

Bilateral Breast Revision Augmentation With Deep Inferior Epigastric Perforators/Superficial Inferior Epigastric Artery Flaps

Case Reports and Literature Review

Steven L. Henry, MD, Jung-Ju Huang, MD, and Ming-Huei Cheng, MD, MHA

Abstract: Free tissue transfer is rarely used for cosmetic breast enlargement, but in certain cases of failed augmentation with implants, it may be a justifiable alternative. Our experience in treating bilateral capsular contracture with deep inferior epigastric perforators/superficial inferior epigastric artery flaps has been very favorable. Advantages include avoidance of implants and their related problems, more natural feel and shape, and ancillary abdominoplasty. Although the operation is substantially lengthier and more complicated than implant replacement, and the overall treatment cost much higher, we feel that surgeons who are skilled in perforator-based free tissue transfer should consider such procedures in the appropriate circumstances.

Key Words: breast, augmentation, revision, mammoplasty, capsular contracture, autologous, free tissue transfer, free flap, DIEP, SIEA

(*Ann Plast Surg* 2010;64: 416–420)

While breast augmentation is among the most common cosmetic procedures, autologous tissue is almost never used. The reason is obvious—implants are simple, reliable, and safe for the overwhelming majority of patients. Nonetheless, implants do have their drawbacks, such as unnatural feel and contour, infection, capsular contracture, and rupture/deflation. It is therefore somewhat paradoxical that autologous tissue is often considered superior to implants for breast reconstruction, given that many of the benefits of autologous tissue—more natural feel and contour, potential donor site benefit (especially with modern perforator flap techniques), and avoidance of implant-related complications—would also be of interest to augmentation patients. The disadvantages of autologous tissue for breast augmentation are substantial, including greater operative risk, recovery period, and cost. However, from our point of view as microsurgeons, these disadvantages may be counterbalanced by the benefits for select patients requiring revision augmentation for implant-related complications. We present 2 such patients who underwent bilateral revision augmentation with free tissue transfer from the abdomen.

Received December 17, 2008, and accepted for publication, after revision, May 27, 2009.

From the Division of Reconstructive Microsurgery, Department of Plastic & Reconstructive Surgery, Chang Gung Memorial Hospital, Taoyuan, Taiwan. None of the authors has a financial interest in any of the products or techniques mentioned in this article. There were no external sources of support or funding for this work.

Reprints: Ming-Huei Cheng, MD, MHA, Division of Reconstructive Microsurgery, Department of Plastic and Reconstructive Surgery, Chang Gung Memorial Hospital, Chang Gung University, College of Medicine, Taoyuan, Taiwan 5, Fu-Hsing Street, Kweishan, Taoyuan 333, Taiwan. E-mail: minghueicheng@gmail.com or minghuei@adm.cgmh.org.tw.

Copyright © 2010 by Lippincott Williams & Wilkins
ISSN: 0148-7043/10/6404-0416

DOI: 10.1097/SAP.0b013e3181b0224c

CASE 1

A 48-year-old woman presented with severe, recurrent bilateral breast capsular contracture (Fig. 1). She had undergone subglandular augmentation with gel implants 19 years prior, and 1 year prior had been treated for capsular contracture with capsulotomy and replacement of saline implants in the subpectoral plane. The contracture recurred several months thereafter. She wished to have the implants removed and not replaced, but wanted to maintain her augmented volume. She also desired abdominoplasty, and requested that her excess abdominal tissue be used to replace the implants. After discussion of the risks and benefits, she elected to undergo free tissue transfer from the abdomen. Through bilateral inframammary incisions measuring 10 cm in length (long enough to accommodate the flap), the implants and capsules were removed. To avoid muscular compression or distortion of the flap, a new pocket was created in the subglandular plane, and the sternocostal insertion of the pectoralis muscle was reattached to the chest wall (specifically, to the perichondrium and periosteum of the ribs). The recipient internal mammary vessels were prepared bilaterally with resection of a portion of the fifth ribs, the most cephalad level that could be reached from the inframammary incisions. The external diameter of the artery and veins at this level were 2.5 and 1.5 mm, respectively. A second team harvested the abdominal tissue simultaneously, basing the right flap on the deep inferior epigastric perforators (DIEP) and the left on the superficial inferior epigastric artery (SIEA), using standard techniques described previously.¹ The flaps measured 17 × 13 cm and displaced approximately 380 mL (Fig. 2), comparable in volume to the implants that were removed. The flaps were deepithelialized and buried with the exception of a small ellipse of skin that was inset into the inframammary wounds for monitoring purposes (Fig. 3). Ischemia time for the right flap was 1.5 hours and for the left 2.4 hours, and total operative time was 12 hours. The patient stayed in the intensive care unit for 3 days and in the hospital for 7 days (as is routine for microsurgical patients at our institution). The monitoring skin paddles were excised 1 month postoperatively in an outpatient procedure. The patient's recovery was unremarkable and free of complications or donor site morbidity. She was very pleased with the natural feel and shape of her breasts (Fig. 4). She was also happy with her improved abdominal contour.

