Breast Reconstruction After Mastectomy

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What is breast reconstruction?

Many women who have a mastectomy—surgery to remove an entire breast to treat or prevent breast cancer—have the option of having the shape of the removed breast rebuilt. Some people choose not to have their breasts reconstructed after a mastectomy, instead preferring a flat closure.

Breasts can be rebuilt using implants (saline or silicone) or autologous tissue (that is, tissue from elsewhere in the body). Sometimes both implants and autologous tissue are used to rebuild the breast.

Surgery to reconstruct the breasts can be done (or started) at the time of the mastectomy, called immediate reconstruction, or it can be done after the mastectomy incisions have healed and treatment has been completed, called delayed reconstruction. Delayed reconstruction can happen months or even years after the mastectomy.

In the final stage of breast reconstruction, a nipple and areola may be re-created on the reconstructed breast, if these were not preserved during the mastectomy.

Sometimes breast reconstruction surgery includes surgery on the other, or contralateral, breast so that the two breasts will match in size and shape.

How do surgeons use implants to reconstruct a woman's breast?

Implants are inserted underneath the skin or chest muscle following the mastectomy. Implants are usually placed as part of a two-stage procedure.

- In the first stage, the surgeon places a device called a tissue expander under the skin that is left after the mastectomy or under the chest muscle (1, 2). The expander is slowly filled with saline or air during periodic visits to the doctor after surgery.
- In the second stage, after the chest tissue has relaxed and healed enough, the expander is removed and replaced with an implant. The chest tissue is usually ready for the implant 2 to 6 months after the tissue expander is placed.

In some cases, the implant can be placed in the breast during the same surgery as the mastectomy—that is, a tissue expander is not used (3).

Surgeons are increasingly using material called acellular dermal matrix as a kind of scaffold or "sling" to support tissue expanders and implants. Acellular dermal matrix is a kind of mesh that is made from donated human or pig skin that has been sterilized and processed to remove all cells to eliminate the risks of rejection and infection.

How do surgeons use tissue from a woman's own body to reconstruct the breast?

In autologous tissue reconstruction, a piece of tissue containing skin, fat, blood vessels, and sometimes muscle is taken from elsewhere in a woman's body and used to rebuild the breast. This piece of tissue is called a flap.

Different sites in the body can provide flaps for breast reconstruction. Flaps most often come from the abdomen or back. However, they can also be taken from the thigh or buttocks.

Depending on their source, flaps can be pedicled or free.

- With a pedicled flap, the tissue and attached blood vessels are moved together through the body to the breast area. Because the blood supply to the tissue used for reconstruction is left intact, blood vessels do not need to be reconnected once the tissue is moved.
- With free flaps, the tissue is cut free from its blood supply. It must be attached to new blood vessels in the breast area, using a technique called microsurgery, to give the reconstructed breast a blood supply.

Abdominal and back flaps include:

- **DIEP flap:** Tissue comes from the abdomen and contains only skin, blood vessels, and fat, without the underlying muscle. This type of flap is a free flap.
- **Latissimus dorsi (LD) flap:** Tissue comes from the middle and side of the back. This type of flap is pedicled when used for breast reconstruction. (LD flaps can also be used for other types of

reconstruction, such as abdominal or head and neck reconstruction.)

- **SIEA flap (also called SIEP flap):** Tissue comes from the abdomen as in a DIEP flap but includes a different set of blood vessels. It also does not involve cutting of the abdominal muscle and is a free flap. This type of flap is not usually an option for breast reconstruction because the necessary blood vessels are often not adequate or do not exist.
- **TRAM flap:** Tissue comes from the lower abdomen as in a DIEP flap but includes muscle. TRAM flaps can be either pedicled or free.

Flaps taken from the thigh or buttocks are used for women who have had previous major abdominal surgery or who don't have enough abdominal tissue to reconstruct a breast. These types of flaps are free flaps.

- **IGAP flap:** Tissue comes from the buttocks and contains only skin, blood vessels, and fat.
- **PAP flap:** Tissue, without muscle, comes from the upper inner thigh.
- **SGAP flap:** Tissue comes from the buttocks as in an IGAP flap but includes a different set of blood vessels and contains only skin, blood vessels, and fat.
- **TUG flap:** Tissue, including muscle, comes from the upper inner thigh.

