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CASE REPORT
Breast

Using the Venous Pectoral Branch from the Thoracoacromial System as a Lifeboat in Autologous Breast Reconstruction

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Summary: The most common recipient vessels for autologous free flap breast reconstruction are the internal mammary vessels. At times, there are problems with the exposed internal mammary vein (IMV) that require other options such as using the contralateral IMV, superior rib resection to access proximal IMV, retrograde IMV use, and thoracodorsal vein access with or without a vein graft. This case demonstrates using the pectoral branch of the thoracoacromial venous system without a vein graft as a lifeboat option when the IMV is not suitable for anastomosis. C.W. was a 65-year-old female who underwent right-sided mastectomy with placement of a tissue expander. After adjuvant radiation therapy, C.W. underwent deep inferior epigastric perforator free flap breast reconstruction. During exposure of the internal mammary artery and IMV, an iatrogenic venotomy occurred that precluded the use of this vessel as a reliable recipient. The deep inferior epigastric perforator flap pedicle was then dissected proximal to isolate the artery and vein, and the vein was successfully anastomosed to the venous pectoral branch of the thoracoacromial system. The postoperative course was uneventful and patient was discharged home on postoperative day 4. Using the venous pectoral branch of the thoracoacromial is a safe and valuable option that can be considered in difficult situations when the IMV is not a suitable option. *(Plast Reconstr Surg Glob Open 2017;5:e1367; doi: 10.1097/GOX.0000000000001367; Published online 23 June 2017.)*

The internal mammary system has become the gold standard recipient vessels in autologous free flap breast reconstruction. Problems can arise with the internal mammary vein (IMV) that can be due to venous thrombosis, a small caliber recipient vein, and damage to the recipient vein from radiation, inflammation, or iatrogenically. When a problem arises, intraoperatively in which the exposed IMV can no longer be used one has to turn to secondary options. Popular options include the use of the other IMV if it is a viable paired system, resecting another rib superiorly to reach a healthier segment of anterograde IMV, resecting another rib inferiorly to use a segment of retrograde IMV, or the use of the thoracodorsal (TD) vein. This case demonstrates the use of the vein from the pectoral branch of the thoracoacromial (TAC) venous system as a lifeboat option when the primary recipient IMV was no longer suitable (Fig. 1).

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METHODS

C.W. is a 65-year-old African American female with a history of diabetes mellitus type II, hypertension, and previous hysterectomy who was diagnosed with invasive ductal carcinoma of the right breast. The patient underwent a right mastectomy and axillary lymph node dissection with placement of a tissue expander. Postoperatively, she received adjuvant radiation therapy. The patient then chose to undergo autologous right breast reconstruction with a deep inferior epigastric perforator (DIEP) free flap.

A 2-team approach was used. The internal mammary artery (IMA) and vein were exposed in the third intercostal space. During exposure, an iatrogenic venotomy was made in the IMV, which was repaired primarily. The second paired IMV was insufficient in caliber. The left DIEP flap was harvested obtaining a pedicle length of 10 cm. The artery and vein were anastomosed in the usual fashion using a 2.5-mm venous coupler. However, the vein thrombosed shortly thereafter and venous recoupling was

