



Breast Reconstructive Surgery

Cleveland Clinic Department of Plastic Surgery

Breast cancer is a complex disease. It can affect all aspects of a woman's life. When given a diagnosis of breast cancer, we know that there is much to take in. There are fears and concerns to overcome, and treatment options and outcomes to consider.

This guide is intended to help educate you about the reconstructive options after your treatment for breast cancer. It contains information on the timing and techniques used to reconstruct a breast. We hope you are able to refer to this guide before your consultation with the reconstructive plastic surgeon. This will help you to understand more about breast reconstruction and to choose the option that is right for you.

Your decision on whether or not to consider breast reconstruction after mastectomy is completely personal. The long-term possibility of living without a breast or part of a breast affects each woman differently. Some women will be perfectly comfortable

without any reconstruction. Others will be deeply affected by the absence or deformity of their breast.

Reasons why women seek breast reconstruction vary. Some women will focus on comfort and convenience, and others might have psychological and aesthetic concerns. Women might seek reconstruction to improve their sense of femininity, self-confidence, and sexual attractiveness. Other women might choose breast reconstruction to return to wholeness and as a means to restore their body image after their cancer experience.

The fact is that after the breast has been removed and a deformity remains, many women experience a deep sense of loss. The desire for reconstruction is a healthy reaction to this problem. For those women who feel the need to restore their body image and replace their missing breast or breasts, reconstruction offers a positive source of hope for the future.



Is Breast Reconstruction an Option for You?

After your mastectomy, you may choose to not reconstruct a new breast. You may be satisfied with external breast forms or pads. But if you are like many women, the option to have your breast reconstructed is appealing.

If you choose to have reconstruction, one of the first decisions that needs to be made is the timing of the reconstructive procedure. Immediate reconstruction happens at the same time of the mastectomy. Delayed reconstruction happens at a later time when your cancer treatment is completed.

Immediate reconstruction has the benefits of enhanced cosmetic outcome, less scarring of the breast, and a reduced number of procedures. Importantly, you will not have to spend any time without a breast.

Delayed reconstruction might be a better choice when cancer treatment needs to proceed without delay, when certain types of tumors are involved, and when radiation therapy is known to be part of the surgical plan. It can also allow time for patients to consider if reconstruction is right for them.

A consultation with a plastic surgeon early in the treatment planning, as part of your multidisciplinary breast cancer team, is important if you are considering reconstruction. Most of the reconstructive efforts will require staged operations which are coordinated along with cancer treatments.

We encourage you to bring your questions and concerns to your plastic surgeon, who will discuss your options in detail. You will be shown before and after photographs so that you can see the complete spectrum of results you might expect. If you would like to talk with other women who have had reconstructive surgery, your plastic surgeon can help you contact them.

Operations to Reconstruct a Breast

Most women are candidates for immediate or delayed breast reconstruction. More than 70 percent choose immediate reconstruction.

Today, with the development and refinement of techniques to satisfy the request of the patients seeking breast conservation or restoration, the results of reconstructive surgery have improved dramatically.

The type of reconstruction chosen by you is determined based on your personal desire, cancer staging, body type, and health condition. It also depends on the amount and quality of tissue remaining after the mastectomy or lumpectomy. All forms of breast reconstruction have advantages and drawbacks, and all may be compromised by subsequent radiation therapy.

Breast Reconstruction after Lumpectomy

One of the surgical treatments for breast cancer is a partial mastectomy, also called a lumpectomy or wide local excision. This means that just one part of the breast is going to be removed. Most patients will not require any reconstruction at all after lumpectomy.



A Tradition of Innovation

Cleveland Clinic plastic surgeons are among the best in the country when it comes to breast reconstruction after mastectomy. With more than 40 years of experience and a history of innovation in the field, they offer not only excellent medical care, but also the individualized attention you need to weigh your options.

Plastic and reconstructive surgeons are part of the multidisciplinary team of experts in Cleveland Clinic's Breast Center, which provides screening, diagnosis and treatment of all medical and cosmetic breast problems.



Figure 1. The above diagram explains how the plastic surgeon will perform the oncoplastic reduction. The technique used to reshape the breast will depend on where the tumor is located.

It is important to know that radiation therapy will follow the lumpectomy to reduce the risk of recurrence of cancer in the affected breast. This risk should be discussed with your breast cancer physician.

There are three major reasons to reshape the breast after lumpectomy:

1. The lumpectomy creates a substantial defect in the breast
2. A smaller breast is easier to irradiate than a large, droopy breast
3. Smaller breasts have a much lower risk of complications than larger breasts, which tend to develop more shrinkage and hardening over time

Breast reconstruction can either be performed at the same time as your lumpectomy, or approximately one week later when surgical margins are known to be clear (no tumor left behind). It is preferable to perform breast reduction or breast reshaping at the time of lumpectomy, and definitely before radiation therapy. This timing is critical to achieve a satisfactory result.

Types of breast reconstruction surgery following a lumpectomy can be as simple as a closure of the defect, or rearrangement of the breast tissue left behind. Another option is a flap procedure, which means taking of tissue from another area of your body to reconstruct the portion of the breast that is missing.

A common procedure after a lumpectomy is called oncoplastic reduction, or breast reduction after lumpectomy. This is a good option if you have larger breasts, and you may be able to undergo breast reduction surgery in combination with the lumpectomy.

When an oncoplastic reduction is chosen the plastic surgeon will mark your breast prior to the operation as if you were having a breast reduction. After the lumpectomy is done and the margins are clear, the plastic surgeon will analyze the defect left and start reassembling and reducing the breast as needed (Figure 1). This will help to reshape your breast. He or she will also perform a matching procedure in the opposite breast. This takes approximately two hours in addition to the lumpectomy time.