The table below summarizes the different types of flaps used for breast reconstruction:

Name of flap	Type of flap	Source of tissue	Includes muscle?
DIEP	Free	Abdomen	No
Latissumus dorsi	Pedicled	Middle and side of back	Yes
SIEA/SIEP	Free	Abdomen	No
TRAM	Pedicled or free	Lower abdomen	Yes
IGAP	Free	Buttocks	No
PAP	Free	Upper inner thigh	No
SGAP	Free	Buttocks	No
TUG	Free	Upper inner thigh	Yes

In some cases, an implant and autologous tissue are used together. For example, with flaps taken from the thigh or buttocks an implant is often used as well to provide sufficient breast volume. Also,

autologous tissue may be used to cover an implant when there isn't enough skin and muscle left after mastectomy to allow for expansion and use of an implant (1, 2).

How do surgeons reconstruct the nipple and areola?

After the chest heals from reconstruction surgery and the position of the breast mound on the chest wall has had time to stabilize, the nipple and areola can be reconstructed. This can be done in two ways—surgically or with tattoos.

For surgical nipple reconstruction, the new nipple is created by cutting and moving small pieces of skin from the reconstructed breast to the nipple site and shaping them into a new nipple. A few months later, the surgeon can re-create the areola. This is usually done using tattoo ink.

However, in some cases, skin grafts may be taken from the groin or abdomen and attached to the breast to create an areola at the time of the nipple reconstruction (1).

Alternatively, a new nipple and areola can be created by a tattoo artist who specializes in 3-D nipple tattooing. Such a nipple is flat to the touch but looks realistic.

A mastectomy that preserves a woman's own nipple and areola, called nipple-sparing mastectomy, may be an option for some women, depending on the size and location of the breast cancer and the shape and size of the breasts (4, 5).

What factors can affect the timing of breast reconstruction?

One factor that can affect the timing of breast reconstruction is whether a woman will need radiation therapy. Radiation therapy can sometimes cause wound healing problems or infections in reconstructed breasts, so some women may prefer to delay reconstruction until after radiation therapy is completed. However, because of improvements in surgical and radiation techniques, immediate reconstruction with an implant is usually still an option for women who will need radiation therapy. Autologous tissue breast reconstruction is usually reserved for after radiation therapy, so that the breast and chest wall tissue damaged by radiation can be replaced with healthy tissue from elsewhere in the body.

Even if a woman is a candidate for immediate reconstruction, she may choose delayed reconstruction. For instance, some women prefer not to consider what type of reconstruction to have until after they have recovered from their mastectomy and subsequent adjuvant treatment. Women who delay reconstruction (or choose not to undergo the procedure at all) can use external breast prostheses, or breast forms, to give the appearance of breasts.

What factors can affect the choice of breast reconstruction method?

Several factors can influence the type of reconstructive surgery a woman chooses. These include the size and shape of the breast that is being rebuilt, the woman's age and health, her history of past surgeries, her risk factors for complications after surgery (for example, smoking history and obesity), the availability of autologous tissue, and the location of the tumor in the breast (2, 6). Women who have had past abdominal surgery may not be candidates for an abdominally based flap reconstruction.

Each type of reconstruction has factors that a woman should think about before making a decision. Some of the more common considerations are listed below.

Reconstruction with Implants

Surgery and recovery

- Enough skin and muscle must remain after mastectomy to cover the implant
- Shorter surgical procedure than for reconstruction with autologous tissue; little blood loss
- Recovery period may be shorter than with autologous reconstruction
- Many follow-up visits may be needed to inflate the expander and insert the implant

Possible complications

- Infection
- Accumulation of clear fluid causing a mass or lump (seroma) within the reconstructed breast (7)
- Pooling of blood (hematoma) within the reconstructed breast
- Blood clots
- Extrusion of the implant (the implant breaks through the skin)
- Implant rupture (the implant breaks open and saline or silicone leaks into the surrounding tissue)
- Formation of hard scar tissue around the implant (known as a contracture)
- Obesity, diabetes, and smoking may increase the rate of complications
- Very small risk of developing a very rare form of immune system cancer called breast implant associated–anaplastic large cell lymphoma, particularly with textured implants
- A small number of squamous cell carcinomas and various lymphomas in the scar tissue around implants have been reported, but they are very rare

Other considerations

- May not be an option for patients who have previously undergone radiation therapy to the chest
- May not be adequate for women with very large breasts
- Will not last a lifetime; the longer a woman has implants, the more likely she is to have complications and to need to have her implants removed or replaced
- Silicone implants may feel more natural than saline implants to the touch

- The Food and Drug Administration (FDA) recommends that women with silicone implants undergo periodic MRI screenings to detect possible “silent” rupture of the implants

More information about implants can be found on FDA’s Breast Implants page.

Reconstruction with Autologous Tissue

Surgery and recovery

- Longer surgical procedure than for implants
- The initial recovery period may be longer than for implants
- Pedicle flap reconstruction is usually a shorter operation than free flap reconstruction and usually requires a shorter hospitalization
- Free flap reconstruction is a highly technical operation that requires a surgeon who has experience with microsurgery to reattach blood vessels.

