous options, as free tissue transfer offers patients the opportunity to use their own tissue, and



Fig. 3 (Top) Preoperative photograph demonstrating outline of bilateral profunda artery perforator (PAP) flaps and the location of the perforators. (Bottom) Intraoperative photograph of PAP flap harvest from the left leg. The dotted line represents the medial edge of the gracilis muscle. The marker points to the perforator. (Inset) Magnified view of the perforator dissection.

can provide long-lasting, cosmetically pleasing results while avoiding many of the complications associated with implants, such as contracture and infection.⁴ Although a variety of abdominal flaps can be used for this purpose, many patients lack the volume of tissue to achieve a symmetrical reconstruction. The recently described PAP flap is a nonabdominal source of tissue for breast reconstruction, although its volume is limited. In this case report, we have described the first report of using stacked PAP flaps for larger volume unilateral breast reconstruction.

The use of perforator flaps for augmentation mammoplasty in patients with Poland syndrome was first described by Allen and Heitland in 2003.⁵ Gautam et al reported a series of congenital breast deformity reconstruction using perforator flaps, and although deep inferior epigastric perforator and superficial inferior epigastric artery flaps were preferred, GAP flaps were used for cases where there was a paucity of abdominal tissue.⁶ However, the authors noted that SGAPs and IGAPs resulted in unfavorable scar positioning, SGAPs had a higher chance for requiring revision because of a buttock contour deformity, and IGAPs risked wound dehiscence. Furthermore, the IGAP harvests tissue from the medial fat pad over the ischial tuberosity and thus may lead to difficulty sitting.

The PAP flap perforators from the profunda femoris artery have good caliber vessel size (average artery: 2.2 cm and vein: 2.8 cm), and the pedicle length averages 9.9 cm (and can be as long as 13 cm), thus allowing for either ipsilateral or contralateral breast reconstruction using the internal mammary or thoracodorsal vessels as recipients.³ The long elliptical design provides an ideal breast shape for coning a naturally shaped breast, with a more pliable tissue quality compared with that in the fibrofatty gluteal area. In the situation where abdominal free tissue transfer cannot be performed for larger volume breast reconstruction, stacked PAP flaps can provide an alternative tissue source, allowing adequate volume restoration with potentially less donor site morbidity than other nonabdominal free tissue options.



Fig. 4 Appearance of breast reconstruction and donor sites at 1 year postoperatively.

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