



## How Much Flap to Take? Invited Commentary on “Comparisons Between Normal Body Mass Index and Overweight Patients Who Underwent Unilateral Microsurgical Breast Reconstructions”

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Of all the options available to women seeking breast reconstruction after mastectomy, autologous tissue reconstruction is increasingly becoming a preferred option due to a more natural feel and lack of foreign body device. The global obesity epidemic has triggered a plethora of studies that have thoroughly investigated the complexities of autologous tissue reconstruction in the overweight patient population.<sup>1,2</sup> Nonetheless, abdominal-based tissue transfer for breast reconstruction in thin women has its own unique set of considerations and challenges that have received comparatively less attention.

In the current study examining unilateral breast reconstruction with abdominal-based free-tissue transfer, Cheng and colleagues address this distinct perspective. Among 321 flaps performed in women with a normal body mass index (BMI) (18.5–24.9 kg/m<sup>2</sup>) and 97 flaps performed in overweight patients (BMI, 25–29.9 kg/m<sup>2</sup>), the former cohort required the use of higher weight percentages of the entire lower abdominal adipocutaneous ellipse harvested for unilateral breast reconstruction (82.2% vs 71.4%).<sup>3</sup>

Although the finding that thinner patients required more of the harvested flap tissue to reconstruct a breast mound may be intuitive, this observation incites additional questions. Achieving a satisfactory unilateral reconstruction requires symmetry relative to the contralateral native

breast. How much flap is enough to achieve symmetry? Flap weights and weight percentages represent only one aspect of the answer to this question.

Another important consideration is the amount of skin required to match the contralateral breast ptosis and create adequate projection. This point is particularly important for delayed breast reconstruction, which comprised the majority of the cases in the current study. Even in the delayed-immediate setting with the presence of a tissue expander, the extent of skin deficiency often is greatly underestimated, particularly in the setting of radiation-associated skin contracture. In obese patients, thick flap adipose layers increase the difficulty of inset and often require the harvesting of more tissue across the hemiabdomen. Frequently, the additional tissue harvest is dictated by the need for additional skin surface area to facilitate optimal inset and shaping rather than the need for a larger reconstruction volume. The skin deficiency cannot be routinely overcome by reliance on contralateral symmetry procedures alone such as reduction or mastopexy. These nuances in autologous breast reconstruction are challenging to study objectively, but are nevertheless critical to the achievement of aesthetic success.

The question of how much flap is enough naturally leads to the next question: How much flap is safe when transferred on a single pedicle? Hartrampf et al.<sup>4</sup> and Holm et al.<sup>5</sup> defined the four zones of perfusion associated with the deep inferior epigastric vascular territory within the infraumbilical abdominal ellipse. Wong et al.<sup>6</sup> demonstrated the greater ability of medial row perforators to sustain contralateral perfusion across the midline (Hartrampf zone 2, Holm zone 3) compared with lateral row perforators. Indocyanine green angiography has been used to delineate margins of cross-midline flap perfusion during flap harvest.<sup>7</sup> Regardless of the perforator location or the

method of perfusion assessment, there is consensus that the most lateral aspect of the contralateral hemiabdomen (Hartrampf and Holm zone 4) is not routinely reliable when supported only by a single deep inferior epigastric vascular pedicle.

In the current study, the percentages of flap weights actually used from the total abdominal tissue harvested are a function of two potentially competing factors: the amount of tissue needed to reconstruct an aesthetically pleasing breast mound and the amount of tissue safely vascularized on a single pedicle. Practically speaking, both factors likely contribute to the percentage of harvested tissue actually used for the reconstruction, but it cannot be assumed that 100% of the harvested abdominal tissue based on single-pedicle perfusion is safely available in every patient.

All these factors should be collectively considered to optimize unilateral autologous tissue breast reconstruction. It usually is easier and more prudent to remove flap excess secondarily with liposuction or direct excision than to add tissue to a completed breast reconstruction with deficient volume, shape, and/or skin. Observations such as these in our own extensive experience with autologous free-flap breast reconstruction has prompted us more frequently to use bipediced or stacked-deep inferior epigastric artery perforator flaps for unilateral breast reconstruction. These approaches are particularly applicable for thin women, delayed reconstruction, or both. With these techniques, the flap harvest usually is more challenging and anastomotic configurations more complex, but we find that bipediced and stacked-flap reconstruction allows favorable flexibility in volume replacement, shaping, projection, and skin replacement without excessive concerns of vascular inadequacy in the flap tissue.

Although additional microvascular anastomoses potentially increase the risk of anastomotic thrombosis, with contemporary microvascular techniques, equipment, and experience, microvascular thrombosis resulting in flap loss is extremely rare, particularly with relatively large-caliber vessels.<sup>8,9</sup> Even in patients with a higher BMI and greater flap thickness, having additional skin available facilitates tension-free inset without compromising flap vascularity while allowing for adequate ptosis, particularly if the chest wall has been irradiated.

Ultimately, meticulous defect analysis, accurate flap design, and a tailored approach to patients' individual needs will optimize the results of unilateral autologous free-flap breast reconstruction. Cheng and colleagues have provided a credible contribution to the existing body of literature on this subject. Additional studies likely will bring us closer to identifying the optimal quantity of tissue to be included for autologous breast reconstruction in different patient populations.

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## REFERENCES

1. Chang EI, Liu J. Prospective evaluation of obese patients undergoing autologous abdominal free-flap breast reconstruction. *Plast Reconstr Surg.* 2018;142:120e–5e.
2. Srinivasa DR, Clemens MW, Qi J, Hamill JB, Kim HM, Pusic AL, et al. Obesity and breast reconstruction: complications and patient-reported outcomes in a multicenter, prospective study. *Plast Reconstr Surg.* 2020;145:481e–90e.
3. Cheng M, Koide S, Chen C, Lin Y. Comparisons between normal body mass index and overweight patients who underwent unilateral microsurgical breast reconstructions. *Ann Surg Oncol.* 2020. <https://doi.org/10.1245/s10434-020-09076-3>.
4. Hartrampf CR, Schefflan M, Black PW. Breast reconstruction with a transverse abdominal island flap. *Plast Reconstr Surg.* 1982;69:216–25.
5. Holm C, Mayr M, Höfter E, Ninkovic M. Perfusion zones of the DIEP flap revisited: a clinical study. *Plast Reconstr Surg.* 2006;117:37–43.
6. Wong C, Saint-Cyr M, Mojallal A, Schaub T, Bailey SH, Myers S, et al. Perforasomes of the DIEP flap: vascular anatomy of the lateral versus medial row perforators and clinical implications. *Plast Reconstr Surg.* 2010;125:772–82.
7. Momeni A, Shekter C. Intraoperative laser-assisted indocyanine green imaging can reduce the rate of fat necrosis in microsurgical breast reconstruction. *Plast Reconstr Surg.* 2020;145:507e–13e.
8. Chang EI, Kronowitz SJ. Dual-pedicle flap for unilateral autologous breast reconstruction revisited: evolution and optimization of flap design over 15 years. *Plast Reconstr Surg.* 2016;137:1372–80.
9. Chu CK, Fang L, Kaplan J, Liu J, Hanasono MM, Yu P. The chicken or the egg? Relationship between venous congestion and hematoma in free flaps. *J Plast Reconstr Aesthet Surg.* 2020;73:1442–7.

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