JPRAS Open 39 (2024) 121–126

Contents lists available at ScienceDirect

JPRAS Open

journal homepage: www.elsevier.com/locate/jpra

Original Article

Beyond the Breast: Body Contouring in the Context of Abdominally Based Microsurgical Breast Reconstruction ☆

Connor Crowley [a,*], Jonathan Bank [b]

[a] Northwell Health Division of Plastic Surgery
[b] New York Breast Reconstruction & Aesthetic Plastic Surgery, 833 Northern BLVD, Suite 160, Great Neck, NY 11021

ARTICLE INFO

Article history:
Received 11 September 2023
Accepted 26 November 2023
Available online 30 November 2023

Keywords:
DIEP Flap
Abdominal Donor Site
Abdominal Aesthetics
Body Contouring
Breast Reconstruction

ABSTRACT

With continued advances in abdominally based microsurgical breast reconstruction, the operative goal is no longer the creation of a simple breast mound but rather the formation of an aesthetically pleasing breast. While a substantial body of work has been dedicated to accomplishing this result, a similar progression has yet to be reflected in the literature with regard to the contour and shape of the abdominal donor site. Operative advances including muscle, fascial, and nerve preservation have been effective in minimizing the physiologic donor site morbidity of this procedure but have focused less on its cosmesis. Additionally, the published techniques aimed at the aesthetics of the abdomen have focused on the initial procedure and have not utilized the multistage process of breast reconstruction. In this paper, we will describe our ap-

☆ The authors have read the JPRAS "Guide for Authors" and are in compliance with all of its terms. The authors confirm that this is an original research article that has not been published or presented elsewhere or submitted for publication simultaneously and if accepted to this journal will not be submitted or published elsewhere without the consent of the copyright holder.

* Corresponding Author: Connor Crowley, M.D., Office of Surgical Education Victoria M. Waithe, 270-05 76th Ave Research BLDG-C Level Room 039AB, New Hyde Park, NY 11040, Phone: 631-379-7025; Fax: 559-238-0405
E-mail address: Connorwcrowley21@gmail.com (C. Crowley).

https://doi.org/10.1016/j.jpra.2023.11.013

proach to optimize the aesthetic result of the abdomen in abdominally based microsurgical breast reconstruction.

Background

More than 25000 cases of abdominally based microsurgical breast reconstruction were performed in the United States in 2020, with greater than 85% of these being free deep inferior epigastric artery perforator (DIEP) flaps.[1] The number of DIEP flaps as well as the number of women pursuing breast reconstruction has continued to increase over the past several years.[2] Despite these increases, most studies to date have focused on optimizing the aesthetic result of the breast while largely ignoring the abdominal donor site. Illustrating some of these issues, Niddam et al. studied the abdominal satisfaction rates of patients after unilateral DIEP flap breast reconstruction. A total of 52% of patients were “happy” or “very happy” with the aesthetic result of their abdomen, however, a surprising 34% of patient’s preferred their abdomen prior to surgery. The reasons cited for this included residual overhanging skin, dog ears, and superiorly displaced abdominal scars.[3]

Figure 1 demonstrates some of the typical abdominal shortcomings after DIEP flap breast reconstruction. The patient has an acceptable breast volume and contour; however, when critiquing the abdominal donor site, the overall shape is suboptimal with no accentuation of the abdominal silhouette, leading to an unnatural and unsatisfactory result. Additionally, the transverse abdominal scar is relatively high and is unable to be concealed in underwear or two-piece bathing suits.

Three components are proposed to help address these issues.