CASE 2

A 35-year-old woman presented with bilateral breast grade 2–3 capsular contracture 10 years after subpectoral augmentation with saline implants (Fig. 5). The right implant had recently ruptured. She desired removal of both implants and wished to maintain her augmented volume without the use of new implants. She also requested that her excess abdominal tissue be used for volume replacement, and so chose to undergo free tissue transfer from the abdomen. The procedure was nearly identical to Case 1, except that bilateral DIEP flaps were transferred. Each flap measured 16 × 12 cm and displaced approximately 260 mL (Fig. 6). Access to the recipient internal mammary vessels was gained bilaterally through the fourth ribs, where the artery and veins measured 2.5 and 2.0 mm,



FIGURE 1. Preoperative appearance of a 48-year-old woman who presented with recurrent bilateral capsular contracture.

respectively. Ischemia time for the left flap was 1.7 hours and for the right 2.6 hours, and total operative time was 14 hours. The patient's postoperative course and recovery were routine and unremarkable. The monitoring skin paddles were excised 1 week postoperatively. The patient was delighted with the shape, volume, and feel of her breasts and the contour of her abdomen (Fig. 7).

DISCUSSION

Free tissue transfer is rarely indicated for cosmetic breast surgery, and for good reason. The placement of breast implants is a straightforward outpatient procedure with few operative risks, rapid convalescence, and highly predictable results. Free tissue transfer is quite the opposite, characterized by technical complexity, lengthy inpatient hospitalization, and risk of severe complications including partial or total flap loss, fat necrosis, donor site morbidity, and even life-threatening conditions, such as deep venous thrombosis. To incur these risks for standard primary augmentation is inarguably unjustified.

That these risks are considered acceptable for breast reconstruction reflects the 3 major drawbacks of breast implants: unnatural appearance and/or feel because of thin overlying tissue and/or capsular contracture; exposure and/or infection (especially in an irradiated field); and rupture or deflation. All of these drawbacks also pertain to breast augmentation, albeit to lesser degrees. The risk of capsular contracture in primary augmentation is in the range of



FIGURE 3. A small ellipse of skin was temporarily inset into the inframammary wounds for monitoring purposes and excised at 1 month.

8% to 20%,^{2,3} compared with 10% to 40% in reconstruction.^{4,5} Exposure/infection is also less common in augmentation (1%) than in reconstruction (2% in nonirradiated and 6% in irradiated cases), as is rupture or deflation (5%–16% vs. 9%–27% at 7 years [with substantial variation depending on implant type]).^{3,6–8}

Considering all of the above, implants are clearly better suited for primary augmentation, while free tissue transfer is more reasonable for reconstruction. Nonetheless, the odds of a patient needing a second procedure for an implant-related complication are at least 21% at 6 years (and undoubtedly much higher over the course of a lifetime), and with revision augmentation the risk of implant-related complications, particularly capsular contracture, is magnified.^{2,3,7} This risk must be viewed in the context of the modern microsurgical era, in which autologous breast reconstruction can be achieved with a high success rate and very little donor site morbidity.^{1,9–11} Indeed, with the DIEP flap or the SIEA flap there is the potential for donor site benefit in the form of an ancillary abdominoplasty. These factors make the relative risk of free tissue transfer more acceptable. In this sense revision augmentation lies at the crossroads of cosmetic and reconstructive breast surgery, where plausible arguments can be made for either implant replacement or autologous tissue transfer.