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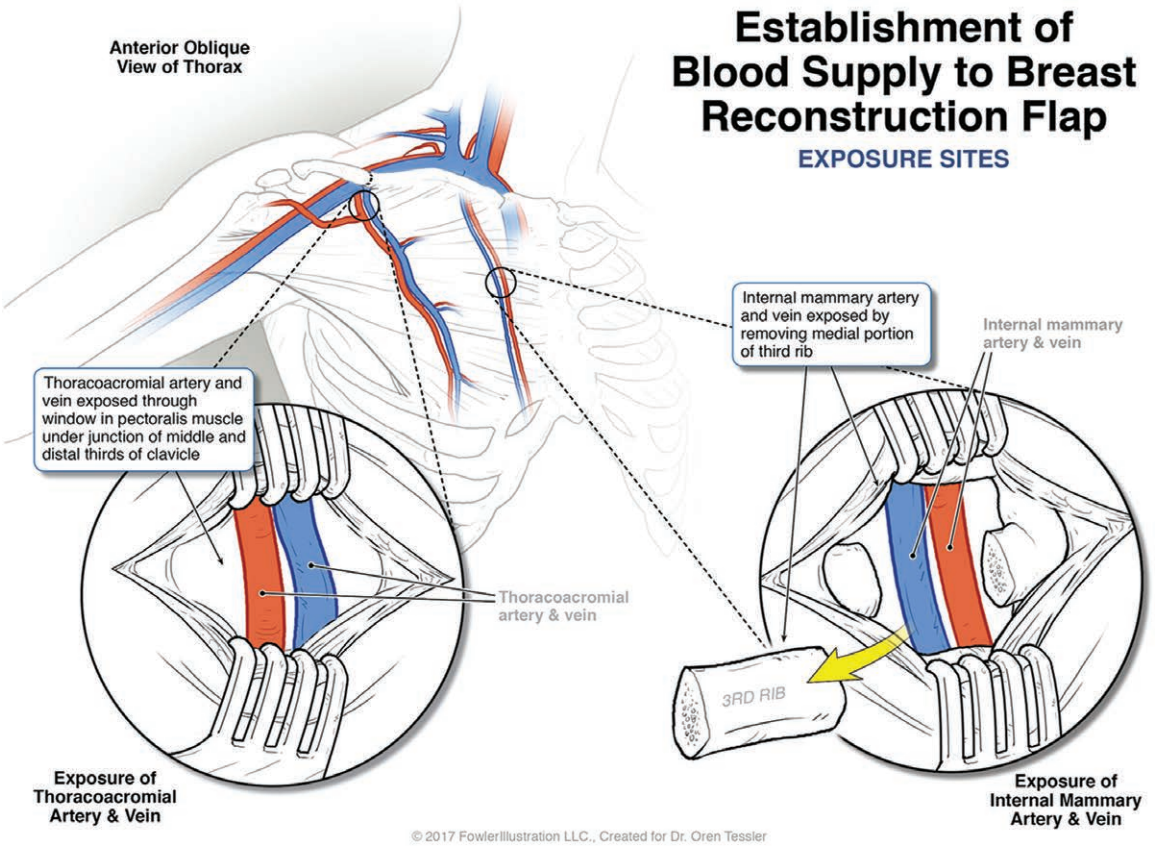

Fig. 1. Illustration depicting the dissection site for the exposure of TAC artery and vein, compared with dissection site for the exposure of IMA and vein.

attempted 3 times. Further attempts would have required resection of additional ribs to gain adequate recipient length. Further, previous lymph node dissection created a hostile environment for harvesting of the TD system. To avoid increasing the risk of chest wall deformity and postoperative pain, it was decided to attempt to use the pectoral venous branch of the TAC system at the midclavicular level in the clavico-pectoral groove. A hand-held Doppler was used to easily identify the location of the recipient vessels at the midclavicular line approximately 2–3 cm below the clavicle. The recipient vessels were rapidly identified after dissecting through the pectoralis major muscle. The artery and vein were separated from each other with the vein medial to the artery (Fig. 2). Then the DIEP vena comitantes and artery were separated from each other for several centimeters to gain adequate reach to the new recipient vein. The DIEP pedicle vein spanned the superior surface of the pectoralis major muscle to the clavico-pectoral groove donor site. Adequate length without undue tension was achieved and the venous anastomosis was performed with a 2.5 mm coupler. The flap was inset with the pedicle in a "Y" pattern (Figs. 3, 4).

RESULTS

The postoperative course was uneventful with a warm and viable flap. The patient was discharged home on postoperative day 4. At 2 weeks and 6 weeks postoperatively,