Tissue Expander and Implant Reconstruction

For some women, tissue expander and implant reconstruction is the best option. This type of surgery is often regarded as the simplest and most convenient method of breast restoration. The shorter, staged procedures are easier to undergo, particularly if you are overwhelmed with all of your options. Starting your reconstruction process with a tissue expander after a mastectomy will not prevent the use of other reconstructive techniques that may be more appealing to you at a later time.

A tissue expander/implant reconstruction offer a number of advantages including:

- a. The procedure can be accomplished without additional breast scars
- b. You will be an active participant in the final determination of the volume and size of your reconstruction
- c. You will be able to decide about symmetry and timing for the secondary procedures
- d. In case of the need for postoperative radiation, the tissue expander can be used in an immediate-delayed type of reconstruction. This means that the tissue



expander is placed immediately at the time of the mastectomy to keep the breast skin envelope stretched until radiation is finished. The expander will be substituted by your own tissue 9–12 months after radiation is complete. This can potentially reduce the damaging effects of radiation on your final reconstruction.

The tissue expander reconstruction process also has its disadvantages. It is time-intensive, and more office procedures are usually required. This can interfere with the demands of work and family. Usually, expansions can take about two months to be completed.

Tissue Expander/Implant Reconstruction Considerations

Look and Feel. It is almost impossible to create a breast with an entirely natural shape and feel with an implant. These types of reconstructions may be better for women with smaller breasts that have very little droop.

Matching. It is almost always necessary to adjust the other breast for symmetry when one-sided reconstruction with implant is done. Good symmetry can be obtained if both breasts are being removed. It is important to understand that natural and reconstructed breasts do not change in the same way over time. While your own breast will drop and change over time, this will occur much less on the implant side. This means that your breasts might look very good when you are dressed but they will show some differences when you look at yourself undressed. This is one of the reasons why women who choose breast implants for reconstruction might have a higher number of surgeries for revision during their lifetime.

Potential Problems. It is important to know that implants require monitoring for rupture or leak and will commonly need to be exchanged over time. This will require a same-day surgery. Depending on your age, the implant may need to be exchanged more than once. Implants are also prone to hardening, deflation, and rippling (visible folds and creases on your skin). If radiation therapy is needed, you will have an almost 50% chance of failure of your reconstruction with an implant. This means that your breast can change shape and volume, and scarring can form around the implant. Additionally, you can be more prone to infections of the irradiated reconstruction and the implant can become exposed. In these cases another type of reconstruction might be necessary to resolve the problem.

It is important to be aware that this reconstructive approach is not a single stage procedure. A second operation will be required to exchange the tissue expander for a breast implant and a third operation is needed for the nipple/areola reconstruction. Sometimes other procedures are necessary at a later date for minor revisions, to adjust implant size or shape, and to release scar tissue (capsular contracture).

A tissue expander is a silicone rubber balloon-like device with a small metal filling port (Figure 2). The expander is placed behind the chest wall muscles after removal of the breast (Figure 3). Your surgeon may recommend the use of an acellular dermal matrix to partially cover the tissue expander. This may allow for a better shape of the lower and outer portions of the reconstructed breast.

The tissue expander reconstruction procedure adds approximately one to two hours to the length of your mastectomy surgery. Typically this does not increase



Figure 2. Tissue expander

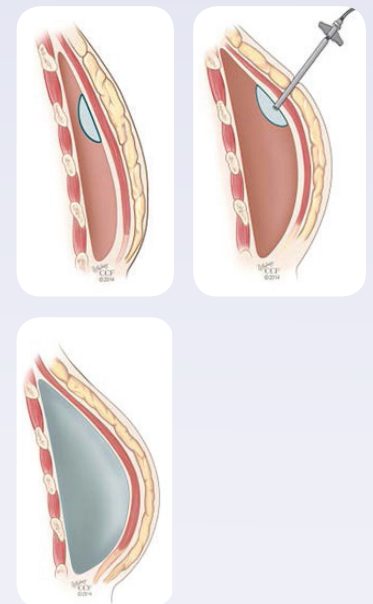


Figure 3.



Figure 4. Permanent implant

the length of your hospital stay compared to a mastectomy without a tissue expander. Patients stay in the hospital for one to two days after this surgery.

A drain tube is left in place and

later removed in the clinic to prevent fluid build up around the expander. A small or moderate amount of fluid may be placed in the expander at the time of surgery, or your surgeon may choose to wait to add fluid until the skin and muscle have had a chance to heal.

You will need to return to the clinic on a weekly or bi-weekly basis to have fluid added to the expander. The fluid is saline solution, the same fluid that is used for intravenous injections. A special magnet is moved along the breast skin to locate the metal port. Skin overlying the port is cleansed with antibacterial soap and a needle is placed through the skin into the port. Most patients have minimal feeling along the mastectomy skin and report that the needle is painless or causes minimal discomfort.

You can resume usual activities or return to work immediately after the clinic visit for expansion. If you feel mild discomfort after expansion you may use pain medication if needed.

The expansion process will continue until the skin is expanded slightly larger than the desired breast size. This allows additional skin to create some of the “droop” of a normal breast.

After the final expansion, the tissue expander is left in place for several months to allow the newly stretched tissue to settle in place. A second surgery (second stage procedure) is necessary to remove the tissue expander and replace it with a permanent implant, either saline-filled or silicone-filled (Figure 4). There are different types of implants and you should discuss with your surgeon the option that will best fit your needs.

