

Strategies In Surgery

Today's Breast Reconstruction Options

- Reconstruction using expanders followed by implants
- Expanders with internal port silicone implants with profile options
- Reconstruction using autologous tissue
- Determining the best option

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Current trends in breast reconstruction after mastectomy include either immediate or delayed reconstruction. The final decision may be based on multiple factors, but most surgeons recommend immediate reconstruction at the time of mastectomy.

The current modalities available include the use of either implants or autologous tissue and sometimes, the combination of both. The surgical modality, choice of immediate versus delayed reconstruction and the approach for the contralateral breast all must be established preoperatively. Patient concerns and expectations should be explored in depth.

Disease stage is pertinent information. Large tumor size and/or strong clinical suspicion for nodal involvement increases the probability that radiotherapy will be needed and, as a result, delay of reconstruction is preferable due to the effects of radiation therapy on the quality and aesthetics of the reconstructed breast.

The current common options in breast reconstruction are:

- Expanders/Implants
- Autologous tissue:
 - Pedicled TRAM (Transverse Rectus Abdominis Muscle)
 - Free TRAM
 - Muscle Sparing Free TRAM

- Deep Inferior Epigastric Perforator (DIEP) Flap
- Superficial Inferior Epigastric Perforator (SIEP) Flap
- Pedicled Latissimus +/- Implant

Reconstruction using expanders followed by implants

Following mastectomy and to reduce the risk to the mastectomy skin flaps, an expander is placed under the pectoralis major muscle (Figure 1) and is used to reach the volume required for the final implant placement. The expansion is done every one to two weeks with an over expansion of approximately 30 percent. The capsule is allowed to consolidate over two to three months; the final implant is then placed in an outpatient setting.

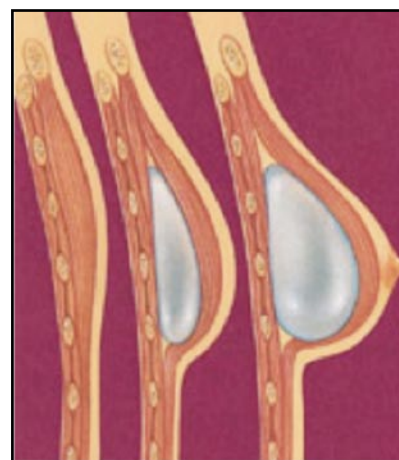


Figure 1: Expander is placed under the pectoralis muscle at the time of mastectomy and then, expanded by 30 percent, allowing the capsule to consolidate.

The implant choices currently available are either saline or silicone with the silicone being the cohesive type with less risk of shell bleed and leakage (Figure 2).

Expanders with internal port silicone implants with profile options



Figure 2: Expanders commonly used and a sample of silicone implants with different profiles.

The best candidates for this type of reconstruction are slim or small body framed patients (Figure 3), non-smokers with a small-to-moderate sized breast with minimum ptosis (droop). It can be done on larger breast sizes with the

use of either cadaveric dermis such as Neoform (made by Mentor) or AlloDerm (made by Lifecell) to add to the length of the pectoralis major muscle, allowing complete coverage of the expander as well as more volume of initial fill (Figure 4). A reduction pattern such as a Weiss pattern can be made at the time of mastectomy to help in reducing the size of the reconstructed breast (Figure 5).



Figure 3: Patient with bilateral reconstruction with expanders followed by silicone implants prior to nipple reconstruction.

Reconstruction using autologous tissue

The Pedicled TRAM (Figure 6) is still the most common autologous tissue reconstruction done nationwide. Techniques have been developed to maintain the integrity of the rectus muscle and to base the flaps on perforators from the main axis vessel such as the Deep Inferior Epigastric Artery (DIEA).

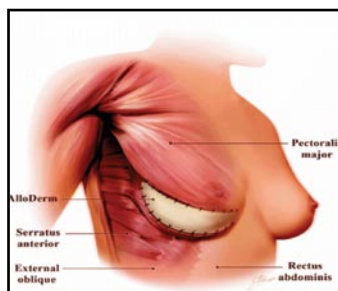


Figure 4: The use of cadaveric dermis AlloDerm and Neoform to extend the pectoralis muscle and provide coverage for the expander.

