

MODERN CONCEPTS IN BREAST RECONSTRUCTION: LESSENING THE PSYCHOLOGICAL TRAUMA FOR WOMEN WITH BREAST CANCER

Hooman Soltanian, M.D.

Introduction and background:

Breast cancer has become one of the most common malignancies among women. In 2003, an estimated 211,000 women will be diagnosed with invasive breast cancer. Additionally, Carcinoma in situ of the breast accounts for approximately 55000 new cases each year. About 39,800 American women will die from breast cancer in 2003.^{1,2} The lifetime risk of being diagnosed with invasive or in situ breast cancer for women of all races is about 16%.²

Recent advances in the treatment of breast cancer showing a trend toward less invasive procedures. However, a large number of women require mastectomies. There is a significant psychological trauma associated with the loss of one or both breasts. John M. Goin noted, "The breast, far more importantly than any other anatomical part, is an emotional symbol of a woman's pride in her femininity, sexuality, and motherliness".³ Depression after mastectomy is very common and resembles mourning in the same way as these patients would mourn the loss of a loved one.⁴ Negative psychological consequences of mastectomy can be significantly reduced by breast reconstruction. There are data to show that immediate breast reconstruction at the time of the ablative surgery is more effective in this regard.⁵⁻⁸

Utilization of Breast Reconstruction:

There is a wide regional variation in the rate and type of breast reconstruction after mastectomy documented by the Surveillance, Epidemiology, and End Results (SEER) Program.² Many factors play a role including patient's choice, referring physicians' biases, race, and availability of plastic surgeons. A recent study from Canada revealed that there is a great need for communication between the referring physicians and plastic surgeons to provide the women suffering from breast cancer with the most complete treatment plan.⁹ More than one-third of the referring physicians in the study indicated that breast reconstruction would delay the detection of local recurrence despite of evidence to the contrary (see below). Within that study, women older than 49 years were not referred for reconstruction because they were considered too old for the procedure. Despite the above, many women older than 49 years are potential candidates for breast reconstruction.¹⁰

Major reasons for women who choose not to have breast reconstruction include the fact that they are afraid of complications, perceive themselves too old, and do not have enough information.¹¹ The major reason most often cited by women who decided to have breast reconstruction was the desire to feel whole again.

There is evidence that informing women about their options for reconstruction before mastectomy can minimize their psychological distress.¹² It may be therapeutic to discuss

the possibility of breast reconstruction with women because the treatment gives them a more hopeful outlook, and providing them with a sense that the doctor believes in their survival. The fact that the reconstructive option is available to them is a source of comfort and strength to many women who face mastectomy.¹³

Breast Reconstruction

Breast reconstruction consists of two parts. The first and, by far, more extensive, part is the reconstruction of the breast mound. The second part is the creation of the nipple and areola complex which is usually a minor procedure and can be performed under local anesthesia.

Breast reconstruction can be combined with the ablative procedure (immediate reconstruction) or can be performed at a later time after mastectomy (delayed reconstruction). Immediate reconstruction is increasingly performed and accounts for approximately 40% of all breast reconstructions. It requires one less general anesthetic induction, is more convenient for the patients, and can provide better aesthetic results.¹⁴ Different options for the creation of the breast mound vary in their level of complexity, potential morbidity and aesthetic result attainable (Table I).

Method	Complexity	Aesthetic Result
Implant	+	+
Expander/Implant	++	+
Latissimus dorsi	+++	++
TRAM pedicled flap*	+++	+++
Free flaps	++++	++++

Table I

* TRAM = Transverse Rectus Abdominis Myocutaneous

Expander/Implant

Tissue expansion followed by permanent implants is the most common method of breast reconstruction. The procedure is relatively simple. It adds less than 30 minutes per side to the surgical time if performed at the time of mastectomy. In certain cases, such as patients with small breasts and skin-sparing mastectomy, the breast mound can be reconstructed in a single stage procedure with placement of an implant in the subpectoral space. In the majority of the cases, the expander is placed in the subpectoral space and the mastectomy flaps are closed. Depending on the amount and condition of the preserved skin, the expander is filled with saline to initiate the process of the expansion. Over weeks or months, depending on the condition of the overlying skin, saline is injected into the expander through a built-in port. This allows for gradual expansion of the tissue on the chest to accommodate a permanent implant. The expansion can be continued during the course of chemotherapy, as long as significant neutropenia is avoided. Once the desired size is reached, the expander is left in place for about 3-6 months to allow the capsule to mature. During the second stage, the expander is exchanged with a permanent implant.

