

Unilateral Internal Mammary Recipient Vessels for Bilateral DIEP Flap Breast Reconstruction

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Summary: The deep inferior epigastric perforator flap has become increasingly popular for breast reconstruction with the most common recipient vessels being the internal mammary artery and vein. In certain cases, however, these recipient vessels are inadequate due to an absent or diminutive vein. Moreover, patients at high risk for future coronary artery disease may sacrifice the best conduit for coronary revascularization if the internal mammary recipients are used. Alternative recipient vessels, including the thoracodorsal, thoracoacromial, external jugular, and cephalic vessels have significant limitations. In this report, we describe a novel technique using unilateral internal mammary recipient vessels for bilateral free flap breast reconstruction. Two cases are presented that represent distinct indications for this technique: (1) absence or inadequacy of unilateral recipient vessels and (2) preservation of the left internal mammary system for future bypass in patients at high risk for coronary artery disease. (*Plast Reconstr Surg Glob Open* 2017;5:e1359; doi: 10.1097/GOX.0000000000001359; Published online 23 June 2017.)

INTRODUCTION

The deep inferior epigastric artery perforator (DIEP) flap is a popular method for breast reconstruction. The most common recipient vessels are the antegrade ipsilateral internal mammary (IM) vessels with the distal (retrograde) ends of the IM vessels ligated. In cases where the IM vessels are diminutive and unusable due to radiation, scarring, or anatomic variations, alternative recipient vessels are required. In other cases, the patient may be at high risk for coronary artery disease (CAD) and preserving the left IM vessels for future coronary artery bypass grafting (CABG) is desirable. The retrograde IM vessels are reliable for stacked flaps and bipediced flaps.¹⁻⁸ Here, we report the use of unilateral IM recipient vessels for bilateral DIEP flap breast reconstruction in 2 cases, representing distinct indications for this novel technique.

CASE 1

Patient 1 underwent bilateral mastectomy with immediate DIEP flap reconstruction. Following IM vessel exposure, the left venous diameter was < 1 mm, despite 2 rib resections,

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so it was deemed unusable. The IM vessels on the right were adequate. A decision was made to use the right antegrade and retrograde IM vessels for both DIEP flaps. The right retrograde IM vessels were used for the left-sided flap after the pedicle was tunneled across the midline in the subcutaneous plane over the sternum. The tunnel was created with a tonsil clamp and then widened bluntly, accommodating a finger. The pedicle was oriented with a marking pen and passed into a Penrose drain through the tunnel. The Penrose was pulled through the right mastectomy wound, bringing the properly oriented pedicle with it. The right antegrade IM vessels were used for the right DIEP flap in standard fashion (Fig. 1). To have enough pedicle length to cross the midline, it was dissected to its origin off the external iliac vessels. Additionally, ipsilateral flaps were employed, orienting the point at which the periumbilical perforator enters the flap inferomedially, thus providing additional length. Following anastomosis, the pedicle on the left had a weaker pulse, but both flaps had triphasic cutaneous Doppler signals. Mixed tissue oximetry demonstrated adequate and stable postoperative perfusion. The patient followed standard postoperative protocol and was discharged on postoperative day (POD) 4 without complications.

CASE 2

Patient 2 underwent bilateral mastectomy with immediate DIEP flap reconstruction. She had multiple risk factors for CAD so the left IM vessels were electively preserved and not exposed. The technique was identical to

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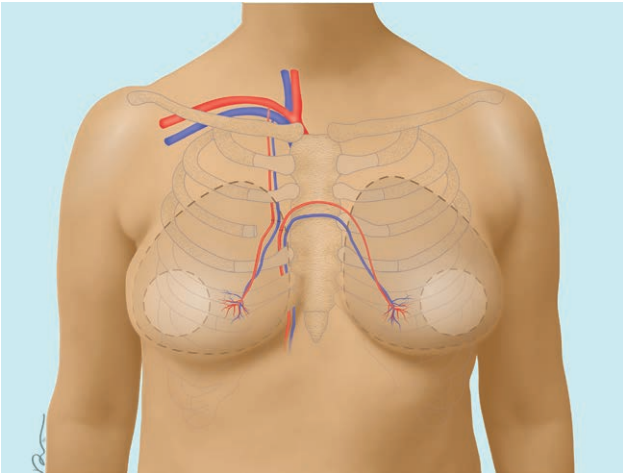


Fig. 1. Unilateral recipient vessels for bilateral DIEP flap reconstruction. In the described cases, the right IM recipient vessels were used and the left DIEP flap pedicle was tunneled across the sternum in the subcutaneous plane. Ipsilateral flaps are utilized to medialize the perforator, effectively increasing pedicle length for tunneling across the midline.

our first case. This patient did well postoperatively and was discharged on postoperative day 4.