You are not required to stay overnight in the hospital when your second stage procedure is performed. During this surgery, the tissue expander is removed and the scar tissue formed around the implant is adjusted. A permanent implant is placed into the pocket created by the tissue expander. The skin is again closed with sutures and a drain

is not always necessary. During this procedure, your plastic surgeon may choose to add fat underneath your skin to improve the shape and “feel” of your breast. This is called lipofilling or lipomodelling.

Patients are usually satisfied with tissue expander/implant reconstruction. In general, if you are a good candidate, the results are very satisfactory. Patients undergoing unilateral reconstruction might have changes on the opposite breast tissue with time. These changes can affect the symmetry of the reconstruction. In general, patients who undergo bilateral reconstruction have better symmetry over time.

It is important to know that you will likely need to exchange your breast implant within a 10-15 year period. While there is no official expiration date, implants have a shelf life of about 10 years and you will be required to continue to follow-up with your plastic surgeon over time.

Complications that can happen with this type of reconstruction can be immediate or later after reconstruction. Problems such as infection, bleeding requiring reoperation, or fluid collection around the expander or implant (seroma) can occur early after surgery. Problems like device failure, capsular contracture (scar tissue around the implant), device exposure (opening at the skin that allow you to actually see your implant), and device displacement (implant moving to another area or rotating inside of its pocket) are late complications. Although these problems are not common, they should be discussed with your plastic surgeon before you undergo surgery.

Immediate Reconstruction with Permanent Breast Implants

Single-stage breast reconstruction or immediate breast reconstruction with permanent implant placement is a new method of treatment that is gaining popularity. It is an option for a specific group of patients who meet certain criteria. It is suitable for women undergoing either skin-sparing or nipple-sparing mastectomy who are willing to accept a smaller breast size. If a larger size breast is desired, a tissue expander might be a better option. Breast skin must be loose and healthy immediately after the mastectomy in order to adequately cover the breast implant.

While the procedure is similar to tissue expander reconstruction, most women will require acellular dermal matrix to cover the bottom of the implant. Lipomodelling

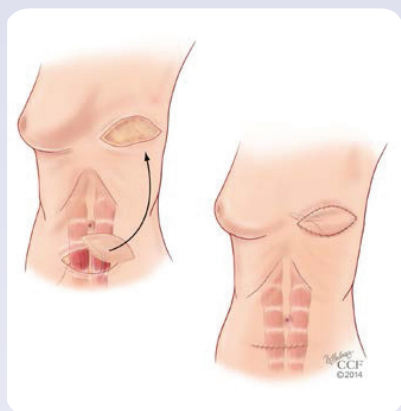


Figure 5. The DIEP procedure involves moving abdominal skin and fat to the chest to reconstruct the breast without taking the abdominal muscle. The flap has its own blood vessels that will be reconnected to blood vessels in the chest wall.

can also be used to improve shape. The breasts will seem flat at the cleavage at first, but the shape will change in few weeks due to the stretching of the chest wall muscle.

Sometimes minor adjustments might be necessary, even though this is called a single-stage approach. If nipple-areola reconstruction is needed, this is done after the new breast has “settled” in place.

Options For Breast Reconstruction Using Your Own Body Tissue

Using your own tissue to construct a new breast after mastectomy is a popular option. During these procedures, generally referred to as flap procedures, plastic surgeons take tissue from another part of the body, usually the abdomen, to replace missing breast tissue and create a breast mound.

There are a variety of flap procedures that work to rebuild and restore the breast after a mastectomy, including DIEP Free Flap, TRAM Flap, Latissimus Dorsi Flap, Gluteal Flap, and Gracilis Flap.

Cleveland Clinic plastic surgeons most often use tissue from the abdomen. It is the same tissue that is discarded during abdominoplasty (tummy tuck) procedures and, therefore, results in tightening of the stomach. It leaves a horizontal scar across the lower abdomen, but this generally is the least objectionable place for such a scar.

Deep Inferior Epigastric Artery (DIEP) Free Flap

For patients who desire breast reconstruction after a mastectomy using their own tissue, we offer a procedure called “DIEP flap.” This surgical technique utilizes patients’ abdominal excess skin and fat tissue without the sacrifice of an important muscle, the rectus abdominis (commonly referred to as “abs or six-pack muscle”). This allows for the preservation of abdominal strength and integrity.

The DIEP flap procedure provides breast cancer patients an excellent option for breast reconstruction. This technique has raised breast reconstruction to a higher level of technical refinement, requiring significant microsurgical expertise.

These are, by definition “free flaps,” meaning that the DIEP flap is completely disconnected and then reconnected to the body using a surgical microscope. A team of expert plastic surgeons, anesthesiologists, and nurses are key components to the success of this procedure.

The DIEP flap procedure is a refined version of the TRAM (transverse rectus abdominal muscle) flap procedure. The conventional TRAM flap requires the use of one or both rectus abdominis muscles. This can lead to loss of abdominal strength, abdominal bulges, or hernias.

Unlike the TRAM flap, the DIEP flap is unique in that it uses your own fat tissue in the lower abdomen, which simulates the consistency of the natural breast, while sparing the abdominal muscles.



Before your surgery, a computed tomographic angiography (CTA) of your abdomen is performed to provide a “road map” of the blood vessels supplying the abdominal skin and fat, as part of the surgical planning.

The DIEP procedure starts with incisions made along the bikini line similar to that used for a tummy tuck. The excess of skin and fat tissue are removed with tiny blood vessels connected to it. These will be reattached under the microscope to blood vessels that run along the breastbone at the mastectomy site. The tissue is then sculpted into a breast. In addition to reconstructing the breast, the contour of the abdomen is often improved much like a tummy tuck (Figure 5).

