



Considering factors for breast reconstruction using stacked profunda artery perforator flaps in an Asian patient: a case report

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In cases where there is insufficient abdominal tissue or a history of previous abdominal surgery, thigh tissue may be considered as an alternative for reconstruction. This report discusses a case involving a 49-year-old Asian woman with thin abdominal fat and thick thigh fat, who underwent a right nipple-sparing mastectomy followed by bilateral profunda artery perforator flap breast reconstruction. The discussion will address specific considerations relevant to Asian patients preoperatively.

Keywords Unilateral breast neoplasms / Free tissue flaps / Asian people / Case reports

INTRODUCTION

The deep inferior epigastric artery perforator (DIEP) flap is widely regarded as the preferred method for autologous breast reconstruction due to its numerous advantages, including patient satisfaction, aesthetically pleasing outcomes, and minimal donor site morbidity. However, in cases where the abdominal soft tissue is insufficient to match the projection, volume, and shape of a relatively large breast, or in patients who have undergone previous abdominal surgery, the profunda artery perforator (PAP) flap is increasingly recognized as the most effective alternative. This option offers adequate soft tissue volume and features well-hidden scars with minimal donor site morbidity [1-3].

Although numerous studies have reported outcomes related to the PAP flap, there are very few cases specifically involving Asian patients. This report describes a 48-year-old Asian woman with thin abdominal fat tissue and thick thigh fat tissue who underwent

a right nipple-sparing mastectomy followed by bilateral PAP flap breast reconstruction. The discussion will focus on considerations that should be taken into account for Asian patients preoperatively.

CASE REPORT

A 48-year-old female patient with no notable medical or surgical history was diagnosed with right breast cancer. She had a body mass index of 27.27 kg/m², with a weight of 70.6 kg and a height of 160.9 cm. A skin-sparing mastectomy with sentinel lymph node biopsy was planned by a general surgeon. Prior to surgery, she visited our clinic for a consultation regarding immediate breast reconstruction. Given the patient's preference for autologous breast reconstruction and a predetermined schedule for post-mastectomy radiation therapy, implant-based reconstruction options were not considered. Her breast volume was moderate to large, with a large areolar size, a breast width of 15.0 cm, and a projection of 4.5 cm (Fig. 1). Although the DIEP flap is generally the preferred method for autologous breast reconstruction, preoperative computed tomography revealed that the thickness of her abdominal tissue was significantly less than that of her breast tissue (Fig. 2). Consequently, we opted for stacked PAP flaps as an alternative.

To evaluate the presence, location, caliber, and route of the PAP flap perforators, patients underwent preoperative lower extremity computed tomography angiography (Fig. 3). We selected the medial perforator nearest to the inferior gluteal crease. Markings for the preoperative gluteal crease were made while the patient was in a standing position. The general surgery team performed a skin-

Received: Oct 7, 2024 Accepted: Oct 9, 2024

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Fig. 1. A 48-year-old female patient diagnosed with right breast cancer with moderate to large breast volume and areolar size.



Fig. 2. (A) Computed tomography revealing the thickness of breast tissue. (B) Computed tomography revealing relatively thin abdominal tissue.

sparing mastectomy, and the excised breast tissue weighed 771 g. The third medial costal cartilage was removed to expose the internal mammary vessel. In a frog-leg position, bilateral PAP flaps, each measuring 14×6 cm, were harvested from the medial to the lateral portion with a transverse skin paddle orientation. Dissec-

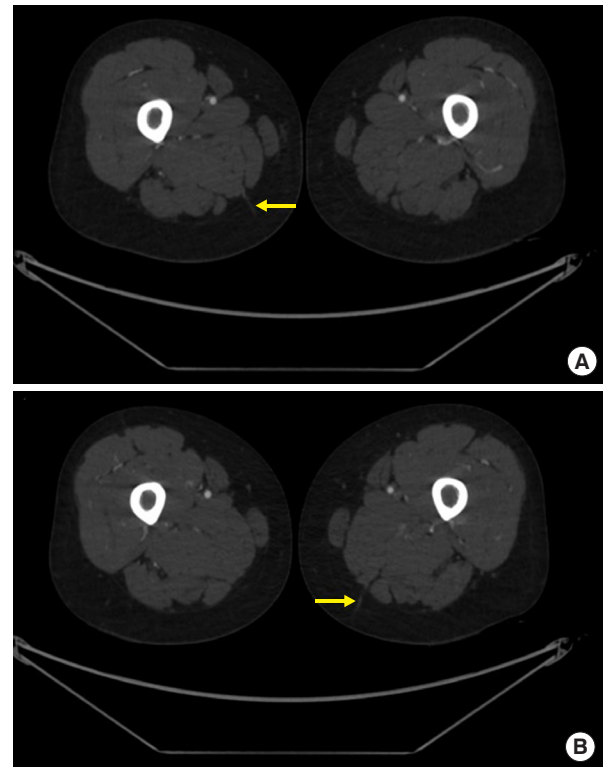


Fig. 3. (A) Preoperative lower extremity computed tomography angiography revealing a right profunda artery perforator (arrow) and (B) a left profunda artery perforator (arrow).

