

A Unique Case of Lower Limb Soft Tissue Reconstruction with a Prefabricated Bipedicled Deep Inferior Epigastric Artery Flap

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Summary: Aesthetic lower-extremity reconstruction is a secondary field in lower limb reconstructive surgery. Nevertheless, it plays an important role in the final stages of patient rehabilitation after traumatic events, treatment of deformations, and oncoplastic surgery, and in unique cases of purely aesthetic reconstruction. We present a clinical case of lower limb reconstruction with a prefabricated bipedicled deep inferior epigastric artery (DIEP) flap in a young patient who underwent a massive congenital circular pigmented nevus excision surgery. Due to the lack of sufficient donor site tissues anywhere on the body, a bilateral DIEP flap was prefabricated using tissue expansion. Two expanders were used to prepare the donor site. Six months after expansion, lower limb reconstruction was performed. A large (50 × 25cm²) surgical defect was covered by a prefabricated DIEP flap. Flap positioning was regarded with extra care due to importance of proper venous outflow in accordance with lower limb venous anatomy. Treatment results were above the satisfactory level both aesthetically and therapeutically. Aesthetic and therapeutic incentives were assessed before surgical treatment decision. Large defects of the lower limbs require significant amount of excess tissue in the donor site and may require prefabrication. In young patients with low BMI, flap transfer is nearly impossible without prior expansion. In this case, we successfully performed giant pigmented nevus excision, with immediate reconstruction with a prefabricated bilateral DIEP flap. Venous outflow was problematic due to the anatomical structure of lower limb veins. This required extra venous drainage and special regard to positioning of the flap. (*Plast Reconstr Surg Glob Open* 2020;8:e2976; doi: [10.1097/GOX.0000000000002976](https://doi.org/10.1097/GOX.0000000000002976); Published online 24 July 2020.)

Rare clinical cases resulting in new approaches to lower limb reconstruction have a high impact on future practice. The aesthetic and therapeutic components in lower limb reconstruction can be equally important, underlining the need for intricate problem-solving and algorithmic approach in complex patients.

A 27-year-old woman presented with a massive (50 × 25cm²) congenital circular pigmented nevus covering over 80% of calf skin on the left lower limb (Fig. 1). This condition caused significant aesthetic discomfort and was a serious oncologic hazard.¹ Repeated traumatization of the nevus was cause for concern. After primary consultation, our surgical brigade decided that the best possible procedure would be excision of nevus with lower limb defect closure via prefabricated bipedicle deep inferior epigastric artery (DIEP) flap.

CASE REPORT

Due to the patient's aesthetic body type and low fat (body mass index, 22), prefabrication of the flap was necessary. Six months before surgery, 2 expanders were implanted into the anterior abdominal wall between the rectus sheath and subfacial adipose tissue. The expanders were positioned with preservation of paraumbilical medial perforators and lateral perforator vessels. Preoperative computed tomography visualization and careful dissection allowed for preservation of larger perforator vessels,

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Fig. 1. Preoperative view. Giant pigmented nevus of the left lower limb.

deemed necessary for flap viability. The expanders were consecutively filled with saline: the epigastric expander was filled to 450ml, and the hypogastric expander was filled to 550ml (Fig. 2).

Surgical Procedure

The patient was placed in a supine position, with legs spread. After incision, the expanders were removed. A bilateral DIEP flap measuring $45 \times 20 \text{ cm}^2$ was raised with the preservation of superficial veins. The DIEP flap was mobilized on a left medial perforator vessel and a right lateral perforator vessel. After dissection, the left pedicle was 12 cm long and the right pedicle was 14 cm long. The right and left



Fig. 2. Preoperative view of donor site: prefabrication of bilateral DIEP flap.

superficial veins were preserved and dissected to a length of 8 cm. Due to the differences in venous anatomy of the anterior chest wall and the lower limb, extravenous drainage was required for flap viability. Simultaneously, a second surgical brigade prepared the recipient zone. Following excision of the nevus ($50 \times 25 \text{ cm}^2$), the recipient vessels were located and prepared for microvascular anastomosis. The bipedicle DIEP flap was prepared and transferred into the recipient zone. A total of 5 microsurgical anastomoses were made. Microvascular end-to-side anastomoses of the left DIEP pedicle artery and the anterior tibial artery were performed first. The left DIEP pedicle vein was anastomosed with an anastomotic branch of the vena saphena magna. The right DIEP pedicle artery was anastomosed end-to-side with the anterior tibial artery distally, and the vein was connected to an anastomotic branch of the rete venosum. The right superficial epigastric vein was connected to a perforator vein in the distal third of the calf.

RESULTS

The patient was hospitalized for 14 days, with monitoring and manual compression of the transferred flap to stimulate venous restructurization. Temporary venous congestion was seen as expected and was managed with compression and leeching. Drains were kept for 1 week. One week after surgery, the patient was activated, with portioned physical exercise and flap monitoring. Two weeks after surgery, the patient was discharged to ambulatory care. Six weeks after surgery, a corrective aesthetic procedure was done on the flap. After 6 months, the results were satisfactory (Fig. 3). Functionally, the lower limb is mobile, and the transferred flap is viable without tactile sensation, but elastic, without bulking and does not cause discomfort to the patient. The donor site scar is satisfactory, with no bulging, no abdominal wall weakness, or no discomfort noted.

DISCUSSION

The main difficulty in free-flap lower limb reconstruction is venous drainage.² The choice of flap for lower limb reconstruction depends on tissue thickness, availability,

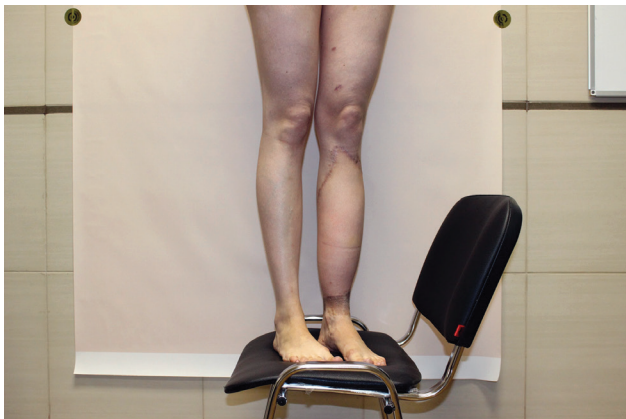


Fig. 3. Postoperative view of reconstructed left lower limb (6 months postoperative).

vasculature, and perfusion consistency. The abdominal area has the best characteristics for flap mobilization, due to persistent anatomy, an excess of tissues for mobilization, and an abundant venous system (superficial and deep). The DIEP flap minimizes anterior abdominal wall traumatization and provides sufficient tissue volume for large defect closure. Excising large amounts of abdominal tissues does not provide tissue deficiency in the donor site.

Due to the different vascular anatomy of the legs, it is important to account for venous congestion and position the flap for possibility of through-flow of venous blood.³

Despite significant problems with venous congestion, through exercise, physical therapy, and proper care, the flap is viable and aesthetically pleasing. High patient satisfaction and improvement of overall quality of life were achieved without considerable difficulty. This case highlights patient preparation steps in aesthetic lower limb reconstruction, surgical algorithm for closing a large defect on the lower limb, importance of venous anatomy differences in reconstructive surgery, and postoperative care with long-term patient management for best results.

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