The use of autologous tissue for revision augmentation is certainly not unprecedented. Bilateral pedicled transverse rectus abdominis myocutaneous flaps have been used for volume replace-

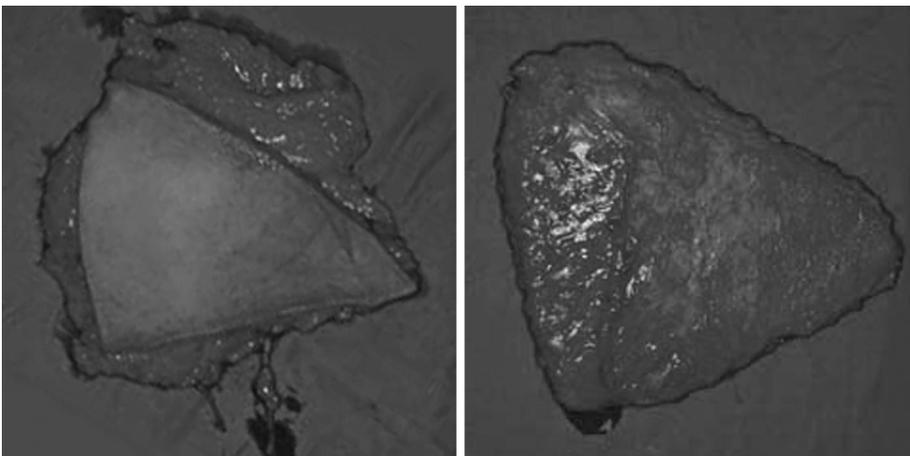


FIGURE 2. (Left) SIEA flap was harvested from the left hemi-abdomen and (right) DIEP flap from the right.

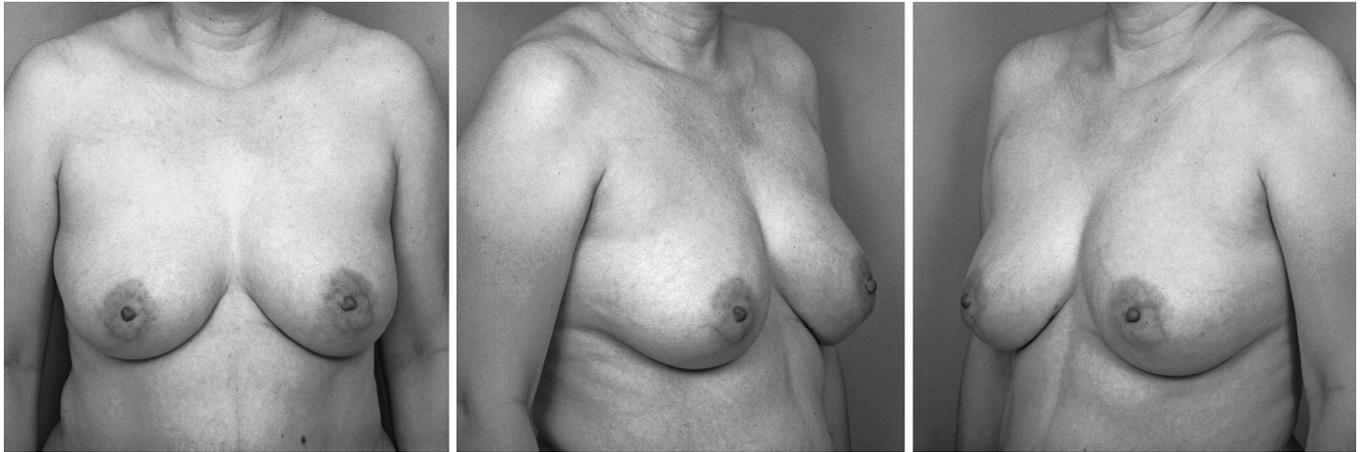


FIGURE 4. At 6 months, the patient was very pleased with the natural shape and feel of her breasts.