tion involved undermining the subcutaneous tissue above the gracilis muscle fascia. By retracting the gracilis muscle anterolaterally, we exposed the fascia covering the adductor magnus muscle, through which the PAP traveled. The pedicle dissection continued until it matched the proper length and diameter to reach the internal mammary vessels (Fig. 4). Before dividing the pedicle, 3 mg of indocyanine green was injected intravenously, and the good perfusion of the bilateral PAP flap was confirmed under a fluorescence camera (Fluobeam 800, Fluoptics).

The combined weight of the flap was 365 g. The right PAP flap was anastomosed in an antegrade fashion to reconstruct the superior half of the breast. The left PAP flap was anastomosed retrograde to address the inferior half of the breast (Fig. 5). Some of the skin from the PAP flap was preserved to replace the excised areolar tissue, and the remaining unnecessary skin was de-epithelized. The volume of the reconstructed breast was adequate, and the blood flow in both flaps was intact. The donor site was closed in layers, and a drain was inserted on each side (Fig. 6).

There were no vascular complications, and the course of the reconstructed breast was unremarkable. Partial skin necrosis of the mastectomy flap occurred; debridement and primary closure were performed (Fig. 7). The donor site was clear, with no evidence of wound dehiscence.

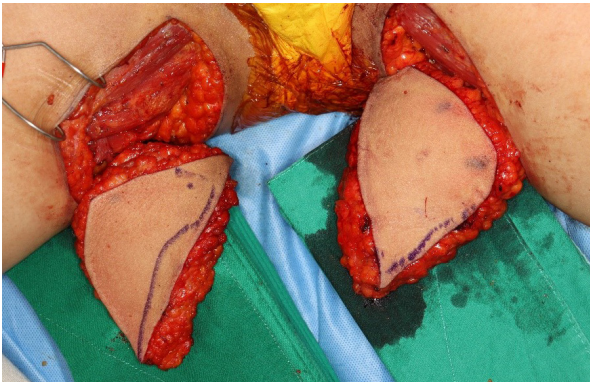


Fig. 4. Bilateral profunda artery perforator flap before pedicle division.

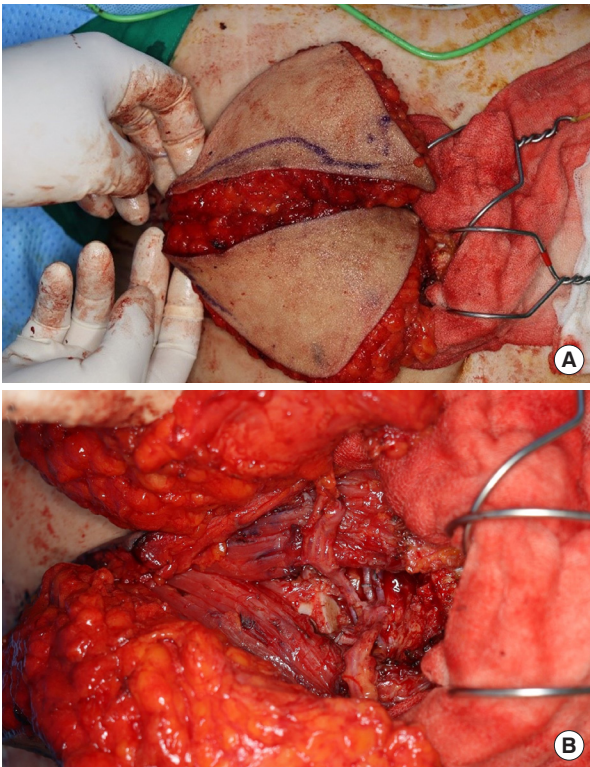


Fig. 5. The right profunda artery perforator (PAP) flap was anastomosed in an antegrade manner, obliterating the superior half of the breast. The left PAP flap was anastomosed in a retrograde manner to reconstruct the inferior half breast. (A) The right PAP is placed above and the left PAP is placed below. (B) The divided internal mammary vessel is anastomosed independently to the vascular pedicle from each side of the flap.

