

The Piggyback Superficial Circumflex Iliac Perforator Flap for Complex Free Flap Reconstructions

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Summary: This article introduces a reproducible strategy for complex reconstruction scenarios that require the use of two flaps. It specifically focuses on the utilization of the superficial circumflex iliac artery perforator (SCIP) flap as a secondary flap, particularly in complex cases where available arterial options are limited. In the first scenario, the SCIP flap is elevated simultaneously during elevation of a fibula bone flap. The pedicle of the fibula flap will be anastomosed to the recipient vessels, and the pedicle artery of the SCIP flap, the superficial circumflex iliac artery, will be anastomosed to the distal end of the peroneal artery. The SCIP flap pedicle offers greater length compared with a cutaneous flap sourced from the peroneal artery, thus providing increased flexibility for the flap inset. In the second scenario, the SCIP flap is combined with the anterolateral thigh (ALT) flap to manage a significant defect. The pedicle of the ALT flap is anastomosed to the recipient vessels, and the superficial circumflex iliac artery is anastomosed to the distal end of the pedicle artery of the ALT flap, the descending branch of the lateral circumflex femoral artery. The SCIP flap can be harvested simultaneously with a fibula flap or an ALT flap from the same side, and its arterial anastomosis can always be established with the distal ends of the arterial pedicle of these two flaps. This efficient and reproducible method can also contribute to minimal donor site morbidity and will be particularly valuable in settings where recipient artery choices are limited. (*Plast Reconstr Surg Glob Open* 2024; 12:e5899; doi: [10.1097/GOX.0000000000005899](https://doi.org/10.1097/GOX.0000000000005899); Published online 17 June 2024.)

CONCISE PRESENTATION OF UNIQUE IDEA, INNOVATION, OR TECHNIQUE

The chimeric flap concept is useful in complex reconstruction where multiple flaps become necessary.¹⁻³ However, locating a suitable artery for the secondary flap can be challenging due to the inherent difficulty in certain circumstances of identifying an arterial branch of sufficient size in certain circumstances. This is why a different recipient artery is used for the second flap in many head and neck reconstructions and in breast reconstructions, where retrograde flow of the internal mammary artery is often used.^{4,5} During reconstruction of the extremities,

particularly in the lower extremity, there are instances where this approach cannot be used, mainly for two reasons: firstly, the availability of arterial options is restricted, and secondly, retrograde flow often fails to provide adequate perfusion for larger flaps.

The aim of this report is to introduce a highly effective and reproducible technical strategy using the superficial circumflex iliac artery perforator (SCIP) flap as a secondary flap to circumvent difficult situations that require use of two flaps.

Adding the SCIP Flap to the Fibula Flap

The SCIP flap is elevated simultaneously during elevation of a fibula bone flap, in a two-team approach. This can be done on the same side, as the placement of a tourniquet will not interfere with elevation of a SCIP flap. The pedicle of the fibula flap will be anastomosed to the recipient vessels, and the pedicle artery of the SCIP flap, the

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Received for publication October 26, 2023; accepted April 24, 2024.

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DOI: [10.1097/GOX.0000000000005899](https://doi.org/10.1097/GOX.0000000000005899)

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

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superficial circumflex iliac artery (SCIA), will be anastomosed to the distal end of the peroneal artery in an end-to-end fashion.

CASE 1

A wide resection of osteosarcoma of the left tibia left a 20-cm bone defect and a 12×9cm skin defect. A 25-cm fibula flap was harvested from the right lower leg, which was inset into a tibial allograft. The allograft and the fibula flap were inset into the bone defect using a plate, and the peroneal artery was anastomosed to the posterior tibial artery. The peroneal vein was anastomosed to the vena comitans of the posterior tibial artery. A 15×9cm SCIP flap with 4-cm-long pedicle was harvested simultaneously with the fibula flap, and was used to cover the defect over the allograft and hardware (Fig. 1A). The SCIA (1.2mm) was anastomosed to the distal end of the peroneal artery (1.0mm) of the fibula flap (Fig. 1B). The superficial circumflex iliac vein (SCIV) was anastomosed to the great saphenous vein to prevent compression to the vein after flap inset.

Adding the SCIP Flap to the Anterolateral Thigh Flap

When an extra flap becomes necessary, the SCIP flap can be elevated at the same time as the anterolateral thigh (ALT) flap. The pedicle of the ALT flap is anastomosed to the recipient vessels, and the SCIA is anastomosed to the distal end of the pedicle artery of the ALT flap, the descending branch of the lateral circumflex femoral artery (LCFA).

CASE 2

A wide resection of sarcoma originating from the left axillary region left a 30 x 9 cm defect at first, but intraoperative pathology came back positive, and the additional resection left a 30×18cm defect. During elevation of a 30×9cm ALT flap, an additional flap became necessary. A 15×9cm SCIP flap was elevated from the same side to add to the coverage of the large defect (Fig. 2A). The descending branch

Takeaways

Question: How should you combine a superficial circumflex iliac artery perforator (SCIP) flap with other free flaps?

Findings: The SCIP flap can be harvested simultaneously with a fibula flap or an anterolateral thigh flap from the same side, and its arterial anastomosis can always be established with the distal ends of the arterial pedicle of these two flaps.

Meaning: The piggyback SCIP flap offers an efficient and reproducible method that can also contribute to minimal donor site morbidity and will be particularly valuable in settings where recipient artery choices are limited.

of the LCFA and its vena comitans were anastomosed to the thoracodorsal artery and its vena comitans (Fig. 2). The SCIA (1.0mm) and the SCIV (1.5mm) were anastomosed to the distal end of the descending branch of the LCFA (1.5mm) and its vena comitans (2.4mm). The range of motion was not limited postoperatively. (See figure, **Supplemental Digital Content 1**, which shows that range of motion of the shoulder was not affected by reconstruction using free flaps. <http://links.lww.com/PRSGO/D275>.)