FIGURE 5. Preoperative appearance of a 35-year-old woman who presented with bilateral capsular contracture and right implant deflation.

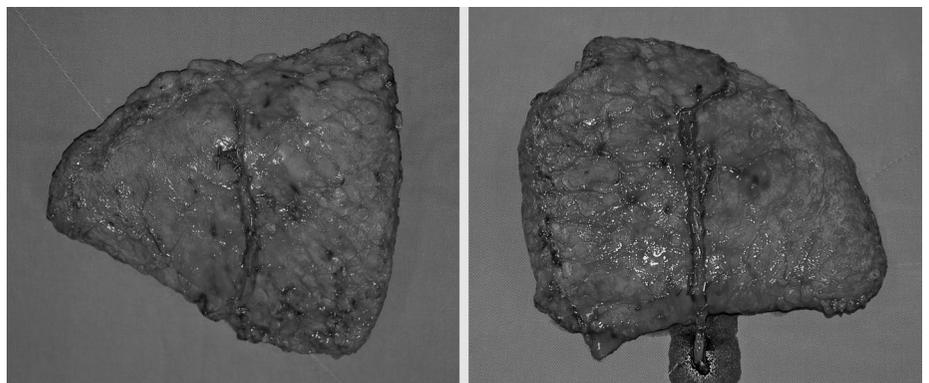


FIGURE 6. Bilateral DIEP flaps were harvested.