Once the main DIEP flap procedure has been completed, additional contouring and matching procedures on the other breast may be performed at a second operation for symmetry. Nipple reconstruction may also be performed toward the completion of the reconstructive process. This can be followed by tattooing of the areola, depending on the patient’s desires.

Women who undergo delayed breast reconstruction should be aware that a large island of skin from their abdomen will be moved to the chest. This is necessary because skin that was removed or damaged during mastectomy or radiation needs to be replaced to restore the breast contour.

There are many benefits of the DIEP procedure. The breast feels more natural than with an implant reconstruction. The DIEP flap procedure can be done at any time after your mastectomy, although it is commonly performed at the same time of your mastectomy. It can also be performed during nipple-sparing mastectomy. One or both breasts can be reconstructed at the same time.

The DIEP flap will avoid long-term complications that can be associated with implants, such as the need for corrective procedures, and will also age like a natural breast. Abdominal wall hernia or “bulge” is less common in DIEP flaps because the rectus abdominis muscle is spared. If radiation is needed after surgery as part of your cancer treatment, the DIEP flap tends to be more resistant to radiation damage in comparison to other reconstructive procedures such as breast implants and expanders.

The recovery time following a DIEP flap is longer than after an implant reconstruction, with a typical hospital stay of three to five days. The first 24 to 48 hours are spent at a flap-monitoring unit where well-trained nurses will be checking on you every one to two hours. The first two days

are the most difficult due to pain, which is controlled by a pain pump and by an on-Q pain ball that delivers numbing medication to your surgery site. Most patients recover well after that. Typically, strenuous physical activities (running, aerobic activity, lifting more than 10 pounds) are to be avoided for four to eight weeks after surgery. Since the abdominal muscles are maintained, a swifter rehabilitation can be expected.

As a free flap, the DIEP can be subject to microvascular complications, such as partial or complete flap loss, which are extremely rare at high volume breast reconstruction centers (<1-2% at Cleveland Clinic). Minor healing problems are more common and can occur at the breast reconstruction site or at the abdominal incision. Most instances can be treated with simple wound care. Wound complications are seen more commonly in patients who smoke, have diabetes, or are obese.

Not all patients undergoing mastectomy are candidates for DIEP free flaps. If you are extremely thin, you might not have enough tissue to reconstruct a breast. If you had previous abdominal surgeries, you might not have the blood vessels needed for this operation. Women who are extremely overweight, smoke or have other medical conditions may not qualify to undergo this procedure due to the higher risk of complications.

If your blood vessels are too small to supply blood flow to the skin and fat of a DIEP flap, your surgeon might choose to take a small piece of your muscle surrounding these vessels. This is called a muscle-sparing TRAM. This is only done when your plastic surgeon feels that it will be unsafe to separate those tiny blood vessels from the muscle, which can potentially cause damage to your flap. A small piece of mesh might be necessary to reinforce the abdomen if this technique is used. Despite removal of a small piece of muscle, there is little impact on abdominal wall strength and function.

Each patient must be evaluated individually to determine if they are healthy enough for this surgery and if they have enough abdominal wall tissue to match the breast size that they desire. A thorough evaluation by a plastic surgeon will help determine if you are a candidate for the DIEP flap procedure.

For many women, the reconstructed breast may be firmer and have a more youthful appearance than their natural breasts. Most patients undergoing the DIEP free flap breast are satisfied with their results and are more likely to choose the same type of reconstruction again.



TRAM Flap

The Transverse Rectus Abdominis Myocutaneous (TRAM) flap was among the first “own-tissue” breast reconstruction procedures, and is still a common method in the United States. The technique allows the surgeon to reconstruct the breast with the patient’s own tissue without the need for implants while providing her with a slimmer abdomen. Like the DIEP flap, it is recommended for women who have some extra tissue on the abdomen.

The TRAM flap is a major surgery, and you should be in good health to undergo this method of reconstruction. Because the skin and fat from the abdomen are moved to the chest while remaining connected to their blood supply, it is important that this blood supply is healthy enough to feed the flap. Patients who are very obese, have had previous chest or abdominal surgery, or have had previous radiation to the chest might not be candidates due to poor quality of these blood vessels. Also, patients who are smokers or have diabetes have a higher risk for problems with this operation.

The surgery takes approximately three hours, and can be done at the same time as the mastectomy (immediate reconstruction), or after the mastectomy has healed well (delayed reconstruction). An incision that goes from hip to hip is made, and all the excess skin and fat from the belly button down to the groin is used. This tissue is transferred to the chest wall through a “tunnel” under the breast fold and it remains connected to the rectus muscle. This is necessary because the blood supply that feeds all that tissue “runs” through the muscle.

In considering the TRAM flap, patients should be aware that there will be an abdominal scar and more time is needed for recovery. Because there is a risk for a “bulge” or a hernia from where the flap was taken, most plastic surgeons will place a piece of mesh in the abdomen to prevent those problems and strengthen the abdominal wall.

The TRAM flap can result in natural breast reconstruction without implants. However, it does require more recovery time up front. It is a time-tested and well-tolerated operation and can give outstanding results in appropriately selected patients.

Superficial Inferior Epigastric (SIEA) Free Flap

The superficial inferior epigastric vessels are part of the network of blood vessels that bring blood supply to the abdomen. These vessels run above the abdominal muscle closer to the skin. When these vessels are used for flap reconstruction, there is no need to cut through the muscle at all. This is a great way to reconstruct a breast using your own tissue. Unfortunately, many times these blood vessels are too small to feed all the skin and fat, making them unreliable. Only about 10-20% of patients will have with robust, small blood vessels that make them candidates for the SIEA free flap. Generally, this determination will be made during a planned DIEP flap procedure.

