Pedicled Descending Branch Latissimus Dorsi Mini-flap for Repairing Partial Mastectomy Defect: A New Technique

Ruizhao Cai, M.D.*†
Zeming Xie, M.D., Ph.D.*†
Lihuan Zhou, M.D.*†
Jin Wang, M.D., Ph.D.*†
Xing Li, M.D., Ph.D.*†
Junhao Huang, M.D.*†
Yan Wang, M.D., Ph.D.*†
Mingtian Yang, M.D.*†
Edward I. Chang, M.D., Ph.D.‡
Jun Tang, M.D., Ph.D.*†

Summary: Volume loss is 1 of the major factors influencing cosmetic outcomes of breast after partial mastectomy (PM), especially for smaller breasts, and therefore, volume replacement is critical for optimizing the final aesthetic outcome. We present a novel technique of raising a pedicled descending branch latissimus dorsi (LD) mini-flap for reconstruction of PM defects via an axillary incision. After PM, the LD mini-flap is harvested through the existing axillary incision of the axillary dissection or the sentinel lymph node biopsy. The descending branches of thoracodorsal vessels and nerve are carefully identified and isolated. The transverse branches are protected to maintain muscle innervation and function. The LD muscle is then undermined posteriorly and inferiorly to create a submuscular pocket and a subcutaneous pocket between LD muscle and superficial fascia. Once the submuscular plane is created, the muscle is divided along the muscle fibers from the deep surface including a layer of fat above the muscle. Finally, the LD mini-flap is transferred to the breast defect. Given the limited length and mobility of the LD mini-flap, this approach is best utilized for lateral breast defects. However, for medial defects, the lateral breast tissue is rearranged to reconstruct the medial breast defect, and an LD mini-flap is then used to reconstruct the lateral breast donor site. This technique can therefore be employed to reconstruct all quadrants of the breast and can provide aesthetic outcomes without scars on the back, with minimal dysfunction of LD muscle. (Plast Reconstr Surg Glob Open 2018;6:e1692; doi: 10.1097/GOX.0000000000001692; Published online 13 March 2018.)

INTRODUCTION

Volume loss is 1 of the primary reasons for contour deformities after partial mastectomy (PM).1–2 When PM defects encompass more than 20% of the breast, volume supplement is often necessary for cosmetic outcomes, and several oncoplastic techniques have been introduced to improve aesthetics, including latissimus dorsi (LD) myocutaneous flap, thoracodorsal artery perforator flap, and implant.3–6

The LD flap has been widely used in breast reconstruction. However, harvesting the entire LD musculocutaneous flap can lead to postoperative functional defects and poor aesthetics of donor site.7 Recently, the pedicled descending branch LD flap technique has been reported for breast reconstruction, maintaining muscle innervation, function, and aesthetics.8–10 How-

Disclosure: The authors have no financial interest to declare in relation to the content of this article. The Article Processing Charge was paid for by the authors.

Supplemental digital content is available for this article. Clickable URL citations appear in the text.
ever, its use for reconstruction of PM defects has never been reported. We developed a novel technique of raising the pedicled descending branch LD mini-flap for PM reconstruction via an axillary incision without a scar on the back, and the procedures are described as follows.

**METHODS**

**Surgical Technique**

The patient is positioned by elevating the ipsilateral body to approximately 30° abducting the upper limb by 90°. Outlines of the tumor and excision margins are marked on the skin. A standard S-shaped axillary incision (7–8 cm) was also marked for sentinel node biopsy or axillary node dissection and raising the pedicled descending branch LD mini-flap. The size of mini-flap is designed based on the excision volume. The descending branch pedicle is identified, making sure the length from the bifurcation with the transverse branch to the distal mini-flap is sufficient for transfer (see video, Supplemental Digital Content 1, which demonstrates the surgical technique of partial breast reconstruction with pedicled descending branch LD mini-flap. This video is available in the “Related Videos” section of the Full-Text article on PRSGlobalOpen.com or available at [http://links.lww.com/PRSGO/A685](http://links.lww.com/PRSGO/A685).

**Partial Mastectomy**

The design of incisions is determined by the location of the tumor. When the tumor is located in the upper outer quadrant, the PM can be performed through the S-shaped axillary incision. A periareolar incision is utilized for tumors in the lower outer quadrant, and a circum-areolar incision is used for medially located tumors. The tumor including margins is then resected, and frozen sections are performed to confirm adequate resection before designing and harvesting the LD mini-flap.

**Axillary Surgery and Flap Mobilization**

An S-shaped axillary incision is made for access to the axillary nodes. After the axillary surgery, the LD muscle is separated from the serratus anterior muscle through the same axillary incision. The thoracodorsal vessels and nerve (TVN) are identified where they divide into branches supplying the serratus anterior muscle, and the transverse and descending branches (Fig. 1).

Distal to the bifurcation of TVN, the descending branches of TVN are carefully dissected from a distal to proximal direction. Care should be taken to protect the transverse branches to maintain innervation, function, and the favorable appearance of donor site. The LD muscle is then elevated off the chest wall only enough to provide enough volume for the PM defect to minimize any dead space and donor-site morbidity. The muscle is then divided along its fibers including a component of the overlying fat again based on the volume needed. The fat overlying the muscle is harvested in a sub-Scarpa plane, and

---

**Fig. 1.** Identification of TVN, branches to serratus anterior muscle, transverse branches, and descending branches.

**Video Graphic 1.** See video, Supplemental Digital Content 1, which demonstrates the surgical technique of partial breast reconstruction with pedicled descending branch LD mini-flap. This video is available in the “Related Videos” section of the Full-Text article on PRSGlobalOpen.com or available at [http://links.lww.com/PRSGO/A685](http://links.lww.com/PRSGO/A685).