Possible complications

- Necrosis (death) of the transferred tissue
- The risk of bleeding and blood clots is higher with autologous reconstruction than with implants
- Pain and weakness at the site from which the donor tissue was taken
- Obesity, diabetes, and smoking may increase the rate of complications

Other considerations

- May provide a more natural breast shape than implants
- May feel softer and more natural to the touch than implants
- Leaves a scar at the site from which the donor tissue was taken
- Can be used to replace tissue that has been damaged by radiation therapy

All women who undergo mastectomy for breast cancer experience varying degrees of numbness and loss of feeling in the breast because nerves that provide sensation to the breast are cut when breast tissue is removed during surgery. However, some breast sensation may be regained as the severed nerves grow and regenerate, and breast surgeons continue to make technical advances that can spare or repair damage to nerves.

Any type of breast reconstruction can fail if healing does not occur properly. In these cases, the implant or flap will have to be removed. If an implant reconstruction fails, a woman can usually have a second reconstruction using an alternative approach.

Will health insurance pay for breast reconstruction?

The Women’s Health and Cancer Rights Act of 1998 (WHCRA) is a federal law that requires group health plans and health insurance companies that offer mastectomy coverage to also pay for

reconstructive surgery after mastectomy. This coverage must include all stages of reconstruction and surgery to achieve symmetry between the breasts, breast prostheses, and treatment of complications that result from the mastectomy, including lymphedema. More information about WHCRA is available from the Department of Labor and the Centers for Medicare & Medicaid Services.

Some health plans sponsored by religious organizations and some government health plans may be exempt from WHCRA. Also, WHCRA does not apply to Medicare or Medicaid. However, Medicare may cover breast reconstruction surgery as well as external breast prostheses (including a post-surgical bra) after a medically necessary mastectomy. Medicaid benefits vary by state; a woman should contact her state Medicaid office for information on whether, and to what extent, breast reconstruction is covered.

A woman considering breast reconstruction may want to discuss costs and health insurance coverage with her doctor and insurance company before choosing to have the surgery. Some insurance companies require a second opinion before they will agree to pay for a surgery.

What type of follow-up care and rehabilitation is needed after breast reconstruction?

Any type of reconstruction increases the number of side effects a woman may experience compared with those after a mastectomy alone. A woman's medical team will watch her closely for complications, some of which can occur months or even years after surgery (1, 2, 8).

Women who have breast reconstruction may benefit from physical therapy to improve or maintain shoulder range of motion or help recover from weakness experienced at the site from which donor tissue was taken for an autologous reconstruction (9, 10). A physical therapist can help a woman use exercises to regain strength, adjust to new physical limitations, and figure out the safest ways to perform everyday activities.

Does breast reconstruction affect the ability to check for breast cancer?

Mammography is not typically done on a breast that is reconstructed after mastectomy; instead, physical exams are done to check for recurrence. However, women who have one breast removed by mastectomy will still have mammograms of the other breast.

What is flat closure?

A flat closure (also called aesthetic flat closure) is surgery done to rebuild the shape of the chest wall after the removal of one or both breasts. It is also a surgical option for people who have had their breast implants removed.

During an aesthetic flat closure, a surgeon removes extra skin, fat, and other tissue in the breast area. The remaining tissue is then tightened and smoothed out so that the chest wall appears flat and

contoured. Simply forgoing additional procedures to reconstruct the breast(s) after a mastectomy will not achieve a flat closure (11).

What are some new developments in breast reconstruction after mastectomy?

- **Oncoplastic surgery.** In general, women who have lumpectomy or partial mastectomy for early-stage breast cancer do not have reconstruction. However, in some cases the surgeon may use plastic surgery techniques to reshape the breast at the time of cancer surgery. This type of breast-conserving surgery, called oncoplastic surgery, may use local tissue rearrangement, reconstruction through breast reduction surgery, or transfer of tissue flaps. Long-term outcomes of this type of surgery are comparable to those for standard breast-conserving surgery (12).

- **Autologous fat grafting.** A newer type of breast reconstruction technique involves the transfer of fat tissue from one part of the body (usually the thighs, abdomen, or buttocks) to the reconstructed breast. The fat tissue is harvested by liposuction, washed, and liquified so that it can be injected into the area of interest. Fat grafting is mainly used to correct deformities and asymmetries that may appear after breast reconstruction. It is also sometimes used to reconstruct an entire breast. Although concern has been raised about the lack of long-term outcome studies, this technique is considered safe (1, 6, 13).