1) Scar Location and Shape

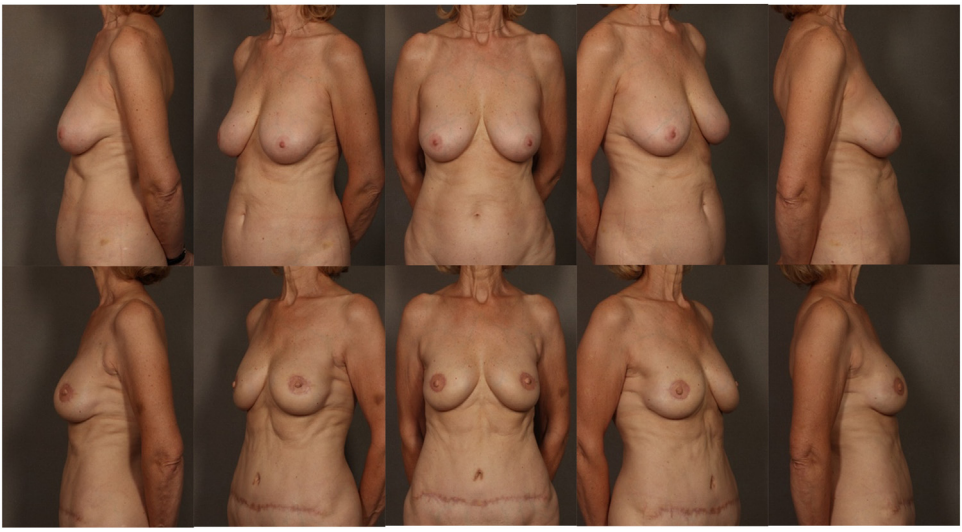

Figure 1. A 62-year-old female seen preoperatively (top) and postoperatively (bottom) after bilateral skin sparing mastectomy, reconstruction with bilateral DIEP flaps, and staged nipple–areolar reconstruction.

Poor location and shape of the abdominal scar can have a deleterious impact on the aesthetic appearance of the abdomen and can serve as a distraction to an otherwise acceptable abdominal contour. While the optimal scar location can be debated, intuitively the ideal scar should remain low enough to be concealed in undergarments and curve gently upward toward the hips, mimicking the natural curvatures of the lower abdominal aesthetic contour.

When designing DIEP flaps the primary goal is to ensure adequate flap perfusion. The presence of dominant periumbilical perforators may result in the surgeon's tendency to shift the skin incisions cephalad, resulting in an unfavorably high scar. To help prevent this, the upper abdominal incision can be planned to allow subcutaneous cephalic beveling of the adipo-fascial component of the flap. This permits for a relatively low upper abdominal skin incision while maintaining the perforating vessels in the flap parenchyma. Additionally, when preoperative imaging demonstrates adequate caliber lower abdominal perforators, the flap can preferentially be harvested on these without including the periumbilical perforators. This allows the surgeon to position the incisions as one would for a traditional abdominoplasty and can have a dramatic effect on the final scar location. The safety and flap reliability of subcutaneous beveling to capture perforators not included in the initial skin incision as well as the use of lower abdominal perforators has been shown to be comparable to flaps harvested on the traditional periumbilical perforators but with the added benefit of a lower scar.[4,5]

The lower abdominal incision should have a curved shape with the nadir positioned 6–8 cm above the vaginal introitus [6,7]. Mons undermining should be minimized to reduce postoperative edema and maintain natural adhesions which will limit upward migration of the scar. Superiorly, the upper abdominal flap should be undermined to the level of the xiphoid while preserving paramedian perforators, which enables rectus plication if indicated. This results in caudal mobility of the upper abdominal skin flap which further reduces the likelihood of cephalic migration of the scar.

In patients with normal BMI and acceptable baseline comorbidities, these steps entail minimal risk. In patients deemed high risk for abdominal donor site complications undermining can be minimalized, no plication will take place, and an incisional suction dressing can be applied to decrease skin tension and local edema.[8]

2) Management of the Umbilicus

In patients at high risk for wound healing problems (obese, diabetic, smokers, and significant preexisting hernias), we modify our approach to the umbilicus and commonly excise it during the initial procedure. Umbilical ablation has been shown to decrease the rate of abdominal donor site complications including full thickness skin loss of the umbilicus, lower abdominal skin necrosis, and wound dehiscence.[9] By excising the umbilicus, we are able to increase the advancement of the superior abdominal flap which has the added benefit of a lower scar position.

The neo-umbilicus is created 2–3 months after the index procedure and is positioned two-thirds of the distance between the xiphoid and the pubis. It is designed with a cruciate incision and the

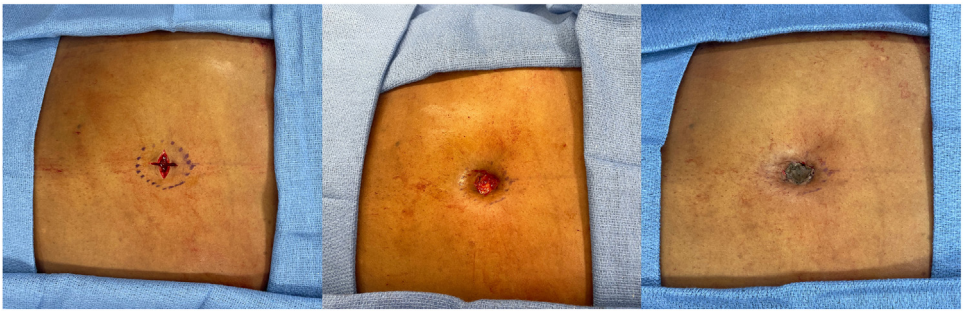

Figure 2. Neo-umbilicus creation shown at three different steps during the creation. On the left a cruciate incision is made and then the outlined periumbilical area is aggressively thinned. The center image shows the four resulting flaps sewn down to the abdominal wall with a long-lasting absorbable suture. On the right a skin graft taken from an abdominal dog ear excision was used to reconstruct the umbilical fossa and was later secured in place with a xeroform bolster dressing.