**Video Graphic 2.** See video, Supplemental Digital Content 2, which displays the operative technique about combining pedicled descending branch LD mini-flap with breast tissue rearrangement. This video is available in the “Related Videos” section of the Full-Text article on PRSGlobalOpen.com or available at [http://links.lww.com/PRSGO/A686](http://links.lww.com/PRSGO/A686).
therefore, no additional incision on the back is needed. When sufficient length and volume have been mobilized, the LD mini-flap is divided inferiorly and superiorly and split medially along the muscle fibers. Careful hemostasis is critical for the difficult exposure of surgical field. The LD mini-flap, attached only by its neurovascular bundle, is harvested and transferred to the breast defect.

**Local Breast Tissue Rearrangement**

Due to the limited pedicle length, the LD mini-flap is ideally suited only for lateral breast defects. However, in the setting of a medial PM defect, our strategy is to fill the medial defect with the lateral breast parenchyma using local breast tissue rearrangement, and then reconstruct the lateral defect with the LD mini-flap.

Through a circumareolar incision, the lateral breast skin is separated from the underlying targeted breast parenchyma. Then the targeted breast parenchyma is separated from the pectoralis major muscle. The lateral breast tissue is mobilized by dividing it from the remaining lateral parenchyma, and the entire breast tissue is moved inward toward the medial defect. Absorbable sutures are performed to reshape the medial contour of the breast. Finally, the lateral defect is repaired by LD mini-flap (see video, Supplemental Digital Content 2, which displays the operative technique about combining pedicled descend-
ing branch LD mini-flap with breast tissue rearrangement. This video is available in the “Related Videos” section of the Full-Text article on PRSGlobalOpen.com or available at http://links.lww.com/PRSGO/A686).

Reconstruction
A tunnel is created through the retromammary space from the axillary wound into the lateral breast defect. The LD mini-flap is then transferred to the defect without tension. Removal of moderate breast tissue around the tunnel may be required in some patients for the symmetry of both breasts. Sutures are used to fix the mini-flap to the adjacent breast parenchyma and reshape the lateral breast mound. If tissue rearrangement is performed as in reconstruction of medial defects, 2 suction drains are placed, 1 in the axillary donor site and the other in the lower level of the breast. For lateral defects, 1 suction drain placed in the donor site is sufficient. Cosmetic results are shown in Figures 2, 3.

CONCLUSIONS
Thirty-four patients underwent breast oncoplastic surgery using this technique after PM between October 2015 and January 2017. Seroma of the donor site occurred in 2 cases (2 of 34), which might be due to the removal of the drains too early, and healed satisfactorily by secondary intention. No nipple-areolar complex necrosis or other major complications have been observed.

This novel technique can reconstruct all quadrants of the breast defects, particularly for smaller breasts requiring volume supplementation. This technique allows more extensive local breast resection, reduces the rates of mastectomy and postoperative reexcision while treating larger tumors, and may provide excellent recipient-site and donor-site aesthetic outcomes. The technique also maintains the innervation and function of LD muscle and leaves no scar on the back. Careful preparation, protection of the branches of the thoracodorsal neurovascular bundle, matching of the length and tissue volume of LD mini-flap with the breast defect, good exposure of surgical field, and careful hemosta-

Jun Tang, MD, PhD
Department of Breast Oncology
Sun Yat-sen University Cancer Center
651 Dong Feng East Road
Guangzhou, 510060, PR China
E-mail: tangjun@sysucc.org.cn

REFERENCES
1. Kronowitz SJ, Kuerer HM, Buchholz TA, et al. A management algorithm and practical oncoplastic surgical techniques for repairing partial mastectomy defects. Plast Reconstr Surg. 2008;122:1631–1647.
2. Rainsbury RM. Breast-sparing reconstruction with latissimus dorsi mini-flaps. Eur J Surg Oncol. 2002;28:891–895.
3. Dixon JM, Venizelos B, Chan P. Latissimus dorsi mini-flap: a technique for extending breast conservation. Breast. 2002;11:58–65.
4. Nahabedian MY, Patel KM, Kaminsky AJ, et al. Biplanar oncoplastic surgery: a novel approach to breast conservation for small and medium sized breasts. Plast Reconstr Surg. 2013;132:1081–1084.
5. Barnea Y, Friedman O, Arad E, et al. An oncoplastic breast augmentation technique for immediate partial breast reconstruction following breast conservation. Plast Reconstr Surg. 2017;139:348e–357e.
6. Xie Z, Wang X, Lin H, et al. Breast-conserving therapy: a viable option for young women with early breast cancer—evidence from a prospective study. Ann Surg Oncol. 2014;21:2188–2196.
7. Adams WP Jr, Lipschitz AH, Ansari M, et al. Functional donor site morbidity following latissimus dorsi muscle flap transfer. Ann Plast Surg. 2004;53:6–11.
8. Colohan S, Wong C, Lakhiani C, et al. The free descending branch muscle-sparing latissimus dorsi flap: vascular anatomy and clinical applications. Plast Reconstr Surg. 2012;130:776e–787e.
9. Wong C, Saint-Cyr M. The pedicled descending branch muscle-sparing latissimus dorsi flap for trunk and upper extremity reconstruction. J Plast Reconstr Aesthet Surg. 2010;63:623–632.
10. Saint-Cyr M, Nagarkar P, Schaverien M, et al. The pedicled descending branch muscle-sparing latissimus dorsi flap for breast reconstruction. Plast Reconstr Surg. 2009;123:13–24.