DISCUSSION

When a long bone flap and a skin paddle are necessary, the most common reconstruction approach is to use the fibula bone flap with a skin paddle perfused from the peroneal artery. However, the length of the perforator from the peroneal artery to the skin paddle is limited to only a few centimeters.⁶ This constraint can potentially lead to the pulling or kinking of the pedicle, especially in extremity reconstruction. Secondly, in most cases, harvesting a skin paddle from the lateral lower leg requires skin grafting at the donor site.⁷ The proposed approach obviates the need for skin grafting at the donor site.

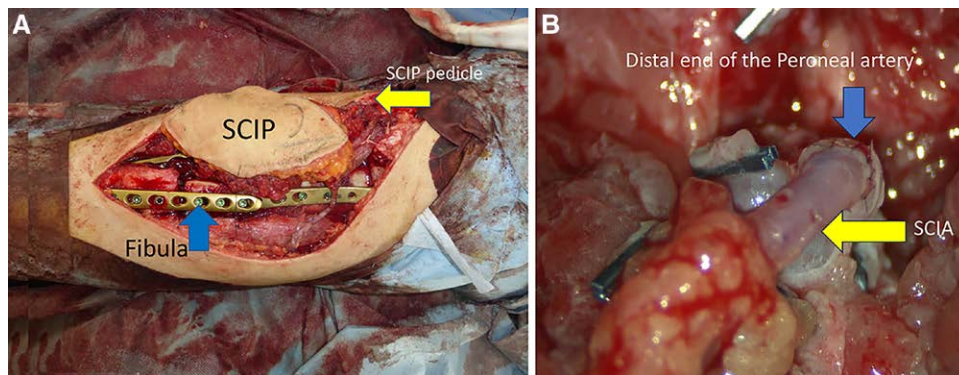


Fig. 1. Piggyback SCIP to the fibula flap. A, A wide resection of osteosarcoma of the left tibia left a 20-cm bone defect and a 12×9 cm skin defect. A 25-cm fibula flap was inset into a tibial allograft, which was fixed to the defect with a plate after a wide resection of osteosarcoma of the tibia. A 15×9cm SCIP flap with 4-cm-long pedicle was harvested simultaneously with the fibula flap, and was used to cover the defect over the allograft and hardware. B, The SCIA (1.2mm) was anastomosed to the distal end of the peroneal artery (1.0mm) of the fibula flap, which was anastomosed to the posterior tibial artery in the defect.

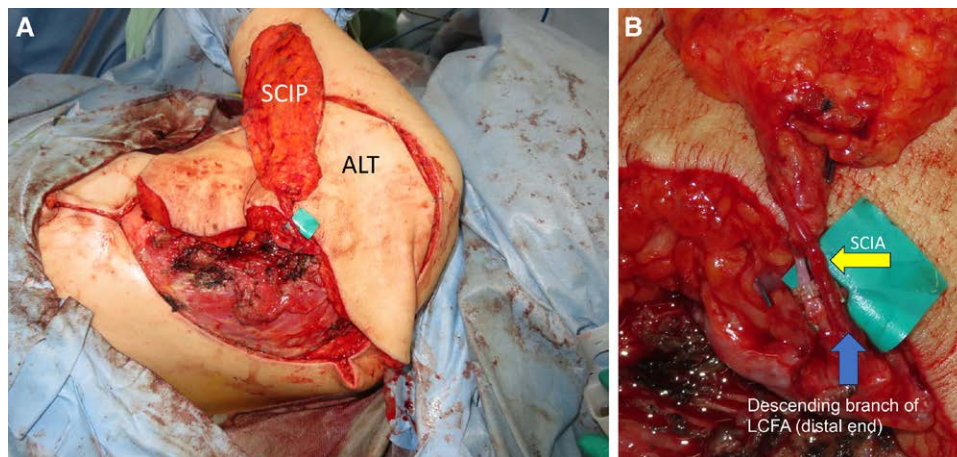


Fig. 2. Piggyback SCIP to the ALT flap. A, A 30×9 cm ALT flap and a 15×9 cm SCIP flap were elevated from the left side to cover a 30×18 cm defect after resection of sarcoma originating from the left axillary region. B, The SCIA (1.0 mm) and the SCIV (1.5 mm) were anastomosed to the distal end of the descending branch of the LCFA (1.5 mm) and its vena comitans (2.4 mm).

Adding the ALT flap to the fibula flap has become the gold standard when a large skin paddle is necessary. Finding a sizable branch of the peroneal artery suitable for anastomosis with the pedicle artery of the ALT flap can be difficult at times, and this is why a different recipient artery is often used in head and neck cases, where options for the recipient artery are abundant.⁸

The pedicle length of the SCIP flap can be adjusted during its elevation, and can be as long as 10 cm, which is longer than the perforator length of the peroneal artery perforator flap.^{9–11} Unlike the ALT flap, the donor site of the SCIP flap can still be directly closed after harvest of a flap with a width as large as 12 cm.¹² The average caliber of the SCIA is 1.2–1.5 mm, and this is ideal for end-to-end anastomosis to the distal end of the peroneal artery or the distal end of the LCFA, when adding a SCIP flap to an ALT flap.¹²

The greatest disadvantage of this method is the small caliber of the SCIA, which can be as small as 1.2 mm. This requires experience with small caliber vessels to a certain level.

We strongly endorse the piggyback SCIP method as a straightforward yet effective and reproducible strategy that inflicts minimal morbidity at the donor site. This approach proves particularly valuable in scenarios where the choices for the recipient artery are limited.

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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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