

Absent Internal Mammary Recipient Vein in Autologous Breast Reconstruction

Mayu Muto, MD*
 Toshihiko Satake, MD, PhD, FACS*
 Yuma Masuda, MD*
 Saya Kobayashi, MD*
 Shihoko Tamura, MD*
 Shinji Kobayashi, MD, PhD*
 Tohru Ohtake, MD, PhD†
 Jiro Maegawa, MD, PhD‡

Summary: The internal mammary vessels (IMA/Vs) have been used as the first-choice recipient vessels for microsurgical anastomosis and flap inset in autologous breast reconstruction owing to their ease of access and use compared with the thoracodorsal vessels (TDA/Vs). Herein, we report two cases of deep inferior epigastric perforator flap breast reconstructions in which the recipient internal mammary vein (IMV) was lacking. In the first case, a 50-year-old patient underwent delayed two-stage reconstruction, and in the second, a 45-year-old patient underwent delayed reconstruction because of capsular contracture following breast implant reconstruction. Neither patient received preoperative radiation therapy. During IMA/V preparation, we could not find the internal mammary vein (IMV) around the internal mammary artery (IMA) despite careful dissection. No internal mammary lymph node adenopathy and vascular encasement from metastasis were noted. Intraoperative indocyanine green angiography revealed absence of IMV, which was presumed to be congenital. Therefore, microsurgical anastomosis was performed to connect the deep inferior epigastric vessels to the thoracodorsal vessel. The postoperative course was uneventful in both cases. Although many anatomical studies have revealed different locations, diameters, branching patterns, and perforators of the IMA/V, absent IMV has been reported very rarely. In autologous breast reconstruction, plastic surgeons should be prepared for the possibility of the absence of IMV. (*Plast Reconstr Surg Glob Open* 2020;8:e2660; doi: [10.1097/GOX.0000000000002660](https://doi.org/10.1097/GOX.0000000000002660); Published online 25 February 2020.)

The transverse rectus abdominis muscle and deep inferior epigastric perforator (DIEP) flap are the standard breast reconstruction procedures, in both immediate and delayed cases. For microsurgical anastomosis, the internal mammary vessels (IMA/Vs) have been preferred over thoracodorsal vessels (TDA/Vs) because of their many advantages, such as consistent anatomy, easy access, reliable arterial flow, less severe irradiation sequelae, comfortable positioning for

surgeons while performing microsurgical anastomosis, and superior flap placement.^{1,2}

When performing delayed DIEP flap breast reconstruction, we encountered two cases in which the internal mammary vein (IMV) was lacking. Following careful dissection of the third intercostal space and indocyanine green (ICG) angiography, we could detect the internal mammary artery (IMA) but not IMV of the recipient drainage vein in both cases. Thus, TDA/Vs were used as alternative recipient vessels. Absent IMV is rarely discovered in autologous breast reconstruction with only three reported cases.^{1,3} Herein, we describe our two clinical cases along with their intraoperative anatomical and ICG angiographic findings.

CASE REPORT 1

A 50-year-old woman underwent delayed breast reconstruction with DIEP flap following left modified radical mastectomy and sentinel lymph node biopsy for invasive ductal carcinoma. She received a 1-year regimen of trastuzumab following adjuvant chemotherapy without radiotherapy (Fig. 1).

Eighteen months before the reconstruction, this patient underwent right reduction mammoplasty, in conjunction with the placement of a tissue expander on the left side. During dissection for the recipient IMA/V in the left

From the *Department of Plastic and Reconstructive Surgery, Yokohama City University Medical Center, Yokohama, Kanagawa, Japan; †Department of Breast Surgery, Fukushima Medical University Hospital, Fukushima, Fukushima, Japan; and ‡Department of Plastic and Reconstructive Surgery, Yokohama City University Hospital, Yokohama, Kanagawa, Japan.

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This study was approved by the institutional review board approval and conformed to the principles of the Declaration of Helsinki.

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Fig. 1. Preoperative photograph of case 1.

third intercostal space via the total rib-sparing technique (Fig. 2), we could find left IMA but not the concomitant IMV despite careful dissection under a microscope. There was no scar tissue or lymph node adenopathy around IMA. Intraoperative ICG angiography revealed the absence of the medial and lateral IMVs around the IMA (Video 1).

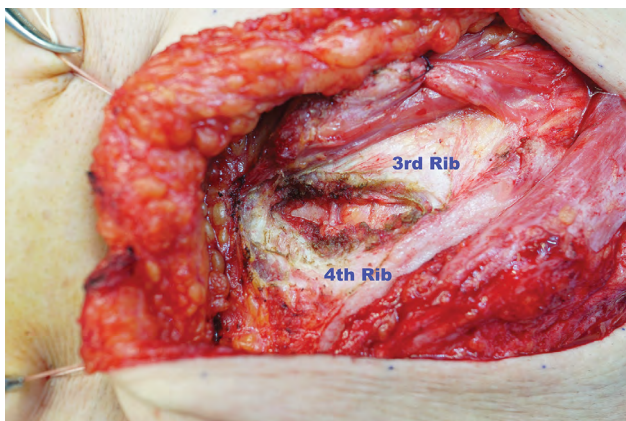


Fig. 2. Intraoperative photograph of the left third intercostal space of case 1, in which the intercostal muscle was removed after the separation of the pectoralis major muscle. The left internal mammary artery was unaccompanied by a concomitant vein.

(See Video 1 [online], which displays ICG angiography demonstrating absence of the left IMV.)