The expander/implant sequence is simple, lacks a donor site, has a short recovery, and is often a great option for bilateral reconstruction. However, it is time-consuming, requires a second procedure, and carries the risk of capsular contracture around the implant. The aesthetic results are generally not as good as other methods and it is difficult to match a large, pendulous breast on the opposite side with this method.

Autogenous Tissue

Patient's own tissue is used for reconstruction of the breast mound. If there is not adequate volume of tissue available, this can be combined with an implant.

Transverse Rectus Abdominis Myocutaneous (TRAM) flap:

This is the method of choice for autogenous reconstruction in suitable candidates. An ellipse of skin and subcutaneous tissue from the lower abdomen is transferred to the chest based on one or both rectus abdominis muscle(s) (Fig. 1, Appearance after mastectomy without reconstruction. The ellipse depicts the area of skin and fatty tissue used for breast reconstruction. A = Mastectomy scar B= Superior Epigastric Vessels C=Rectus abdominis muscle D= Deep Inferior Epigastric Vessels).

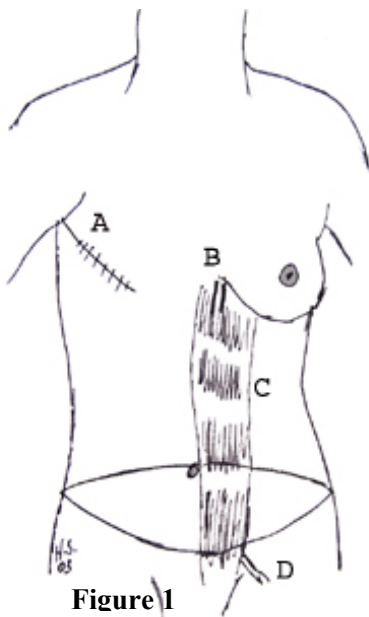


Figure 1

The donor site in the lower abdomen is closed directly. This creates a tighter abdomen similar to a tummy tuck procedure. The tissue can be transferred to the chest in two basic ways:

1- The pedicled TRAM flap (Fig 2, Right breast reconstruction with pedicled TRAM flap. A= TRAM flap on the breast B= Contralateral rectus abdominis muscle tunneled to the right chest C= Superior epigastric vessels perfusing the flap D= Rectus abdominis muscle on the chest E=Final scar on the abdomen): The muscle is transected below the skin flap. The rectus muscle and overlying skin and fatty tissue remain attached to the deep superior epigastric vessels. The entire flap is transferred to the chest through a subcutaneous tunnel in the epigastric area.

The pedicled TRAM requires the use of the entire rectus muscle (occasionally both) which renders the abdominal wall very weak. In these cases, a synthetic mesh is used to avoid formation of a ventral hernia.

2- Free TRAM flap (Fig. 3, Right breast reconstruction with free TRAM (Transverse Rectus Abdominis Myocutaneous) flap. A= TRAM flap on the breast B= postoperative defect in the rectus muscle C= the deep inferior epigastric vessel connected to the Thoracodorsal vessels D= small portion of the rectus muscle transferred with the flap E= Final scar on the abdomen): A small portion of the muscle underlying the skin and fatty

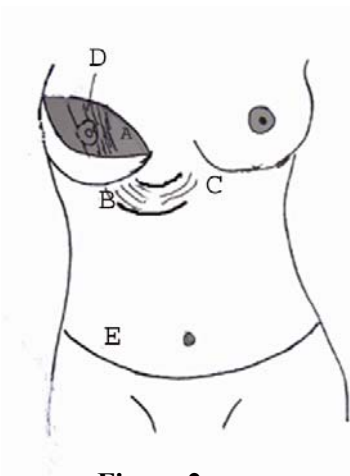


Figure 2

tissue from the lower abdomen is removed. In order to incorporate the deep inferior epigastric pedicle, these vessels are connected to recipient artery and vein in the axilla (thoracodorsal vessels) or on the chest wall (Internal mammary vessels) requiring the use of an operating microscope.

The deep inferior epigastric vessels are the dominant blood supply to the rectus muscle therefore the free TRAM has a better blood supply than the

pedicled flap.

The TRAM flap requires a longer recovery time than an implant reconstruction but the aesthetic results are superior. Providing that there is adequate volume of tissue available, bilateral breast reconstructions can be performed using TRAM flaps. Bilateral Free TRAM flaps can be harvested with minimal sacrifice of the rectus muscles and the anterior rectus sheath maintaining the abdominal wall integrity.

