

The Pyramidal Flap: an Innovative Technique for DIEP Flap Refinement

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Summary: DIEP flap is considered the gold standard technique for breast reconstruction. One of the most frequent contour deformities after breast reconstruction with DIEP flap is a step-off deformity at the interface between the native chest wall and the reconstructed breast. Different techniques have been used to address this problem. We describe the pyramidal flap as a simple, single stage and low risk procedure, which specifically corrects the step-off or tapering deformity of the reconstructed breast with DIEP flap. (*Plast Reconstr Surg Glob Open* 2018;6:e1968; doi: 10.1097/GOX.0000000000001968; Published online 1 November 2018.)

INTRODUCTION

Autologous abdominal flap-based microvascular breast reconstruction is recognized as the gold standard technique among breast reconstructive options, providing the patient a natural and enduring result.¹⁻⁴

Patients who have undergone this procedure report higher rates of satisfaction than do patients who have had other methods of breast reconstruction.^{5,6}

Although the first goal of the surgery is to achieve the flap's survival and create a breast mound that serves as the base to complete the breast reconstruction, the final purpose is to recreate a structure as similar as possible to the contralateral breast. Thus, the aesthetic outcome is the key to reach operative success.^{3,7,8}

Patients frequently require additional surgical procedures so as to accomplish this purpose, so breast reconstruction should be addressed as a multistage procedure.^{7,9,10}

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Contour deformities of the reconstructed breast are common and provide an important indication for surgical revision. One of the most frequent abnormalities is a step-off deformity that occurs at the interface between the native chest wall and the reconstructed breast (Fig. 1).^{10,11}

This article describes a novel technique to correct this defect by creating a pyramidal shaped or stepped flap to restore the natural appearance of the transition between the infraclavicular chest wall and the reconstructed breast.

SURGICAL TECHNIQUE

The defect at the interface between the native chest wall and the reconstructed breast is marked with the patient in the upright position. Taking the contralateral breast as a model, the superior limit of the new upper pole is outlined, where the apex of the pyramidal flap will be attached. The procedure is performed under general anesthesia and with the arms at 90 degrees.

The upper scar of the DIEP flap is incised first, with a n°15 blade. The dissection continues in a cephalic direction in the subcutaneous plane up to the superior limit of the new upper pole, obtaining an infraclavicular skin flap. Then, the DIEP flap is elevated from superior to inferior until its vascular pedicle is reached. Once the superior portion of the DIEP flap is released, it is trimmed every 1.5 cm vertically, in a stepped way, obtaining 1.5 cm thick independent fat flaps (Fig. 2). The width of the flaps should cover the entire width of the DIEP flap in the upper pole of the breast. Next, the most posterior flap is sutured to the infraclavicular chest wall at the precise position to correct the step-off deformity. When the first flap is attached, the remaining flaps are sutured one over the anterior, in

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Fig. 1. A 46-year-old woman who has undergone a DIEP flap breast reconstruction showing a step-off deformity at the interface between the chest wall and the reconstructed breast.

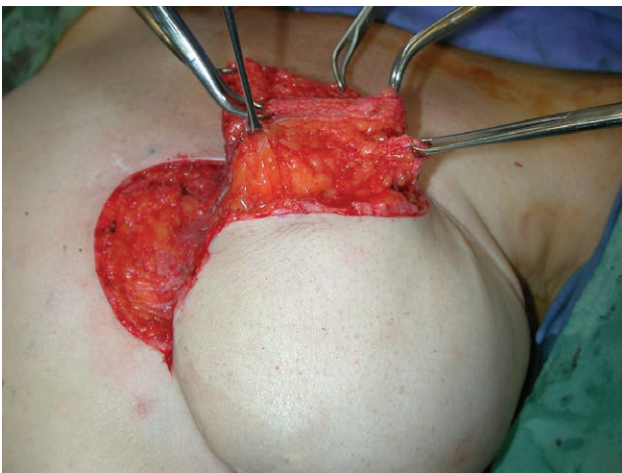


Fig. 2. Pyramidal flap's technical detail.