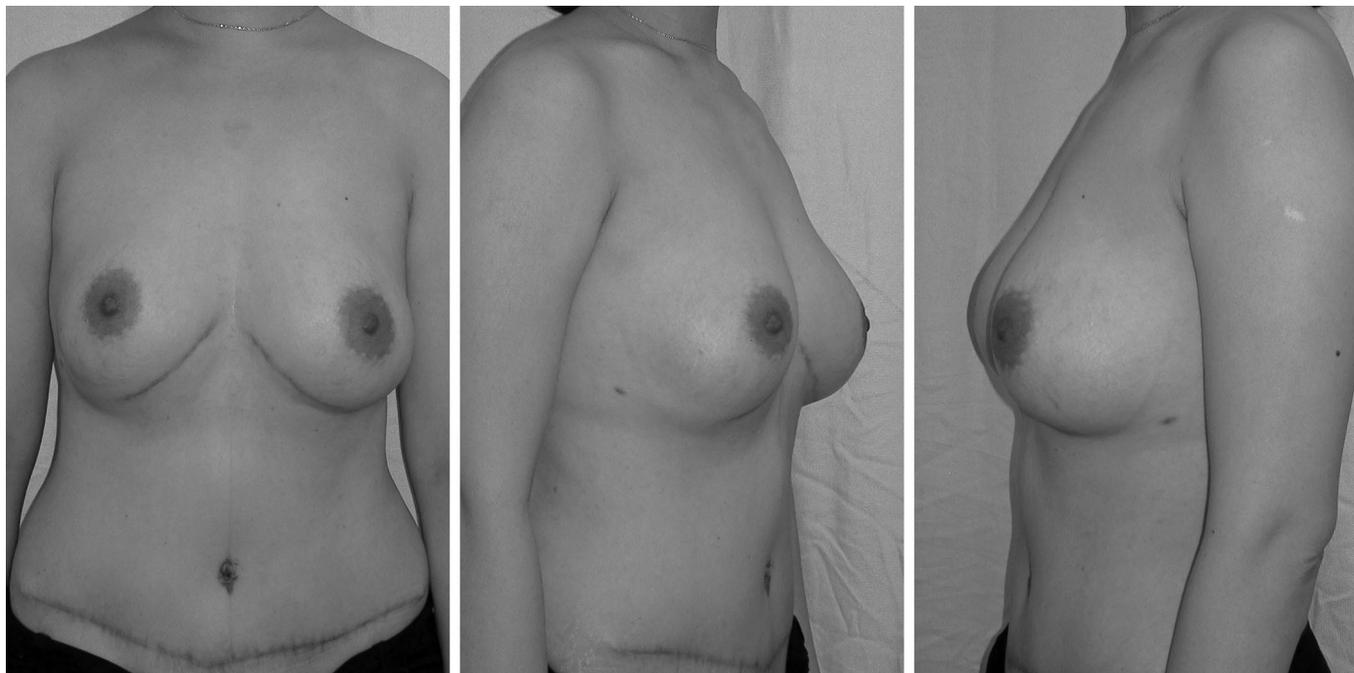


FIGURE 7. At 6 months, the patient was delighted with the shape, volume, and feel of her breasts and the contour of her abdomen.

ment after removal of cosmetic implants¹² and injected silicone^{13,14} and paraffin,¹⁵ and pedicled latissimus dorsi musculocutaneous flaps have been used extensively by Hollis for both revision and primary augmentation.¹⁶ Hollis argued that autologous tissue is advantageous in that it can be expected to correlate with weight changes and the aging process, although no long-term data were presented to support this view.

We agree that autologous tissue can be appropriate and advantageous in select cases of revision augmentation; however, we strongly prefer free tissue transfer, especially for bilateral cases, as donor site morbidity can be minimized. Indeed, for our patients the donor site incurred no morbidity and instead provided a welcomed improvement in abdominal contour. Although labor intensive, we feel comfortable with bilateral DIEP/SIEA flaps because each flap includes only Hartrampf zones I and III and therefore should be at minimal risk for partial flap loss or fat necrosis.^{17–19}

The first reported case in which free tissue transfer was used for bilateral revision augmentation was from Munhoz et al in 2003.²⁰ They used bilateral DIEP flaps to replace implants that had been removed for recurrent mastitis. The flaps were placed in the subglandular plane (where the implants formerly resided) via an inframammary approach, and anastomoses were performed with the thoracodorsal vessels through a separate incision in the axilla. Two surgical teams worked concurrently. There were no complications related to either the flaps or the donor sites, although the patient did subsequently develop ptosis and required mastopexy 3 months later.

Also in 2003, Allen and Heitland described a series of 16 cases using a combination of DIEP, SIEA, and superior gluteal artery perforator flaps for a variety of nononcologic indications.²¹ Included in this series were 3 patients with “failed augmentation” (the first with severe capsular contracture, the second with implant-associated lymphadenopathy, and the third with “silicone hysteria”). The operative protocol was similar to that of Munhoz et al, except that the internal mammary vessels were used as recipients, and a small skin paddle was left in the inframammary fold for monitoring and was later excised (as in our cases). Specifics were not provided

for the 3 revision augmentation patients, but among the series there were numerous complications, including partial flap necrosis, recipient site dehiscence, and seroma. Several patients required donor site revisions and/or mastopexies. Nevertheless, patient satisfaction was very high.

Several authors have since described similar cases in which lower abdominal tissue (free muscle-sparing transverse rectus abdominis myocutaneous, DIEP, or SIEA flaps) was transferred to replace implants with intractable capsular contracture.^{22–24} Like Munhoz et al, they all used the thoracodorsal vessels as recipients, with access gained through a separate axillary incision. None reported significant flap or donor site complications, although, as above, secondary mastopexy was required in some cases.

As with all previous reports, we used an inframammary approach. The incision needs to be rather long (10 cm) to permit passage of the flap. Given this requirement, the only cosmetically-acceptable location is the inframammary crease. We placed the incision slightly medially to gain exposure to the internal mammary vessels, which are our preferred recipients in postmastectomy reconstructions. Unlike with mastectomy defects, access to these vessels from an inframammary incision can be very difficult. Although the vessels are larger with more cephalad exposures, we could reach only the fourth or fifth ribs in our cases. (The sixth rib would be easier to reach, but the vessels at this level are smaller and often bifurcated.) These difficulties notwithstanding, we still favor the internal mammary recipients because they provide the best inflow, facilitate medial positioning of the flaps, and obviate the additional incision in the axilla.²⁵