This procedure offers a great advantage to the patient as it avoids the need for surgical dissection of the abdominal wall musculature. The result is virtual elimination of lower abdominal wall bulging or weakening.

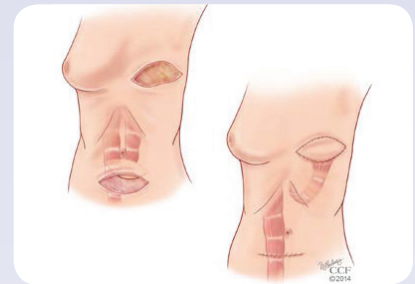


Figure 6. In a TRAM flap, excess abdominal tissue is transferred to the chest through a tunnel in order to reconstruct the breast. The tissue is then shaped to look like a breast.

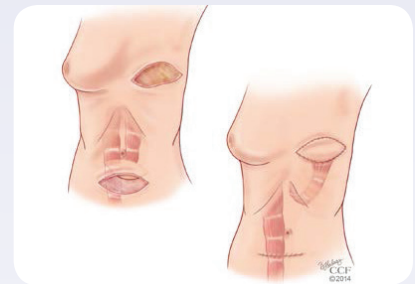


Figure 7. The latissimus dorsi is a large muscle on your back. It is transferred to the chest through a “tunnel” made by the plastic surgeon. A paddle of skin and fat are usually transferred with it. This will leave a straight scar at the bra line. Because this muscle is thin, most often an implant is needed to give volume and projection to the new breast.

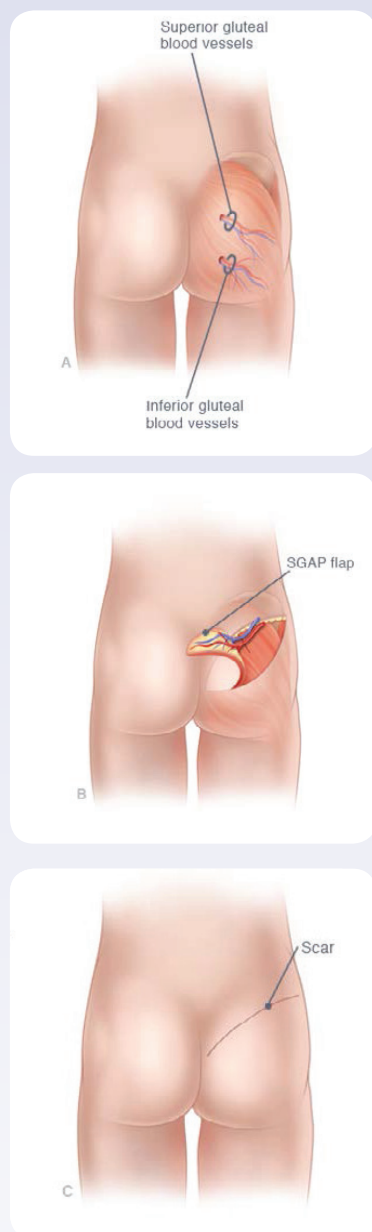


Figure 8. Depending in which portion of the buttock has more tissue for a breast reconstruction, a SGAP (superior) or a IGAP (inferior) flap will be used. The SGAP will leave a transverse scar high on your buttock which will be hidden in the bikini line and the IGAP will leave a scar at the buttock lower fold. Sometimes it is necessary to match the other side of the buttock to avoid differences between them.

Like the DIEP flap, this procedure requires microsurgical connection of the abdominal fat and chest wall vessels. Further sculpting of the tissue occurs following transfer of the abdominal fat to the mastectomy site.

Much like the other flap procedures that use your own tissue from the abdomen, the SIEA flap results in a cosmetically appealing lower abdominal “tummy tuck” scar and a soft, natural reconstructed breast. Because there is less abdominal surgery, the recovery time and postoperative discomfort is reduced.

Latissimus Dorsi Muscle Flap (Lat or Back Flap)

When the tissue from the abdomen is not an option for you, the plastic surgeon can take tissue from the back, thigh, or buttocks. The tissue that is taken from the back is called a latissimus dorsi flap. It moves the skin, fat, and muscle from the your back to the mastectomy site. This flap is tunneled beneath the skin under your armpit to create a new breast mound. Sometimes it is possible to remove enough fat from the back (along with the flap to replace the missing breast volume) without the need of an implant. If greater volume is needed for reconstruction, this flap is often times supplemented with the placement of a tissue expander or an implant.

Your plastic surgeon will evaluate you before surgery to determine if an implant or a tissue expander will be necessary. The evaluation of the opposite breast is also considered to determine whether an augmentation, a breast lift, or a reduction is needed to provide breast symmetry.

During surgery, three or four drainage tubes will be placed. The most common complication of this surgery is the accumulation of fluid (seroma) in the back even after the drains are removed. This fluid eventually dissipates but may require additional office drainage procedures.

Patients are usually satisfied with this procedure. Weakness of the back and shoulder is not common because there are other muscles that can perform similar function as the latissimus muscle. Sometimes the back flap is offered for patients who did not heal well after an implant reconstruction. This can happen in the cases of previous infection, radiation injury to the breast, and when a woman’s skin is extremely thin (a risk factor for implant exposure).

Superior and Inferior Gluteal Artery Perforator Flaps (SGAP/IGAP)

The superior and inferior gluteal vessels supply the skin and fat of the upper and lower buttock. This may be an option if you would like reconstruction with your own tissue but do not have enough excess fat in the abdomen to reconstruct a breast.

