A Standardized Approach to Deep Inferior Epigastric Perforator Flap Marking

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Summary: The deep inferior epigastric perforator (DIEP) flap is the most commonly utilized flap in autologous breast reconstruction. This perforator-based free flap includes the lower abdominal wall adipocutaneous layers while sparing the abdominal musculature. Several studies have looked at preoperative planning for DIEP flap reconstruction using CT angiography; however, no study to date has proposed a standardized approach to DIEP flap markings. We propose a novel technique to standardize DIEP flap marking that leads to greater symmetry and consistency in the donor site. (Plast Reconstr Surg Glob Open 2019;7:e2479; doi: 10.1097/GOX.0000000000002479; Published online 18 October 2019.)

INTRODUCTION

The refinement of abdominally based free flap reconstruction over the past few decades has led to the deep inferior epigastric perforator (DIEP) flap becoming the standard in autologous breast reconstruction. The flap takes advantage of adiposity in the lower abdomen while minimizing donor site morbidity by sparing the abdominal musculature. Despite the flap’s increased popularity, a standardized approach to DIEP flap markings has never been reported in the literature. We propose a novel reproducible marking technique to standardize DIEP flap marking, similar to an abdominoplasty technique, which leads to greater symmetry and consistency in the donor site.

The DIEP flap preoperative donor site markings are largely free handed based on surgeon experience and patient body habitus. A handful of studies have proposed using a template to plan preoperative markings for the optimal breast reconstruction. Miranda et al.¹ used CT angiography to individualize a template that captured the relevant abdominal perforators, which can then be traced onto the patient’s abdomen. Although this method is effective in identifying perforators to maximize flap perfusion, it lacks standardization to optimize donor site symmetry and aesthetics. Another study by Tregaskiss et al.² uses a preoperative paper template based on the contralateral breast to achieve ideal breast mound aesthetics, but this article focuses on optimizing flap inset rather than the donor site markings. Our group’s experience has demonstrated that the following standardized step-by-step approach to preoperative DIEP markings leads to greater symmetry and consistency in the donor site. In particular, measuring and equalizing the vertical distance between standardized points of the superior and inferior borders of the flap creates a more symmetrical donor site.

Standardized DIEP Flap Marking Technique

Begin with identifying the following anatomic landmarks with the patient in the standing position: left and right anterior superior iliac spine, sternal notch, umbilicus, vaginal cleft (Fig. 1).

1. Mark the superior point of the umbilicus. This is the most superior point of the flap (A).
2. Create a point 6–8 cm above the vaginal cleft. This is the most inferior point of the flap (B).
3. With the patient flexed at the waist, find the most lateral aspect of the patient’s natural pannus fold and mark each side (C and D).
4. Create a curvilinear line connecting C–A–D. This is the superior border of the flap.
5. Create a curvilinear line connecting C–B–D. This is the inferior border of the flap.

Objective Assessment of Symmetry

6. Draw a vertical line from the sternal notch, through the umbilicus, to the vaginal cleft.
7. Starting in the center, measure out 10 cm increments to the left and right of points A and B along the curvilinear lines. The distance between the last 10 cm mark and points C and D along the superior border should be equal on both sides (approximately 3–7 cm)

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based on the senior author’s experience). The distance between the last 10-cm mark and points C and D along the inferior border should also be equal on both sides (approximately 3–7 cm). Adjust markings as needed to achieve symmetry.

8. Create vertical markings connecting the superior border 10 cm increments with its counterpart along the inferior border. These vertical lines should be parallel to the first vertical line created. Adjust markings as needed to achieve symmetry.

Once the preoperative markings are completed, the remainder of the flap is incised, elevated, and ultimately closed in the standard fashion.

This standardized preincisional marking approach is applied to any patient’s anatomic landmarks in the absence of other upper abdominal scars. The marked flap leads to a consistently symmetric donor site and can be applied to both unilateral and bilateral cases. Benefits of using standardized preoperative markings include a consistent and efficient method of marking, the potential to improve donor site scar placement and scar symmetry, minimizing standing cones, and reproducibility by trainees. It is the authors’ opinion that the use of free-hand or “eyeball” methods in DIEP donor site marking leads to increased variability in scar position, and is more challenging to teach trainees. Our proposed technique results in a marking which is both patient-specific yet standardized in methodology, allowing for comparison among patients and optimization of donor site scar position.

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**REFERENCES**

1. Miranda BH, Pywell M, Floyd D. A preoperative marking template for deep inferior epigastric artery perforator flap perforators in breast reconstruction. *Arch Plast Surg* 2014;41:171–173.
2. Tregaskiss A, Vermaak PV, Boulton R, et al. The template technique for breast mound planning when using abdominal flaps for breast reconstruction. *Breast* 2012;21:686–689.