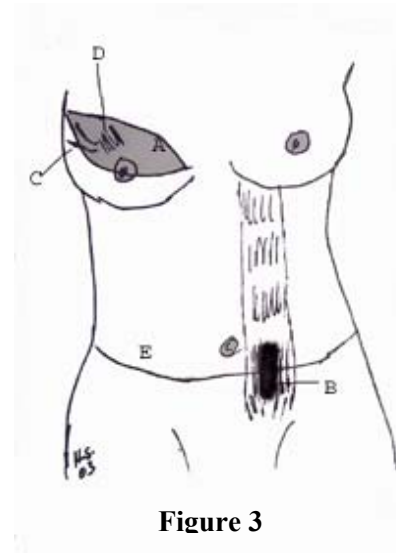


Figure 3

Latissimus dorsi flap:

Tanzini described this flap for the first time in 1906, but Halsted discouraged its use. The Latissimus dorsi muscle and a portion of the skin on the back are transferred anteriorly to the chest to reconstruct a breast. Depending on the thickness of the fatty tissue available, there may be a need for an implant under the muscle flap to achieve symmetry with the contralateral breast. This flap is based on the thoracodorsal axis. Latissimus muscle is used if the TRAM flap is not available (previous abdominal surgeries, etc.). If the mastectomy skin defect is small (e.g. skin-sparing mastectomy) the donor site morbidity is minimal and the scar on the back is quite often hidden under the bra straps. The Latissimus dorsi flap is also used for reconstruction after partial mastectomy or breast-conserving procedures.

Free Flaps:

In addition to the free TRAM flap there are several other potential donor sites for free flap reconstruction of mastectomy defects.

The skin and fatty tissue on the upper and lower part of the buttocks are supplied by two separate vascular pedicles, superior and inferior gluteal arteries and veins respectively. This is the basis for superior and inferior gluteal flaps for breast reconstruction. Their harvest is technically more challenging. The donor site morbidity is relatively minor. Excellent aesthetic results are possible.

The lower abdominal skin and fatty tissue can be harvested based on the superficial inferior epigastric artery (SIEA). These vessels are not consistent and the anatomy is variable. Otherwise, the reconstruction is very similar to a TRAM flap.

The skin and subcutaneous tissue overlying the iliac crest can be used based on the deep circumflex iliac artery (DCIA). This flap may leave a prominent donor defect requiring contralateral procedures to achieve symmetry.

Skin-Sparing Mastectomy

Skin-sparing mastectomy preserves the majority of the native breast skin and does not violate the inframammary fold. This improves the outcome of breast reconstruction without added oncologic risk.¹⁵ Comparison of traditional and skin-sparing mastectomy has shown that they carry a similar rate of recurrence.¹⁶ Performing skin-sparing mastectomy through the smaller incision is more difficult than conventional mastectomy. Immediate breast reconstruction after skin-sparing mastectomy is a team effort requiring close cooperation between the general and plastic surgeons. General surgeons who are willing to perform this procedure show an additional level of dedication and commitment to the aesthetic outcome.

Breast preserving procedures for localized and early stages of breast cancer mark a significant advance.¹⁷ However, breast-conserving procedures can occasionally create significant deformities. This can be a source of emotional stress for the patient. Small defects in large breast commonly do not need reconstruction. Larger defects in large breasts can be improved by breast reshaping procedures including reduction mammoplasty.¹⁸ Defects in smaller breasts may require local flaps and other procedures for a balanced and symmetric appearance.

Cancer recurrence after reconstruction and its detection:

Several studies have reported that breast reconstruction after mastectomy for invasive cancer does not affect the detection of recurrent cancer.¹⁹⁻²¹ The prognostic factors for recurrence in patients after breast reconstruction remain similar to patients who did not have a reconstruction (i.e. tumor size, node and hormone receptor status). A recent study from M. D. Anderson Cancer Center reports that all "locoregional" recurrences are not the same. They distinguished between skin and subcutaneous versus chest wall recurrences.²² Patients with subcutaneous recurrences had a better survival rate, a decreased rate of metastases, and a higher chance of remaining disease-free when compared to those with chest wall recurrence. This study also showed that immediate breast reconstruction did not delay the detection of chest wall recurrences which are deeper. Chest wall recurrences were closely associated with metastatic disease and therefore it is unlikely that the survival rate could have been affected by earlier detection. One could argue that placement of an implant in the subpectoral space would bring the recurrent tumor nodules within the pectoralis muscle closer to the surface and therefore render them palpable earlier.

Nipple and areola reconstruction:

In the majority of the cases of breast reconstruction, the area of skin for the new location of the nipple and areola is either insensate or hypoesthetic obviating the need for general anesthesia. There are several methods available for nipple reconstruction, varying from local skin and subcutaneous flaps on the breast mound to transferring a portion of the contralateral nipple (nipple sharing).

The procedures for the reconstruction of the areola include sharing some of the areolar skin from the contralateral breast, full-thickness skin graft, and tattooing.