This surgery is more challenging than the DIEP free flap. The blood vessels that feed the skin and fat of the buttocks are a little more difficult to harvest. The buttock fat is stiffer and it will require more time to be shaped into a breast. The SGAP/IGAP procedures typically take more time than the DIEP flap.

The SGAP/IGAP flaps are harvested from excess buttock skin and fat (Figure 8). The SGAP uses tissue from the upper portion of the buttocks and the IGAP uses tissue from the lower portion. Thus, the SGAP is designed as an ellipse across



the mid-buttock and the IGAP is designed as an ellipse in the lower portion of the buttock and fold. In both cases, the plastic surgeon will carefully separate the buttock muscles (gluteus muscles) and will harvest the little blood vessels that are feeding all the skin and fat on the flap. You will be lying on your belly for this part of the procedure. Once the flap is separated from your body, you will be moved to a face-up position. The buttock skin and fat is then transferred to your chest and sculpted into a natural breast contour. This procedure requires microsurgical connection of the transplanted buttock tissue and chest wall vessels, just as the DIEP and SIEA flaps.

The postoperative period is very similar to that of the DIEP flap. Frequent flap monitoring is required in the hospital. Some women experience less pain. Problems associated with these procedures include wound breakdown, pain on sitting, numbness, and fluid collection at the buttocks. You should be aware that the donor site defect caused by this flap might require further revision or contralateral matching procedure for symmetry of the buttocks. You might need a walker after surgery, and recovery takes about six to eight weeks.

Gracilis Free Flap (TUG)

One of the most recent additions to breast reconstruction options is the transverse gracilis free flap (TUG flap). Some women have the tendency to accumulate fat in the inner upper thigh. This flap uses that extra inner thigh tissue to reconstruct the breast. The gracilis muscle is an expendable inner thigh muscle that is also included in the TUG flap, since it is necessary to provide the blood supply to the inner thigh fat.

The surgery consists of harvesting the flap from the upper inner thigh through a transverse thigh-lift incision at the junction between the upper thigh and groin. As with all types of microsurgical breast reconstructions, vessels are prepared at the chest wall. The TUG flap is transferred and

the blood vessels are connected with the use of microscope or surgical loupes.

This flap is only available for you if there is enough tissue on your upper inner thighs and if you would consider a modest breast size. You should be aware of the possibility of wound problems at the donor site due to tight closure, as well as fluid collection and swelling of the leg.

Other Breast Reconstruction Techniques

Nipple-Sparing Mastectomy/Immediate Reconstruction

Cleveland Clinic breast cancer surgeons work closely with our plastic surgeons to offer nipple-sparing mastectomy in combination with a variety of breast reconstruction procedures. This method of reconstruction is offered to a limited number of patients who are candidates.

Patient candidacy is determined by both the breast surgeon and plastic surgeon to ensure that patient safety and cancer treatment criteria are met.

If your breasts are not too large or too droopy, the nipple and areola may be spared. The milk ducts underneath of the nipple are excised with the breast specimen. A sample of this tissue under the nipple is sent for frozen sections during the surgery to rule out cancer under the nipple.

The final cosmetic outcome of nipple-sparing mastectomy is usually superior since the entire breast skin envelope is kept intact (Figure 9).

Fat Grafting to the Breast

As breast reconstruction techniques evolve and allow for a more natural and cosmetically appealing breast shape and appearance, we now can further refine contour and volume of the breast using liposculpting or lipomodelling techniques.

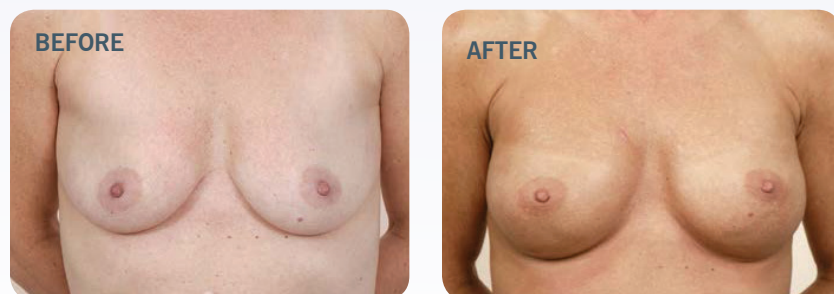


Figure 9. Before and after photos of a patient who underwent bilateral nipple-sparing mastectomies and reconstruction with implants.



Fat grafting, also called lipofilling, lipomodelling or liposculpting, is a technique wherein fat cells are harvested by gentle liposuction of the abdomen, flank or thigh. After gentle washing and preparation, the fat is injected in small parcels into areas of the reconstructed breast that are hollowed or scooped out. This technique can also be used to improve the phenomenon of implant rippling often seen at the upper portion of implant based breast reconstructions. Additionally, fat injections into an “own tissue” breast reconstruction can be used to augment the breast to achieve increased volume or improve symmetry with the opposite breast. Often times, fat grafting sessions may be repeated up to three times to maximize the effect.

Liposuction (removing fat) of the reconstructed breast may be also used to sculpt and reduce areas of excess tissue and optimize shape and symmetry.

If your surgeon feels that you would benefit from these outpatient procedures, your initial session will likely be performed as part of the second or third stage of reconstruction. Recovery time is typically one to two weeks and you may be asked to wear a compression garment to reduce swelling of the area from where fat cells were harvested.