DISCUSSION

For patients who lack sufficient abdominal tissue due to a limited amount or previous abdominal surgeries, alternative flaps such as the superior gluteal artery perforator (SGAP) flap, inferior gluteal



Fig. 6. (A) Immediate postoperative image in the frontal view. (B) Right side and (C) left side after primary closure at the donor site.

artery perforator (IGAP) flap, or PAP flap may be considered. However, SGAP and IGAP flaps often result in unfavorably positioned scars and higher donor site morbidity [3]. To reduce donor site morbidity, the PAP flap was introduced in 2012 as an alternative to the DIEP flap for breast reconstruction [1]. The PAP flap enables the harvesting of a relatively large volume of tissue that can be easily shaped, providing natural and durable results for reconstructed breasts of small to moderate size. Unlike gluteal artery perforator flaps, the PAP flap does not alter the contour of the buttocks. Additionally, its elliptical design is ideally suited for coning to achieve a natural breast appearance. In this case report, we share our experience with using stacked PAP flaps to preserve the benefits of the PAP flap while addressing the limitation of size.

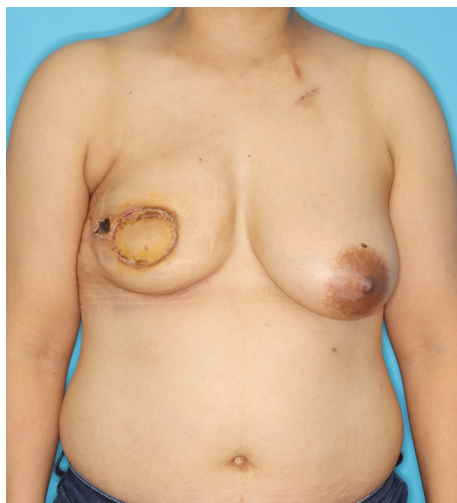


Fig. 7. Photograph from postoperative 30 days. In this case, a vertical length of over 6 cm and a transverse length of over 14 of the flap were necessary to ensure breast symmetry. However, during the pinch test to measure maximal width, it was found that harvesting a flap larger than 6 cm in width resulted in significant tension on the donor site wound, limiting the size of the flap that could be obtained.

We designed the skin paddle with a transverse orientation. In this instance, a vertical length of over 6 cm and a transverse length of over 14 cm were required to achieve breast symmetry. However, during the pinch test, which measures maximal width, it was determined that harvesting a flap wider than 6 cm caused significant tension at the donor site wound. This tension limited the size of the flap that could be safely obtained.

Caucasians have the lowest incidence of keloids and the thinnest epidermal thickness [4,5], while Asians typically exhibit the thickest epidermis [6]. Therefore, for Asian breast cancer patients, it is crucial to conservatively set the skin paddle of the PAP flap to minimize complications such as poor donor scar quality and dehiscence. Additionally, because a portion of the PAP flap includes gluteal tissue, it is less pliable than lumbar or abdominal tissue. In this instance, the harvested flap was relatively non-pliable, which limited the ability to achieve an aesthetically pleasing breast shape postoperatively. Further research is necessary to investigate variations in fat density based on ethnicity and age.

When selecting between bi-pedicled or stacked flaps, there are three available options for anastomosis: (1) crossover anastomosis between the right and left sides of the flap to create a single pedicle for anastomosis at one recipient site, also known as “turbocharging”; (2) two anastomoses of the right and left pedicles to two recipient sites (internal mammary artery and the thoracodorsal axis); and (3) modifying the internal mammary vessels to create a single recipient site for both pedicles.

We chose the third option. The internal mammary artery and vein were divided at the midpoint of their exposed lengths, allow-

ing for the independent anastomosis of the vascular pedicle from each side of the flap to the internal mammary vessels [7]. One anastomosis exhibited antegrade flow, while the other demonstrated retrograde flow. Concerns may arise regarding fat necrosis, which can occur due to inadequate blood flow in a retrograde anastomosis. However, a previous study reported that retrograde anastomosis, utilizing the distal segments of the internal mammary vessels, reliably supported flap perfusion [8]. The arterial inflow and venous outflow in the distal segments of the internal mammary vessels provided sufficient perfusion and venous drainage through their terminal branches. In this case, there was no occurrence of fat necrosis in the bilateral flap.

In summary, although the stacked PAP flap can serve as an alternative for large breast reconstruction, Asian patients might need a more conservative approach regarding flap dimensions due to tissue firmness. This strategy can help minimize complications at the donor site. Additionally, achieving symmetry in ptotic breasts may present challenges, and it is crucial to discuss these factors with the patient.

NOTES

Conflict of interest

Tai Suk Roh is an editorial board member of the journal but was not involved in the peer reviewer selection, evaluation, or decision process of this article. No other potential conflicts of interest relevant to this article were reported.

Patient consent

The patient provided written informed consent for the publication and use of her images.

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