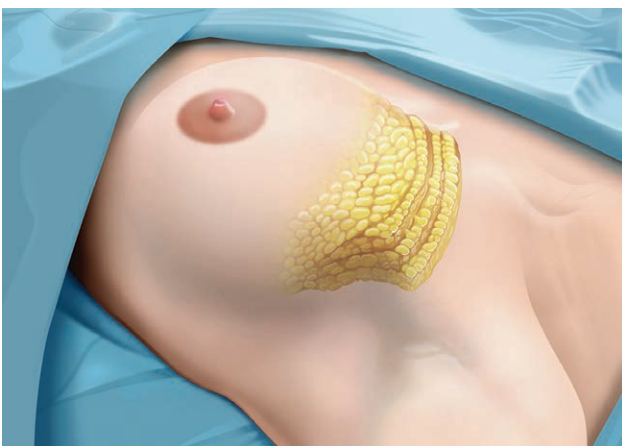


Fig. 3. Graphic illustration of the pyramidal flap positioning to correct de step-off deformity. The flaps are sutured one over the anterior in a stepped way.

a stepped way, achieving a soft transition between the infraclavicular chest wall and the upper pole of the breast (Figs. 3, 4) (see figure, Supplemental Digital Content 1, which displays a graphic illustration of the technique, <http://links.lww.com/PRSGO/A905>). An absorbable suture is used for this purpose. A portion of the superior region of the DIEP flap can be de-epithelized if needed. Finally, the skin incision is closed with an intradermal suture.

RESULTS

No major complications have been reported. We had no infections or wound healing problems nor clinically significant fat necrosis.

DISCUSSION

Advances in breast reconstruction techniques have led to an increase in the expectations for a superior aesthetic result and the reconstruction goal is to provide not only suitable sized and projected breast but also natural contoured breast.^{3,10,12} To achieve this purpose, more secondary procedures are being performed.^{4,7,9,10}

According to the classification defined by Kanchwala et al.,¹⁰ the most common abnormality is a step-off deformity at the interface between the native chest wall and the reconstructed breast.¹¹ This area is particularly distressing for patients, as it is frequently noticeable while wearing clothing.¹¹

Different techniques have been used to address breast contour deformities. Currently, autologous fat injection has become a workhorse for soft-tissue augmentation and multiple reports have addressed the management of breast contour deformities with the use of this technique, mainly as an adjunctive procedure for refinement of implant and flap-based reconstructions.^{10,12-14} This technique has gained in popularity due to its easy performance but it is not exempt from controversy.

Successful autologous fat transplantation is highly technique dependent and given the multiple steps of the



Fig. 4. Breast contour improvement after DIEP flap refinement using the pyramidal flap. A soft transition between the infraclavicular chest wall and the upper pole of the reconstructed breast is achieved.

procedure it is challenging to identify the best approach that optimizes graft survival and minimizes complications.^{10,12,14} Gir et al.¹⁵ in a systematic review found a lack of high-quality clinical studies for fat grafting and no standardized algorithm was identified. This lack of consensus in surgical techniques could explain the variation in graft-related fat necrosis, which has been reported between 2% and 23%.¹² The necrosis generates clinically palpable lesions and suspicious imaging findings, which are of special importance in patients with a history of breast cancer.¹² Although some authors report that masses and calcifications secondary to fat necrosis can be differentiated from those related to breast cancer on imaging, there are cases in which it is not possible to make this distinction and more biopsies are performed based on radiological findings.^{12,16} Thus, the possibility of needing a biopsy to rule out malignancy should be taken into account, and should be explained to the patients preoperatively.^{12,14}

In addition, a volume retention between 44.7% and 82.6%¹⁵ has been reported,¹⁶ and although radiotherapy did not seem to affect graft take and volume retention, in some reports patients with a history of radiotherapy had an increased incidence of repeated injections.^{10,14,17} Therefore, multiple treatments are often required to achieve the desired volume, spaced out by many months in between, which prolongs the reconstruction time.¹⁰ With the pyramidal flap all these problems are avoided.

TECHNIQUE'S DEVELOPMENT

We started to use this technique as an attempt to improve the contour deformity in the critical interface between the native chest wall and the DIEP flap. Initially, we performed it as an additional procedure, to correct the established deformity of the patients, which had been operated on when the DIEP flap was introduced in our hospital. Then, due to the consistently good results, we included the pyramidal flap to the first stage of the DIEP flap to decrease the additional procedures.