On long-term follow-up, patient 2 had palpable (but not visible) bilateral upper pole fat necrosis. Otherwise, both patients recovered well and without further complications.

DISCUSSION

The use of bilateral DIEP flaps remains a popular option for muscle/fascia sparing autologous breast reconstruction. In the vast majority of cases, the standard technique of using ipsilateral recipient vessels is successful. However, this may not be feasible or desirable in every patient. Alternative techniques, such as use of IM perforators, have the advantage of avoiding rib resection but are not as reliable due to variations in mastectomy technique and patient anatomy.¹ Additionally, most surgeons use the IM artery (IMA) and IM vein (IMV), not the perforator, which makes our described technique a more commonly available option. Retrograde IM vessels have been shown to be reliable in both stacked and bipedicle flaps.²⁻⁹ Techniques of tunneling pedicles have proven useful and necessary in both lower extremity and head and neck reconstruction.¹⁰ The technique presented is based on these 2 basic microsurgery concepts yielding 2 significant advantages over traditional approaches.

First, it presents a reliable alternative when IM vessels are unsuitable on 1 side. Other options require the use of a vein graft to reach alternate recipient vessels and involve additional vessel dissection and operative time, whereas our technique does not add time and utilizes highly reliable vessels. In certain techniques, both flaps are dependent on the primary deep inferior epigastric artery and IMA anastomosis, whereas with our technique each flap has a separate anastomosis to the primary recipient vessel. Additionally, the existence of stumps after additional vessel dissection increases the risk of thrombus formation that can propagate into the main pedicle.¹¹ Alternate

recipients such as the thoracodorsal vessels are no longer routine for most perforator flap surgeries, and microanastomosis in this deeper space can be ergonomically challenging. The thoracoacromial system has been proposed as another alternative recipient^{12,13}; however, this requires another intramuscular dissection and the diameter may only be suitable at a high level. This may involve additional chest scars and can be ergonomically challenging. Alternative venous outflow options include turning down the external jugular vein or transposing the cephalic vein,¹⁴ both of which add scars and significant operative time. The contralateral retrograde IM vessels are already dissected and available for use in bilateral cases, unless both are deemed unsuitable.

Second, it offers benefits to patients at high risk for CAD and subsequent CABG. Breast cancer and CAD remain 2 leading causes of morbidity and mortality in women.¹⁵ In a recent study, breast cancer survivors had increased incidence of CAD with a hazards ratio of 1.27.¹⁶ Studies also show that radiation can cause coronary stenosis in a dose-dependent relationship.^{17,18} Although current methods for radiation therapy minimize exposure of the coronary vessels, this cannot be prevented completely, thereby eliminating the risk of coronary stenosis.¹⁹

Mastectomy with breast reconstruction and CABG are both common surgical interventions in women. Because breast cancer is typically diagnosed at a younger age than CAD, DIEP flaps using IM recipient vessels precludes the use of the preferred conduit for CABG in these patients. Although the impact of IM use for breast reconstruction on future CAD/CABG outcomes is unknown, the possible implications of this practice are alarming, especially, given the recent growth in microvascular breast reconstruction.²⁰

The method described employs a combination of clinically proven and accepted techniques, which have not been used in combination for bilateral DIEP flap reconstruction. Reports have been published using the retrograde IM vessels both for salvaging DIEP flaps and for stacked or bipedicle flaps when 1 flap provides inadequate volume.²⁻⁹ No publications have reported adverse effects or long-term ischemic complications. Additionally, tunneling a pedicle from recipient vessel to inset location is a well-established technique in both head and neck and lower extremity reconstruction.¹⁰

CONCLUSIONS

Combining the use of the retrograde IM system and tunneling the pedicle across the midline in the subcutaneous plane allowed us to successfully perform bilateral DIEP flap reconstructions using only the right IM vessels in 2 distinct cases. This technique should be considered on a case-by-case basis and provides another tool for the microvascular surgeon.

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