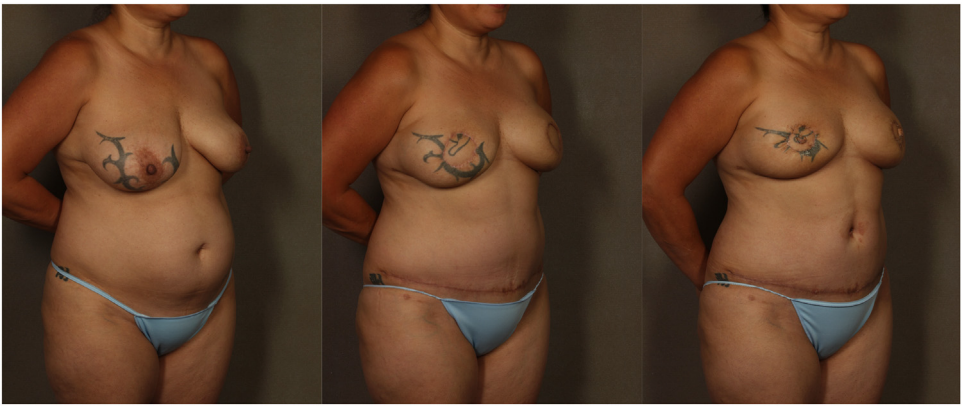

Figure 3. A 45-year-old female seen preoperatively (left) and postoperatively (middle) after bilateral skin sparing mastectomy and reconstruction with bilateral DIEP flaps with umbilical ablation. On the right image, she is seen after secondary umbilical creation as well contouring of the flanks during fat harvest for grafting to the bilateral breasts.

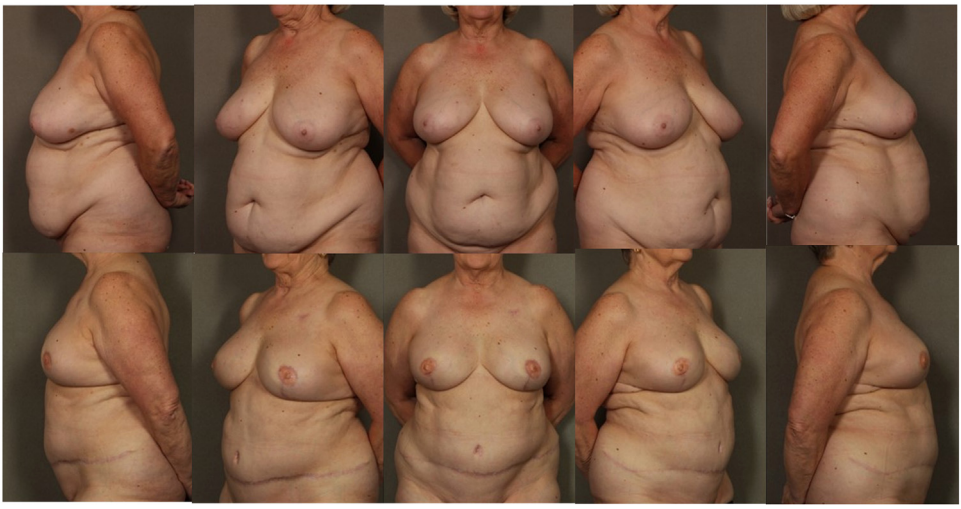

Figure 4. A 66-year-old female seen preoperatively (top) and postoperatively (bottom) after bilateral skin sparing mastectomy, reconstruction with bilateral DIEP flaps and staged nipple–areolar reconstruction.

apices of the four triangular flaps are secured to the rectus fascia with long-lasting absorbable sutures. The preconditioned, previously dissected, abdominal skin and fat permit aggressive thinning of the periumbilical region. This creates a deep "fossa" between the skin and the rectus fascia which serves as a wound bed for a full thickness skin graft, taken from the abdominal dogears or a discarded monitoring skin paddle. This results in an aesthetically pleasing umbilicus and can completely conceal the periumbilical scar from the skin surface. [Figures 2, 3]

3) Liposuction Aided Body Contouring after Breast Reconstruction

In purely cosmetic abdominal surgery, contouring is accomplished with concurrent liposuction at the time of the abdominoplasty. This may be impractical (and potentially hazardous) to add to a microsurgical breast reconstruction setting. Instead, we can utilize the staged approach of breast reconstruction and focus on contouring the abdomen with liposuction during fat harvest for the breast.