Nipple-Areola Reconstruction

At the time of skin sparing or traditional mastectomy, the nipple and areola are removed with the breast tissue excision. Considered one of the final touches in breast reconstruction, creating a nipple and areola may be accomplished in a number of different ways. It is performed when breast volume and symmetry are optimal (typically three to four months after symmetry or implant exchange procedures have been performed).

Nipple reconstruction begins by choosing an appropriate location on the breast mound. Preoperatively, your surgeon may give you a nipple and areola template to adjust on the reconstructed breast to help guide an appropriate final position. A projecting nipple may be created using a small flap of breast tissue that will be folded upon itself. Other less common methods include the use of tissue grafts taken from distant areas of the body including the opposite nipple (nipple sharing procedure). Some surgeons will recommend a combination of flaps and grafts to produce a projecting nipple. Your surgeon will help you decide on the most appropriate technique or combination of methods based on your anatomy and desires.

The areola is the pigmented circular area surrounding the projecting nipple. This structure may be recreated by placing a skin graft, often taken from the inner thigh or lower abdomen. While this may leave a small scar at the place the graft was removed, a skin graft reconstruction may provide the most aesthetically pleasing areola with natural pigmentation and color contrast with the breast skin.

Both nipple reconstruction and areola reconstruction using grafts may be performed at the same time as one another in a brief outpatient procedure requiring minimal anesthesia. Recovery time is typically one to two weeks, with most of the attention focused on dressing care. Your postoperative instructions will depend on the reconstructive methods you and your surgeon have chosen.

Addition of pigmentation by tattooing of the reconstructed nipple and/or areola may improve color matching with the opposite breast, and contrast with the surrounding breast skin. Typically, this procedure will be performed in the office a few weeks following the nipple or nipple areolar reconstruction (Figure 10).

Some women opt to have the entire nipple and areola complex recreated with a tattoo due to its simplicity. Like all tattoo procedures, this is performed in an office-based session. The new techniques of three-dimensional tattooing have showed great results lately. The main disadvantage of a tattoo only nipple/areola complex is the lack of projection and the need to re-touch the color over the years.

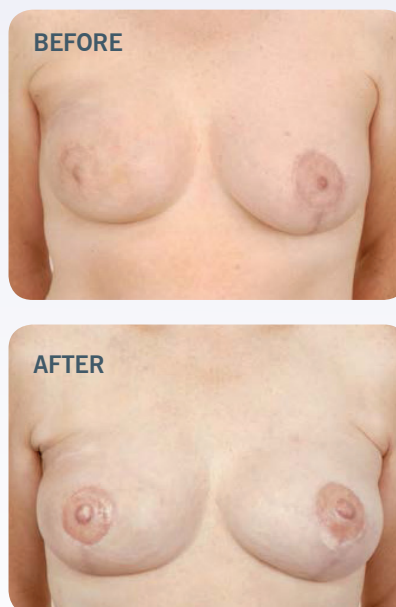


Figure 10. Before and after photos of a patient with nipple-areola reconstruction using local flaps followed by three-dimensional tattooing for color match. This patient had a DIEP free flap for breast reconstruction



Your Hospital Stay and Recovery

For the first few days after surgery, you may experience some discomfort. You will be given pain medication as needed. Throughout your hospital stay, your nurses and plastic surgeon will monitor you closely. You will be encouraged to move your arms soon after the surgery, but not for any forceful activity such as pulling yourself up, getting out of bed or lifting heavy objects.

Intravenous fluids will probably be continued for a day or two, but you will gradually progress to a regular diet. In some cases, a urinary catheter will be in place during recovery. You will be encouraged to walk as soon as you can to avoid blood clot formation in your legs that can potentially travel to your lungs. You also will have surgical drains in place. If they are still necessary when you return home, you will be instructed in the proper care of the drains by emptying and recording their output.

The length of your hospital stay depends on the type of surgery and your individual progress. Implant reconstruction may require only a day or two, while flap procedures may take up to a week.

Once you return home, you can expect some soreness, swelling and bruising for two to three weeks. You may be asked to apply medications to your suture lines or to change bandages at home. Your plastic surgeon will advise you about resuming showering and caring for your surgical drains.

The appearance of your reconstructed breast will gradually improve over the months following surgery. You will be asked to return for regular checkups at an interval that depends on the type of reconstruction you have. Depending on the extent of the operation, most women are able to resume light to normal activities in two to three weeks. Several more weeks may be necessary before you can resume strenuous activity. If you have any questions regarding your recovery at home, please call your plastic surgeon's office.

As part of your treatment plan you will be asked to follow-up with an occupational or physical therapist specializing in lymphedema and breast reconstruction. She/he will give you a series of exercises and massages that will help with your range of motion and overall recovery.



Before deciding on breast reconstruction

- Research and read about all the options available to you. Write down important questions that you might have for your doctor at the time of your consultation and make sure that you understand what is being discussed
- Make a checklist with all pros and cons of each procedure. Weigh them in relation to your own personal values and priorities
- Try to have a clear and realistic expectation of your final result and outcome
- Discuss your options with your breast team and people that you are close to

To view before and after photos of patients who have undergone breast reconstruction visit clevelandclinic.org/breast-reconstruction.



Frequently Asked Questions (FAQs)

1. What types of breast reconstruction options are available?

There are many types of breast reconstruction options. You can choose to undergo a tissue expander/implant reconstruction or you may use your own tissue for breast reconstruction. You should discuss these techniques with your breast surgeon and plastic surgeon to find the option that will be appropriate for you.

2. What is my breast going to look like? Am I going to look normal?

Breast reconstruction happens in many stages, and in each stage your new breast will look better. The goal is for your breasts to look symmetrical and to have a good shape. Sometimes the breast will be smaller than before and the shape might be not the same, but your plastic surgeon will try his/her best to make them as close to normal as possible. There are some things that can make your breasts asymmetrical, and the need for radiation after surgery is one of them.