When discussing with prospective revision augmentation patients the option of free tissue transfer, a thorough process of informed consent is mandatory. The patient must understand the magnitude of the procedure and recovery, both of which far surpass what they may remember from their previous implant-based augmentation. The risks of major events, like massive blood loss, requirement for transfusion, deep venous thrombosis, and pulmo-

nary embolism, must be understood. The patient must also accept the risk of flap failure and the need for a “bailout” procedure, either with an implant or another flap(s) from the buttocks or elsewhere. Donor site issues should obviously be discussed as well, such that the patient appreciates that the morbidity may exceed that of a simple “tummy tuck.” The need for secondary mastopexy, common in the experience of other authors, might also be discussed. (Notably, we have not seen ptosis at 6 months follow-up in either of our patients, even though we did not use tacking sutures or other means to fix the flap to the chest wall.)

In addition, the issue of breast cancer should be considered, as there is certainly a possibility of fat necrosis and consequent interference with mammographic interpretation. As mentioned earlier, we deem this risk to be minimal because only the best-perfused zones are included in each hemi-abdominal flap. Nonetheless, it would clearly be prudent to perform preoperative screening in patients above the age of 35, with either mammography or, as was done in our patients, computed tomography. Another consideration is that this procedure eliminates an option for oncologic reconstruction should a tumor subsequently arise.

Although the litany of risks can be intimidating, our experience has shown us that patients can recover from the procedure quite readily. For many patients the major deterrent may therefore be financial. In Taiwan, all breast reconstructions are deemed “cosmetic” and not covered by the national health insurance system. Thus, both of our patients funded themselves entirely. Relatively speaking, the total cost of treatment in both cases was roughly twice that of implant-based revision augmentation at our institution, although rates of inpatient hospitalization may be much greater in other countries.

The opinion of insurers notwithstanding, the various reports of “autologous augmentation” demonstrate that the line separating revision augmentation and reconstruction can be nebulous. Most of the aforementioned authors use the term “breast reconstruction” to describe their case even when the surgery was performed to correct a problem stemming from strictly cosmetic augmentation. One might argue that for a woman who perceives her augmented state as “normal,” the explanted state would be an abnormal condition requiring reconstruction. Admittedly, the distinction between cosmetic and reconstructive breast surgery may be largely semantic, confounded by the fact that the “function” of a breast, whether physical or psychologic, is not necessarily a product of its size.

Thus, as for all procedures, the fundamental determinant of whether to perform free tissue transfer for breast augmentation remains the ratio of risk to benefit. In capable hands, the surgical risk of free tissue transfer can be reasonable and the benefit substantial. Other factors, such as the risk of future breast cancer and potential need for autologous reconstruction, must also be assessed. The first option in breast augmentation is unquestionably the placement of implants, but free tissue transfer should be considered in select patients for whom implants are undesirable.