In summary, every woman diagnosed with breast cancer should have the opportunity to discuss her options for breast reconstruction. The best source of information is a reconstructive surgeon who is capable of offering all modalities of breast reconstruction and works closely with the oncologic surgeons. This process can be of significant psychological help to the patients even if they decide against the immediate breast reconstruction. Not all the patients are good candidates for the procedure. Post mastectomy breast reconstruction does not seem to change the rate of recurrent cancer and the time to its detection.

Bibliography:

1. Cancer Facts & Figures - 2003. Atlanta, Georgia: American Cancer Society, 2003.
2. The Surveillance, Epidemiology, and End Results (SEER) Program. Bethesda, MD: The National Cancer Institute, 1975-2000:<http://seer.cancer.gov/>.
3. Goin JM, Goin MK. Changing the body: Psychological effects of Plastic Surgery. Baltimore: Williams & Wilkins, 1981.
4. Rosen VH. The role of denial in acute postoperative affective reactions following removal of body part. *Psychosom. Med.* 1950; 12:356-361.
5. Dean C, Chetty U, Forrest AP. Effects of immediate breast reconstruction on psychosocial morbidity after mastectomy. *Lancet* 1983; 1:459-62.
6. Stevens LA, McGrath MH, Druss RG, Kister SJ, Gump FE, Forde KA. The psychological impact of immediate breast reconstruction for women with early breast cancer. *Plast Reconstr Surg* 1984; 73:619-28.
7. Wellisch DK, Schain WS, Noone RB, Little JW, 3rd. Psychosocial correlates of immediate versus delayed reconstruction of the breast. *Plast Reconstr Surg* 1985; 76:713-8.
8. Schain WS, Wellisch DK, Pasnau RO, Landsverk J. The sooner the better: a study of psychological factors in women undergoing immediate versus delayed breast reconstruction. *Am J Psychiatry* 1985; 142:40-6.
9. Wanzel KR, Brown MH, Anastakis DJ, Regehr G. Reconstructive breast surgery: referring physician knowledge and learning needs. *Plast Reconstr Surg* 2002; 110:1441-50; discussion 1451-4.
10. August DA, Wilkins E, Rea T. Breast reconstruction in older women. *Surgery* 1994; 115:663-8.
11. Reaby LL. Reasons why women who have mastectomy decide to have or not to have breast reconstruction. *Plast Reconstr Surg* 1998; 101:1810-8.
12. Daniel RK, Maxwell GP. Breast reconstruction following mastectomy. *Adv Surg* 1983; 16:49-73.
13. Breast Reconstruction: A Matter of Choice. Bethesda, MD: National Cancer Institute. U.S. Department of Health and Human Services, 1990.
14. Carlson GW, Bostwick J, 3rd, Styblo TM, et al. Skin-sparing mastectomy. Oncologic and reconstructive considerations. *Ann Surg* 1997; 225:570-5; discussion 575-8.
15. Slavin SA, Schnitt SJ, Duda RB, et al. Skin-sparing mastectomy and immediate reconstruction: oncologic risks and aesthetic results in patients with early-stage breast cancer. *Plast Reconstr Surg* 1998; 102:49-62.
16. Kroll SS, Khoo A, Singletary SE, et al. Local recurrence risk after skin-sparing and conventional mastectomy: a 6-year follow-up. *Plast Reconstr Surg* 1999; 104:421-5.
17. Fisher B, Redmond C, Poisson R, et al. Eight-year results of a randomized clinical trial comparing total mastectomy and lumpectomy with or without irradiation in the treatment of breast cancer. *N Engl J Med* 1989; 320:822-8.

18. Clough KB, Kroll SS, Audretsch W. An approach to the repair of partial mastectomy defects. *Plast Reconstr Surg* 1999; 104:409-20.
19. Noone RB, Frazier TG, Noone GC, Blanchet NP, Murphy JB, Rose D. Recurrence of breast carcinoma following immediate reconstruction: a 13- year review. *Plast Reconstr Surg* 1994; 93:96-106; discussion 107-8.
20. Slavin SA, Love SM, Goldwyn RM. Recurrent breast cancer following immediate reconstruction with myocutaneous flaps. *Plast Reconstr Surg* 1994; 93:1191-204; discussion 1205-7.
21. Johnson CH, van Heerden JA, Donohue JH, Martin JK, Jr., Jackson IT, Ilstrup DM. Oncological aspects of immediate breast reconstruction following mastectomy for malignancy. *Arch Surg* 1989; 124:819-23; discussion 823-4.
22. Langstein HN, Cheng MH, Singletary SE, et al. Breast cancer recurrence after immediate reconstruction: patterns and significance. *Plast Reconstr Surg* 2003; 111:712-20; discussion 721-2.