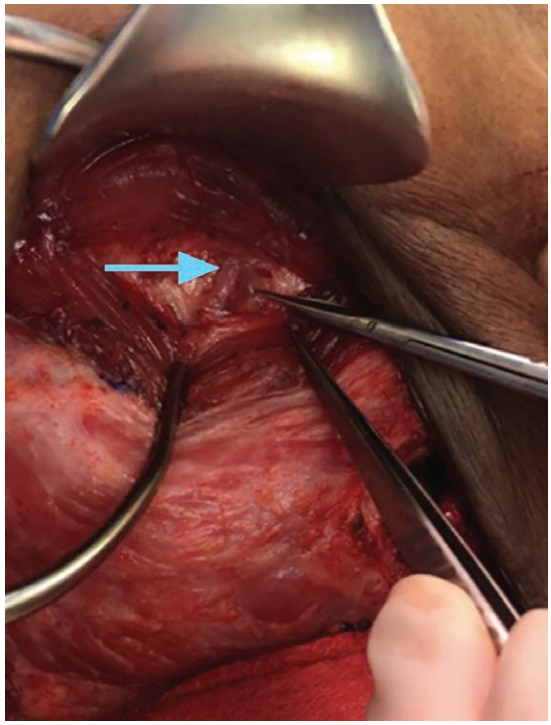

Fig. 2. Dissection through pectoralis major muscle identifying the TAC artery (lateral—blue arrow) and vein (medial—tip of scissors) on the undersurface of the muscle.

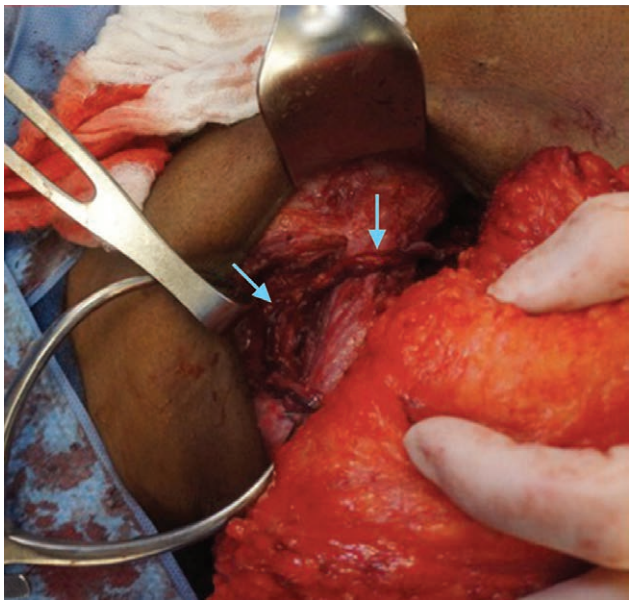

Fig. 3. Pedicle spanning the pectoralis major muscle (thin blue arrow pointing to the venous anastomosis; thick blue arrow pointing to the DIEP artery spanning the pectoralis muscle from sternal window to clavico-pectoral window; Richardson retractor is cephalad).

she was seen in the clinic without any evidence of flap compromise, infection, or fat necrosis. The patient subsequently underwent a second-stage reconstruction involving mastopexy of the left breast and fat grafting to the right reconstructed breast to improve symmetry at 6 months postoperatively.

DISCUSSION

It is well established that the internal mammary system is the most common primary recipient site used for anastomosis for autologous free flap breast reconstruction.[1] The TD system is also a common choice as the primary recipient site for anastomosis. However, there are technical limitations including its lateral location, potential previous iatrogenic injury, and sacrifice of the latissimus dorsi flap as a reliable salvage operation.[2] It has been reported that the IM and TD systems may not be useable 2% and 15% of the time, respectively.[2] Therefore, there are other less common alternatives that are used, which include the lateral thoracic, scapular circumflex, and axillary vessels.[3] Kompatscher et al.[3] studied the location and size of the TAC system in 18 cadavers and 40 female volunteers in which they found the average vein diameter was 1.7 ± 0.3 mm as it coursed cephalad 3.5 cm away from the upper border of the