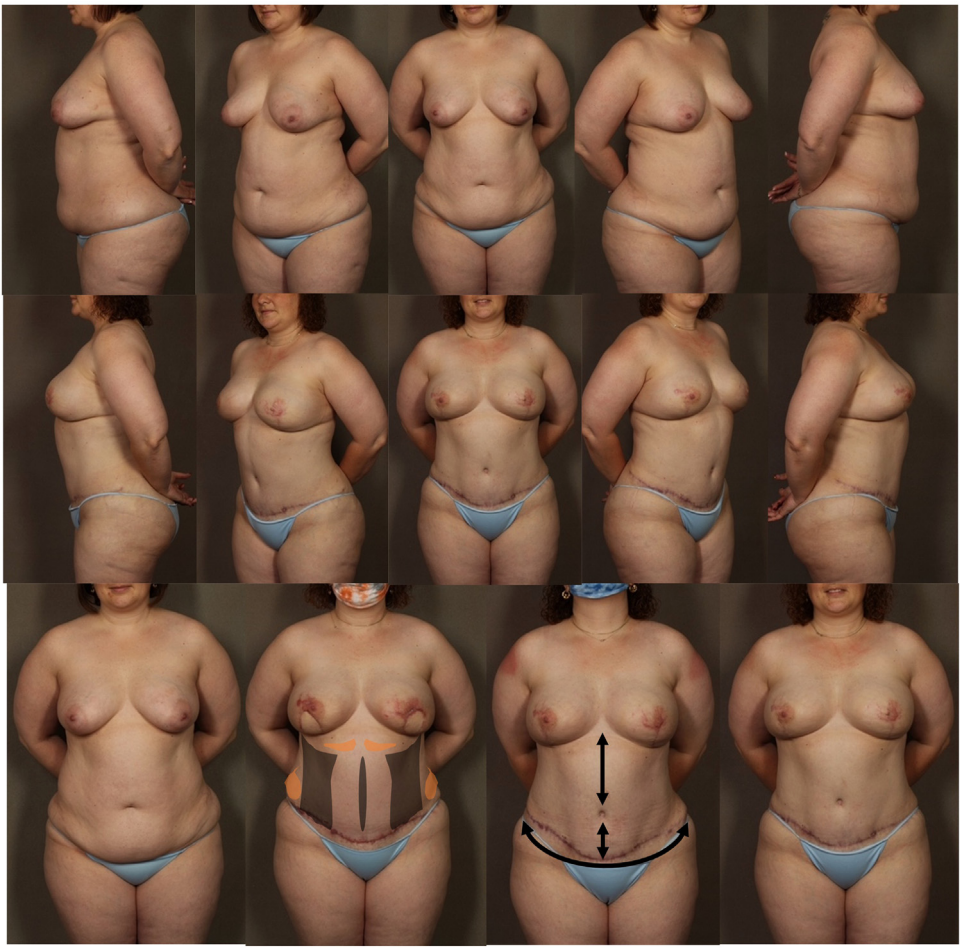

Figure 5. A 42-year-old female seen preoperatively (top) and postoperatively (middle) after bilateral nipple sparing mastectomy, reconstruction with bilateral DIEP flaps with umbilical ablation, and staged umbilical reconstruction and flank contouring during fat harvest for grafting to the bilateral breasts.
Along the bottom row the leftmost image shows the preoperative image again. The left central image shows the areas targeted during fat harvest to contour her abdomen. The right central image shows the correct placement of the umbilicus as well as her donor site scar. The arrows highlight the increased distance from the scar to umbilicus as well as the natural curvature of the lower abdominal scar that leads to a more aesthetically pleasing result postoperatively (furthest right).