CONCLUSIONS

The pyramidal flap specifically restores the transition between the infraclavicular chest and the upper pole of the breast. This is a simple, single stage and low risk procedure to correct the step-off deformity of the reconstructed breast with DIEP flap.

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REFERENCES

1. Healy C, Allen RJ Sr. The evolution of perforator flap breast reconstruction: twenty years after the first DIEP flap. *J Reconstr Microsurg.* 2014;30:121–125.
2. Weichman KE, Broer PN, Tanna N, et al. The role of autologous fat grafting in secondary microsurgical breast reconstruction. *Ann Plast Surg.* 2013;71:24–30.
3. Lozano JA, Escudero FJ, Colás C. [Breast reconstruction with microsurgical perforator flaps]. *An Sist Sanit Navar.* 2005;28:73–79.
4. Hernández-Godoy J, Landín L, García-Redondo M, et al. Secondary surgery related factors in autologous breast reconstruction using abdominal free tissue. *Cir:plást. ibero-latinoam.* 2015;41:393–397.
5. Yueh JH, Slavin SA, Adesiyun T, et al. Patient satisfaction in post-mastectomy breast reconstruction: a comparative evaluation of DIEP, TRAM, latissimus flap, and implant techniques. *Plast Reconstr Surg.* 2010;125:1585–1595.
6. Zhong T, McCarthy C, Min S, et al. Patient satisfaction and health-related quality of life after autologous tissue breast reconstruction: a prospective analysis of early postoperative outcomes. *Cancer.* 2012;118:1701–1709.
7. Enajat M, Smit JM, Rozen WM, et al. Aesthetic refinements and reoperative procedures following 370 consecutive DIEP and SIEA flap breast reconstructions: important considerations for patient consent. *Aesthetic Plast Surg.* 2010;34:306–312.
8. Giacalone PL, Bricout N, Dantas MJ, et al. Achieving symmetry in unilateral breast reconstruction: 17 years experience with 683 patients. *Aesthetic Plast Surg.* 2002;26:299–302.
9. Damen TH, Mureau MA, Timman R, et al. The pleasing end result after DIEP flap breast reconstruction: a review of additional operations. *J Plast Reconstr Aesthet Surg.* 2009;62:71–76.
10. Kanchwala SK, Glatt BS, Conant EF, et al. Autologous fat grafting to the reconstructed breast: the management of acquired contour deformities. *Plast Reconstr Surg.* 2009;124:409–418.
11. de Blacam C, Momoh AO, Colakoglu S, et al. Evaluation of clinical outcomes and aesthetic results after autologous fat grafting for contour deformities of the reconstructed breast. *Plast Reconstr Surg.* 2011;128:411e–418e.
12. Kaoutzanis C, Xin M, Ballard TN, et al. Autologous fat grafting after breast reconstruction in postmastectomy patients: complications, biopsy rates, and locoregional cancer recurrence rates. *Ann Plast Surg.* 2016;76:270–275.
13. Spear SL, Wilson HB, Lockwood MD. Fat injection to correct contour deformities in the reconstructed breast. *Plast Reconstr Surg.* 2005;116:1300–1305.
14. Simonacci F, Bertozzi N, Grieco MP, et al. Autologous fat transplantation for breast reconstruction: a literature review. *Ann Med Surg (Lond).* 2016;12:94–100.
15. Gir P, Brown SA, Oni G, et al. Fat grafting: evidence-based review on autologous fat harvesting, processing, reinjection, and storage. *Plast Reconstr Surg.* 2013;131:185–191.
16. Groen JW, Negenborn VL, Twisk DJWR, et al. Autologous fat grafting in onco-plastic breast reconstruction: a systematic review on oncological and radiological safety, complications, volume retention and patient/surgeon satisfaction. *J Plast Reconstr Aesthet Surg.* 2016;69:742–764.
17. Losken A, Pinell XA, Sikoro K, et al. Autologous fat grafting in secondary breast reconstruction. *Ann Plast Surg.* 2011;66:518–522.