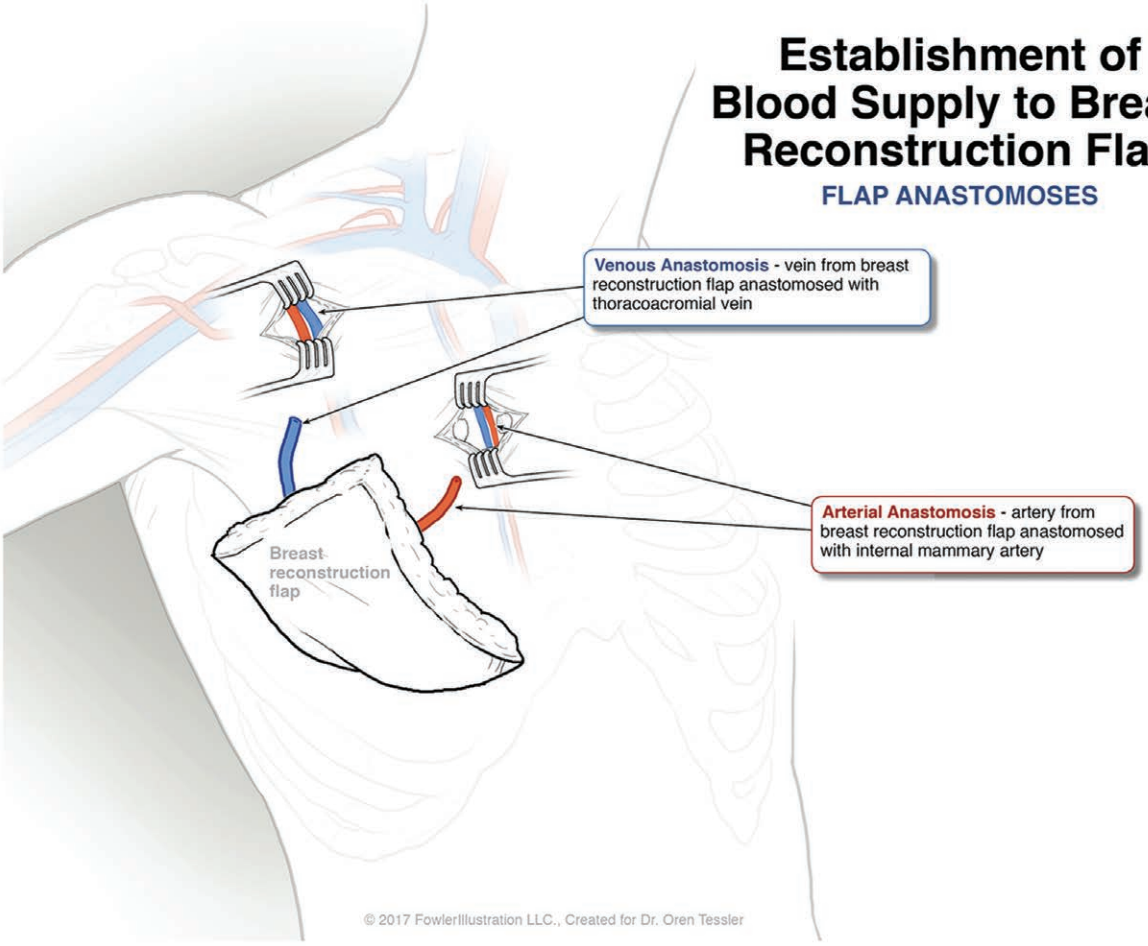

Fig. 4. Illustration depicting how flap was inset with pedicle draping the pectoralis muscle in a Y-fashion.

third rib. The use of the TAC system as a primary recipient site has been used in 2 case series with success.[3] Chun et al.[4] have also reported the use of the TAC for supercharging muscle-sparing free TRAM flaps. More recently, Sing et al.[2] have demonstrated using the pectoral branch from the TAC system via a transverse infraclavicular approach as a primary recipient site. Using the TAC system can be valuable to avoid less common options such as the lateral thoracic vein, external jugular vein, cephalic vein, intercostal vein, circumflex scapular vein, basilic vein, or contralateral IMV.[5] Thus, we were able to perform a primary direct anastomosis to both the IMA and the pectoral venous branch of the TAC system without the use of vein grafts.

There are several advantages for using the TAC system. According to 1 cadaveric and sonographic study, the pectoral branch from the TAC system was reliable and consistent in anatomy and that it gradually increased in caliber toward the TAC main trunk.[3] Further, it can easily be accessed in a relatively safe and rapid manner from the mastectomy incision with minimal donor-site morbidity.[3] In this case, the pectoral venous branch of the TAC was identified and dissected in approximately 15 minutes.

CONCLUSION

In conclusion, we believe that using the pectoral branch of the TAC system is a valuable, safe, and successful option as a lifeboat when the IM and TD systems are no longer suitable for use.

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