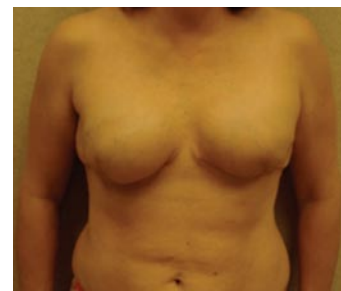


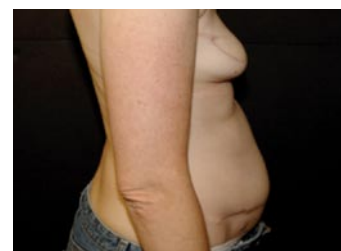
Figure 5: The use of reduction pattern incision at the time of mastectomy in patients with ptosis of the breast. The second picture shows the patient after placement of the implants and before nipple reconstruction.

These techniques help reduce the morbidity of the donor site in the abdomen and the possible consequences of abdominal wall weakness and bulges or hernias. Advances in microsurgery have made this possible. The concept of needing the whole muscle to provide adequate blood supply to the subcutaneous tissue and skin of the flap is no longer accurate.

With the pedicled TRAM, the ipsilateral or contralateral muscle is raised to the costal margin and is passed through a subcutaneous tunnel to the desired pocket. The flap is based on blood supply from the Superior Epigastric vessels. One of the problems seen, especially in bilateral cases, is bulging (Figures 7 and 8). This can sometimes cause pain, change in bowel habits and is typically repaired using non-absorbable mesh.



Figure 6: Pedicled TRAM



Figures 7 and 8: A patient who underwent bilateral pedicled TRAM reconstruction who developed a lower abdominal bulge extending into the pubic area.

Using microsurgical techniques, various modalities were developed to perform free tissue transfer from the abdomen as a donor site. These include free TRAM, DIEP and SIEP. All of these flaps are based on the inferior epigastric vessels whether superficial or deep for blood supply and are

anastomosed to vessels in the recipient site, commonly the thoracodorsal vessels or the internal mammary vessels.

With the free TRAM (Figure 9), a small wedge of muscle is taken with the flap and the fascia is closed primarily in unilateral cases or with added non-absorbable mesh in bilateral cases. This is in contrast to the DIEP (Figures 9 and 10) flap, where the blood supply is dependent on one to two perforators that are dissected through the muscle fibers to the main vessels and minimum to no fascia is taken with the flap. The advantage to such a procedure is the definite reduction in abdominal wall morbidity, especially bulging and hernias, although the risk is still there in bilateral cases. This is probably due to two factors: 1) there will be scarring in the muscle where the dissection took place and that might weaken the muscle; 2) some of the nerves that innervate the muscle have to be cut during the dissection which eventually leads to atrophy of the muscle at that site and bulging.

The SIEP (Figure 12) flap is based on the superficial inferior epigastric vessels which are only present in 30 percent of the population but have the benefit of all the dissection being

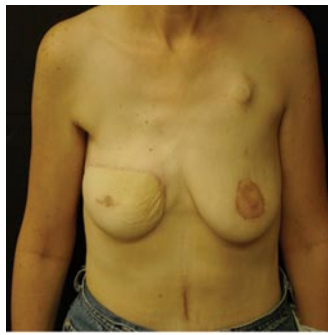


Figure 12: A patient with previous weight loss procedure underwent a delayed right SIEP flap reconstruction. The picture shows the patient after right nipple reconstruction and left breast lift.

delayed reconstruction after radiation but more recently has been used as a means of primary reconstruction (Figures 13 and 14) in the immediate setting, especially due to the fact that patients have a lower length of stay in the hospital and a quicker recovery time compared to other autologous tissue modalities. The question of the pedicle interfering with assessment of the nodes in the axilla during surveillance does not really hold as the bulk of the muscle is passed

below the axilla along the lateral chest wall with ample space for evaluation of the axillary contents during clinic exam.



Figure 9: Free TRAM with the skin facing down showing a wedge of Rectus muscle and the pedicle containing the vessels.

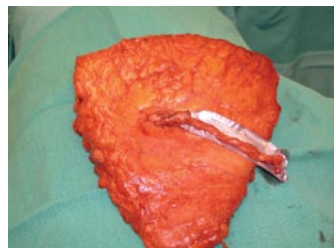


Figure 10: DIEP flap showing a perforator with no muscle or fascia taken.