Liposuction techniques for abdominal contouring are well established and have been described in a multitude of papers and books published within the realm of aesthetic surgery.[10–12] Despite this, we believe it is worth reiterating in the context of DIEP flap breast reconstruction and showing the effect it can have on the overall reconstructive outcome. Successful liposuction begins prior to the OR with careful topographic mapping of areas of excess adiposity as well marking key anatomic landmarks such as the linea alba and linea semilunaris. Intraoperatively, tumescent solution is injected, and we begin by targeting the deeper fat pockets with a 4-mm multiopening cannula. This is typically performed in the flanks as well as throughout the central abdomen in the premarked areas of excess. After debulking of the deeper fat, contouring is performed superficially at the layer immediately below the dermis, with a size 3 canula which can help create definition and a more enhanced contour.

Figure 4 shows a woman after bilateral mastectomies with DIEP flap reconstruction. At her initial surgery, the redundant skin and laxity of the lower abdomen is addressed, yet little has been accomplished with regard to her shape or contour, and there is no definition of the abdomen into its natural anatomic subunits. In Figure 5, the effects of secondary body contouring are more apparent. Specific attention was taken to define the linea alba and semilunaris, and to address flank adiposity, leading to a balanced result that emphasizes the feminine figure.

Discussion

The standards of care for abdominally based microsurgical breast reconstruction have continued to rise and the aesthetic demands of patient's have continued to rise with it. We can no longer be satisfied with low flap failure rates and breast mound creation alone, but should aim to optimize all aspects of this procedure including the final abdominal contour and aesthetic result. The techniques and strategies in this paper are not novel, but they have rarely been described in the context of abdominally based free flap breast reconstruction and have largely remained in the purview of the cosmetic abdominoplasty and body contouring world. We encourage expanding the focus beyond optimizing the aesthetic result of the breast and offer pearls for safely optimizing scar position and its relation to umbilical management, in addition to rethinking of the process of fat harvest to also refine the torso.

Funding

None.

Conflicts of interest

None declared.

Ethical approval

Not required.

References

1. Plastic Surgery Statistics Report. The American Society of Plastic Surgeons. Available online: https://www.plasticsurgery.org/documents/News/Statistics/2020/plastic-surgery-statistics-full-report-2020.pdf
2. MDMD, PhDMD Masoomi Hossein, Hanson Summer E, Clemens Mark W, Mericli Alexander F. Autologous breast reconstruction trends in the United States: Using the Nationwide Inpatient Sample Database. *Ann Plast Surg*. 2021;87(3):242–247. doi:10.1097/SAP.0000000000002664.
3. Niddam J, Bosc R, Lange F, et al. DIEP flap for breast reconstruction: Retrospective evaluation of patient satisfaction on abdominal results. *J Plast Reconstr Aesthetic Surg*. 2014;67(6):789–796. doi:10.1016/j.bjps.2014.02.008.
4. Akita S, Mitsukawa N, Tokumoto H, et al. Low-rise scar deep inferior epigastric artery perforator flap for breast reconstruction. *Microsurgery*. 2015;35(6):451–456. doi:10.1002/micr.22466.
5. Eom JS, Yim JH. The Low DIEP Flap for Breast Reconstruction. *Plast Reconstr Surg Glob Open*. 2018;6(3):e1365. doi:10.1097/GOX.0000000000001365.
6. Le Louarn C, Pascal JF. High superior tension abdominoplasty. *Aesthetic Plast Surg*. 2000;24:375–381.
7. Baroudi R, Moraes M. A "bicycle-handlebar" type of incision for primary and secondary abdominoplasty. *Aesthetic Plast Surg*. 1995;19(4):307–320. doi:10.1007/BF00451657.
8. Limpiado MA, Guest R, Egan KG, et al. Closed-incision negative pressure therapy prevents major abdominal donor-site complications in autologous breast reconstruction. *Ann Plast Surg*. 2022;89(5):529–531. doi:10.1097/SAP.0000000000003285.
9. Fisher M, Bank J, Alba B, et al. Umbilical ablation during deep inferior epigastric perforator flap harvest decreases donor site complications. *Ann Plast Surg*. 2020;85(3):260–265. doi:10.1097/SAP.0000000000002191.
10. Chia CT, Neinstein RM, Theodorou SJ. Evidence-based medicine: Liposuction. *Plast Reconstr Surg*. 2017;139(1):267e–274e. doi:10.1097/PRS.0000000000002859.
11. Parashar S, Venkataram A. Aesthetic subunits of the trunk: Anatomy and behavior of skin and adipose tissue in each unit for better outcomes in liposuction. *Indian J Plast Surg*. 2018;51(2):115–122. doi:10.4103/ijps.IJPS_117_18.
12. Hoyos A, Prendergast P. High definition body sculpting. 2014. doi:10.1007/978-3-642-54891-8