3. How much time I will have to take off work?

For your breast reconstruction most plastic surgeons would recommend you take four to six weeks off work. This time can be adjusted if needed. If other treatments are going to be necessary, such as chemotherapy and radiation, you will most likely need more time to recover.

4. Is insurance paying for it?

Because of the 1998 Breast Reconstruction Federal Law, most insurances do reimburse breast cancer patients for the cost of breast reconstruction, including the cost of breast implants. It is advised that you contact your insurance company before any anticipated operation as a precaution.

5. I am going to have radiation. How can it affect my reconstruction?

Radiation is given to destroy potential cancer cells left behind. It also causes damage to your normal cells, so it can affect your reconstruction. Radiation can cause tightening of the skin and it can shrink the fat



on your breast. If an implant is used in your reconstruction, it is possible that a tight scar can be formed around it and cause the so-called capsular contracture. Your plastic surgeon may offer a delayed-immediate type of reconstruction, in which a tissue expander is placed at the time of the mastectomy to keep your own chest wall skin stretched. After you complete your radiation and you are healed (9-12 months after), your plastic surgeon will finish the reconstruction with your own tissue.

6. I am going to have chemotherapy. Can I still undergo reconstruction?

Most patients can undergo reconstruction and still have chemotherapy. If you choose to have a tissue expander placed, we will proceed with the expansion appointments based on your chemotherapy schedule. Your plastic surgeon might order a blood test before exchanging the tissue expander for a permanent implant to make sure that you are recovered from the chemotherapy.

7. Am I going to have scars?

Any surgery causes scarring. Scars are part of the way the human body heals. Sometimes they are barely noticeable, sometimes they can be quite visible. Scars undergo changes over time. It is normal for them to look reddish and feel thick for several months before they soften and fade. Most people will have good scars at the end. However, if you are prone to have thicker scars you should discuss this issue with your plastic surgeon.



8. Is it painful? Am I going to have pain medications after surgery?

The initial surgery for breast reconstruction can cause pain. The pain level varies from person to person. Your surgeons will provide an efficient pain management plan for you. You will receive oral and intravenous pain medication while in the hospital and oral pain medication to take at home.

9. I am a smoker. Can I still get breast reconstruction?

The risk of complications is increased in smokers. Smokers are more prone to skin sloughing, infection and loss of flaps after breast reconstruction. They are also more prone to airway infections, such as pneumonia after surgery. You should discuss your smoking habits with your plastic surgeon. Most likely your reconstruction will be deferred until you stop smoking.

10. Am I going to have drains? How can I deal with them?

You will have drains after surgery. Depending on the procedure, it can be more than one drain. Your surgery team will teach you how to care for those drains and how to record their output. They are a very important part of your initial breast reconstruction surgery because they prevent fluid build-up underneath your skin.

11. What if I get an infection? Can this delay my other treatments?

Your breast team will watch you very closely after surgery to avoid any possible infection. Unfortunately infections can happen, and will cause an impact on your overall treatment. If an infection happens, it will have to be treated before you can go on with chemotherapy or radiation. If you have a tissue expander/implant type



of reconstruction, you might require another surgery to remove the device or exchange it to a clean one.

12. How do you make a nipple and when?

The nipple is usually made from chest skin in the center of your new breast mound, or from your contralateral nipple (nipple sharing). The areola is usually made using skin obtained from your groin or abdomen. The nipple and areola are made as the last step on your reconstruction, which might take several months. It is important to wait for the breasts to “settle” on their final position before the nipple is reconstructed to avoid asymmetries.

13. I am having implants for reconstruction. Do they have to be replaced? What happens if they “leak”?

Breast implants have no official expiration date, but it is likely that you will need them replaced in the future. Implant leakage is a term used to explain fluid coming out of the implant, which can happen over time in older implants due to shell weakness. If a saline implant leaks, the fluid inside will be absorbed by your body and you will note a deflated implant on your chest. If a silicone implant leaks, sometimes this is not very clear because the silicone is a gel and tends to stay within the breast pocket. An MRI is needed to diagnose a ruptured silicone implant. In case of a leaking implant, independent if it is a saline or a silicone one, it should be removed from your body.

14. How often do I come for expansions?

Expansion can be done every week or every two weeks. Sometimes this is not possible, so you should discuss with your plastic surgeon how to adjust your schedule for the expansion appointments.



Consultations

In-Person

If you would like to set up a consultation with a Cleveland Clinic breast reconstruction surgeon, please call our Department of Plastic Surgery at 216.444.6900 or toll-free at 800.223.2273, ext. 46900.

Online

Cleveland Clinic's MyConsult® Online Medical Second Opinion offers our patients an easy, effective, and secure option for obtaining a breast reconstruction consultation from our plastic surgeons without having to leave the comfort of home.

One of our experts will review the patient's medical records, test results and images and provide a comprehensive, personalized report, taking care to answer your individual questions. You will be able to review detailed information regarding the advantages and drawbacks of the different reconstruction options, as well as recommendations regarding your future care needs, based on your cancer staging and current health.

The following consultations are available:

- Breast Reconstruction Following Mastectomy
- Breast Reconstruction Following Lumpectomy
- Breast Ptosis Following Breast Cancer Surgery
- Secondary Correctional Breast Surgery Following Breast Cancer Surgery
- Breast Deformities For Surgical Evaluation Following Breast Cancer Surgery

To learn more visit
eclevelandclinic.org/secondopinion



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