Figures 13 and 14: Photos of a patient who underwent immediate reconstruction using a Latissimus flap for the right breast with expander followed by gel implant. The first photo shows the patient after nipple tattooing and the second shows the scar on the donor site.



Figure 11: Photo of a patient who underwent immediate bilateral reconstruction using DIEP flaps. Picture taken four weeks post-skin sparing mastectomy.

done above the rectus fascia with no need to violate the fascia or the muscle fibers. The vessels, when present, are usually of small caliber, except in patients who lost a considerable amount of weight, such as following gastric bypass surgery.

The Latissimus flap has been long used in breast reconstruction and was the mainstay until the pedicled TRAM was described by Carl Hartrampf in Atlanta. The flap was reserved for

Determining the best option

“You are the expert. What do you recommend doctor?” It is common for a patient to ask a plastic surgeon about his or her recommendation. The decision should ultimately be made by the patient after thorough discussion and after evaluating factors related to the surgery and factors related to the patient.

The surgeon should take into consideration the following factors:

- Age
- Health status of the patient
- Preoperative evaluation of the affected breast, such as tumor size, multicentricity and nodal involvement
- Need for radiation therapy
- Current breast size and desired breast size
- Intraoperative decision related to the vascularity of the mastectomy skin flaps

The following table contains details of factors a patient should consider prior to decision-making and is discussed with patients at length during initial consultations:

	Tissue Expansion and Implant	Latissimus Flap and expander	Pedicled TRAM Flap (Abdominal Tissue)	Free Tissue Transfer (DIEP, SIEA, TRAM)
Initial Surgery	Moderate	Involved	Highly Involved	Highly Involved
Secondary Surgery	Needed if Tissue Expander is not the final implant Needed for nipple and areola reconstruction	Possible for revisions needed for nipple and areola reconstruction	Possible for revisions needed for nipple and areola reconstruction	Possible for revisions needed for nipple and areola reconstruction
Hospitalization	Commonly 0-1 days	Commonly 1-3 days	Commonly 3-4 or more days	Commonly 4-5 or more days
Scars	No additional scars	Scar located on the upper back	Scar located on the abdomen	Scar located on the abdomen
Shape and Feel	No ptosis (sagging) Firm, little motion No change with weight fluctuation	Moderate to natural ptosis (sagging) Less firm, more motion Little change with weight fluctuation	Natural ptosis (sagging) Soft, Normal motion Symmetric change with weight fluctuation	Natural ptosis (sagging) Soft, Normal motion Symmetric change with weight fluctuation
Opposite Breast	Surgery often required to achieve optimal symmetry	Surgery for symmetry more optional	Surgery for symmetry almost always optional	Surgery for symmetry almost always optional
Impact of Radiation	Significant	Moderate	Varies	Varies
Secondary Gain	Flexibility with breast size in bilateral cases	None	Flatter abdomen similar to a tummy tuck	Flatter abdomen,
Average Back to Work Time	2 weeks	2-3 weeks	6-8 weeks	6-8 weeks
Maintenance	Needed	Might be needed	Needed if bulging in abdomen	Needed if bulging in abdomen
Mesh or similar	May need Dermis e.g. Neofom	Not needed	Needed	May be needed

Table 1: Factors to consider

The question of what constitutes “recovery” is a common one. We use a return to 75 percent of normal activity as our criteria for achieving “recovery.” Based on this, Table 2 below illustrates our experience over the past three years through comparisons of different reconstruction modalities. We have noticed that when given all choices that are applicable

	SIEP	DIEP	Expanders	Latissimus
OR Time (hours)	4	5.5(unilateral)	1.5(bilateral)	2 (unilateral) 4(bilateral)
LOS (days)	3-4	4-7	1	1(unilateral) 2(bilateral)
Recovery 75% (Weeks)	3	4	2	2-3

Table 2: Recovery times

to the individual patient, based on their evaluations, there is a tendency for patients to choose expanders or latissimus flaps with expanders as the primary modality for reconstruction, mainly based on the recovery time.

Summary

- Option of reconstruction should be patient dependent, not surgeon dependent
- Patients should be given choices
- Recovery plays a major role in decision-making
- There are multiple available options for breast reconstruction and a thorough discussion with the patient must take place in order for the patient to make an informed decision

Additional reading

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