REFERENCES

- Cheng MH, Lin JY, Ulusal BG, et al. Comparison of resource cost and success rates between immediate and delayed breast reconstruction using DIEP or SIEA flaps under a well-controlled clinical trial. *Plast Reconstr Surg.* 2006;117:2139–2142.
- Gutowski KA, Mesna GT, Cunningham BL. Saline-filled breast implants: a Plastic Surgery Educational Foundation multicenter outcomes study. *Plast Reconstr Surg.* 1997;100:1019–1027.
- Cunningham B. The Mentor Core Study on Silicone MemoryGel Breast Implants. *Plast Reconstr Surg.* 2007;120:19S–29S.
- Cordeiro PG, McCarthy CM. A single surgeon’s 12-year experience with tissue expander/implant breast reconstruction. *Plast Reconstr Surg.* 2006;118:825–839.
- Sullivan SR, Fletcher DR, Isom CD, et al. True incidence of all complications following immediate and delayed breast reconstruction. *Plast Reconstr Surg.* 2008;122:19–28.
- Levi B, Rademaker AW, Fine NA, et al. Comparison of breast implant deflation for Mentor anterior and posterior valve designs in aesthetic and reconstructive patients. *Plast Reconstr Surg.* 2008;122:685–692.
- Spear SL, Murphy DK, Slicton A, et al. Inamed silicone breast implant core study results at 6 years. *Plast Reconstr Surg.* 2007;120:8S–16S.
- Cordeiro PG, Pusic AL, Disa JJ, et al. Irradiation after immediate tissue expander/implant breast reconstruction: outcomes, complications, aesthetic results, and satisfaction among 156 patients. *Plast Reconstr Surg.* 2004;113:877–881.
- Blondeel N, Vanderstraeten GG, Monstrey SJ, et al. The donor site morbidity of the free DIEP flaps and free TRAM flaps for breast reconstruction. *Br J Plast Surg.* 1997;50:322–330.
- Garvey PB, Buchel EW, Pockaj BA, et al. DIEP and pedicled TRAM flaps: a comparison of outcomes. *Plast Reconstr Surg.* 2006;117:1711–1719.
- Granzow JW, Levine JL, Chiu ES, et al. Breast reconstruction with perforator flaps. *Plast Reconstr Surg.* 2007;120:1–12.
- Spiro SA, Marshall D. Bilateral TRAM flaps for the reconstruction of the post-implantectomy/capsulectomy breast deformity. *Aesthetic Plast Surg.* 1996;20:315–318.
- Aoki R, Mitsuhashi K, Hyakusoku H. Immediate reaugmentation of the breasts using bilaterally divided TRAM flaps after removing injected silicone gel and granulomas. *Aesthetic Plast Surg.* 1997;21:276–279.
- Lai YL, Weng CJ, Noordhoff MS. Breast reconstruction with TRAM flap after subcutaneous mastectomy for injected material (siliconoma). *Br J Plast Surg.* 2001;54:331–334.
- Chen JS, Liu WC, Yang KC, et al. Reconstruction with bilateral pedicled TRAM flap for paraffinoma breast. *Plast Reconstr Surg.* 2005;115:96–104.
- Hollis P. Breast augmentation with autologous tissue: an alternative to implants. *Plast Reconstr Surg.* 1995;96:381–384.
- Cheng MH, Robles JA, Ulusal BG, et al. Reliability of zone IV in the deep inferior epigastric perforator flap: a single center’s experience with 74 cases. *Breast.* 2006;15:158–166.
- Ulusal BG, Cheng MH, Wei FC, et al. Breast reconstruction using the entire transverse abdominal adipocutaneous flap based on unilateral superficial or deep inferior epigastric vessels. *Plast Reconstr Surg.* 2006;117:1395–1403.
- Holm C, Mayr M, Höfner E, et al. Perfusion zones of the DIEP flap revisited: a clinical study. *Plast Reconstr Surg.* 2006;117:37–43.
- Munhoz AM, Ishida LH, Duarte GG, et al. Aesthetic refinements in breast augmentation with deep inferior epigastric perforator flap: a case report. *Aesthetic Plast Surg.* 2003;27:107–111.
- Allen RJ, Heitland AS. Autogenous augmentation mammoplasty with microsurgical tissue transfer. *Plast Reconstr Surg.* 2003;112:91–100.
- Brüner S, Frerichs O, Schneider W, et al. Autologous tissue transplantation (TRAM/DIEP) as an option of therapy in capsular contracture. *Handchir Mikrochir Plast Chir.* 2004;36:362–366.
- Gurunluoglu R, Shafiqi M, Schwabegger A, et al. Secondary breast reconstruction with deepithelialized free flaps from the lower abdomen for intractable capsular contracture and maintenance of breast volume. *J Reconstr Microsurg.* 2005;21:35–41.
- Mosahebi A, Atherton D, Ramakrishnan V. Immediate bilateral autologous breast reconstruction for silicone intolerance. *Br J Plast Surg.* 2005;58:714–716.
- Lin CH, Cheng MH, Yeow KM, et al. Internal mammary vessels as a recipient site for free flap breast reconstruction in Asian women: a study based on preoperative sonography and surgical approach. *J Plast Surg Assoc ROC.* 2005;14:205–212.