Therefore, instead of IMA/V, TDA/V on the affected side was used as the recipient vessel. Microsurgical anastomosis (involving one artery and two veins) between the pedicle of the right DIEP flap and the left TDA/V was performed (Fig. 3). The postoperative course was uneventful (Fig. 4). Twelve months after the reconstruction, the patient underwent left nipple-areola reconstruction.

CASE REPORT 2

A 45-year-old patient underwent left nipple-sparing mastectomy and sentinel lymph node biopsy for invasive ductal carcinoma, followed by immediate one-stage breast reconstruction with a silicone breast implant. She received adjuvant hormonal therapy alone. Capsular contracture occurred, and both the nipple-areola complex and inframammary fold migrated cranially. Four years after the surgery, the left breast implant was replaced with a DIEP flap. During reconstruction, the left TDA/V was used as recipient vessels instead of IMA/V because of the absence of the left concomitant IMV (SDC1). (See figure, Supplemental Digital Content 1, which demonstrates absence of the left IMV, <http://links.lww.com/PRSGO/B316>.) The postoperative course was uneventful.

DISCUSSION

IMA/V and the TDA/V are primarily used as recipient vessels in free flap breast reconstructions. TDA/V is used in cases in which axillary dissection is not performed. Performing microsurgical anastomosis, however, is difficult because these vessels have a deep axillary location.^{1,2} Moreover, inferior flap inset leads to lateral bulkiness and medial emptiness of the reconstructed breast. The disadvantages of using IMA/V include the concave deformity and intercostal neuralgia following rib resection, increased risk of pneumothorax and cardiac tamponade, and inability to use the vessel for future coronary artery bypass.^{1,2} However, IMA/V is the preferred recipient vessels because of the advantages of larger arterial diameter, more potential arterial flow, more comfortable surgeon's approach, more

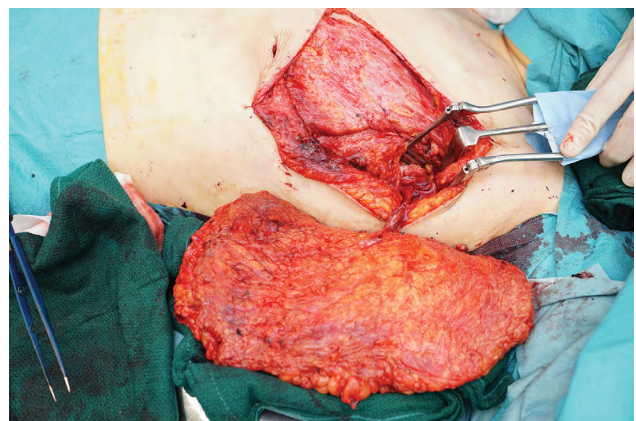


Fig. 3. The pedicle of the right deep inferior epigastric perforator (DIEP) flap was anastomosed to the thoracodorsal vessel on the affected side (case 1).



Fig. 4. Postoperative photograph of case 1. Twelve months after the breast reconstruction, nipple-areola reconstruction was performed.

medial flap placement, more suitable placement for short pedicle free flaps such as gluteal and thigh flaps, and better preservation of the pedicle of the latissimus dorsi flap.

There have been many anatomical studies of IMA/V.⁴⁻⁷ However, no case of absent IMA has been reported,⁷ although problems with IMV in microsurgery have been reported. Particularly, the left IMV is of smaller caliber than the right IMV in many patients.^{4,5} In a study by Mehrara et al., the external jugular or cephalic vein was used as the recipient vein in 12.5% of their cases, because of inadequate IMV.⁸ Following radiotherapy, IMV wall thickening is a possible intraoperative finding.⁷ In a study of Temple et al., 46% showed unusable IMA/V following radiotherapy.⁹

In all cadaveric dissection reports, IMV was present.⁴⁻⁶ However, in three clinical cases, IMV was lacking.^{1,3} In microsurgical breast reconstruction, we encountered only 2 cases of lacking IMV among 694 cases (0.29%) described from October 2003 to July 2019.

IMV may be absent for various reasons: congenital absence, abnormal IMV location (reverse side of the sternum), effects of chemotherapy and radiotherapy (involving IMA/V because of lymph node metastasis), or occlusion after central venous line insertion.^{1,4} The mean (range) distance of IMA from the medial and lateral IMVs was reported to 0.49 (0–2.87) and 0.17 (0–1.03) mm,

respectively, in the third intercostal space.¹⁰ In our cases, we could not detect an IMV close to the IMA under microscope dissection or on ICG angiography.

Magnetic resonance venography and computed tomography venography are reliable for detecting the absence of IMV preoperatively. However, it is not realistic to perform these examinations in all the patients undergoing autologous breast reconstruction considering the rarity of IMV absence.

In our first case, IMV absence may be attributed to chemotherapy considering the lack of scar tissue around the left IMA. Although we cannot deny the possibility that IMV may have had an aberrant course, we presumed that IMV was congenitally absent in both cases. Instead of the IMA/V, we used TDA/V as recipient vessels in both cases because the use of alternative recipient veins, such as the external jugular or cephalic vein, would have necessitated additional skin incisions in the neck or upper arm.⁸

CONCLUSION

Absent IMV is very rarely encountered in autologous breast reconstruction. However, the plastic surgeon should recognize and prepare for the possibility of this situation.

Toshihiko Satake, MD, PhD, FACS

Yokohama City University Medical Center

4-57 Urafune-cho, Minami-ku

Yokohama, Kanagawa 232-0024, Japan

E-mail: toshi@yokohama-cu.ac.jp

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