INFORMATION ABOUT BREAST RECONSTRUCTION

The purpose of breast reconstruction is to restore body image and to enable you to wear all types of clothes without restriction. Most women can wear the most revealing styles with complete confidence after breast reconstruction. It is usually impossible to tell which side is the reconstructed side while dressed. The need for an awkward and sometimes embarrassing external prosthesis is eliminated by permanent reconstruction of the breast.

No method of breast reconstruction will precisely duplicate a normal breast. It is not possible, for example, to restore normal feeling. Some techniques have limitations in terms of creating a soft breast as well as imitating the natural sag of a mature breast. It is impossible to eliminate the scar that results from mastectomy although it can frequently be integrated into the reconstruction so that it is less obvious. Despite these shortcomings, the vast majority of women are very pleased with the results achieved by breast reconstruction.

Breast reconstruction is a complex subject. This document includes detailed information about the techniques currently in use. Although it will answer most of your questions, it may be necessary to read this several times to absorb all of the material presented. Certain parts of this document will be more relevant to your care than others. After your consultation you will be able to focus specifically on the parts that pertain most to you.

Reconstruction with Breast Implants

The most common form of breast reconstruction utilizes a breast implant to rebuild the breast mound. This technique does not add new scars to the body. Implant reconstruction requires less extensive surgery but more procedures are required to complete the process. Implants may be silicone gel or saline filled. Both implants have an outer silicone shell. Silicone implants have a more natural feel and are preferred by most plastic surgeons and patients.

Not all women are candidates for implant reconstruction. Those with small breasts that do not sag are the best candidates. Often a breast augmentation on the opposite side is done for best symmetry, especially if you would prefer to be larger. Breasts that are large or have a lot of sag are difficult to simulate with an implant. Larger breasts usually require a reduction and lift on the normal side in order to achieve symmetry.

Those who have received chest wall radiation prior to reconstruction generally are not candidates for standard implant techniques, with rare exception. The chance of complications requiring removal of the implant is very high in this setting. Other alternatives are available for those who have received radiation and this is presented in greater detail later.

Breast Implant Controversies

Breast implants are thin-walled containers made of silicone elastomer which are filled with saline (salt water) or silicone gel. They have been in use for over forty years and have an excellent safety record. Although there has been concern that the silicone gel in silicone filled implants may cause the development of autoimmune diseases, no studies to date have shown this to be true and the Institute of Medicine has determined that silicone implants are equally safe as saline implants to patients. Saline filled implants have not been implicated in this regard . After extensive study, the FDA approves the use of both types of implants.

Some consumer advocate groups have warned that breast implants may cause breast cancer. Breast cancer caused by an implant has never been reported in humans. Moreover, the laboratory evidence on which this conjecture is based is highly suspect. However, one type of cancer, Anaplastic Large Cell Lymphoma (ALCL) has been linked to breast implants. Women with textured saline and silicone gel breast implants may have a very small but increased risk of developing anaplastic large cell lymphoma (ALCL) in the scar capsule adjacent to the implant. ALCL is an extremely rare cancer of the immune system, which can occur anywhere in the body. The National Cancer Institute estimates approximately 2,000 ALCL cases per year. Incidence of ALCL of the breast is not known. Breast implant associated ALCL is estimated to be 1:300,000 women with breast implants but this likely is underestimated. (deJong. JAMA, 2008) ALCL is currently under investigation. In most cases, women observed changes in the look or feel of the area surrounding the implant after their initial surgical sites were fully healed. Either way, breast implants should be followed by a surgeon over time and patients should seek professional care for implant-related symptoms such as pain, lumps, swelling, or asymmetry. Patients should monitor their breast implants with routine breast self-exams and follow standard medical recommendations for imaging (e.g. mammography, ultrasound, MRI). Abnormal findings may lead to the need for obtaining breast fluid or tissue for pathology and laboratory evaluation and/or surgery to remove the scar capsule around the breast implant, implant removal, or implant replacement.

Implant Rejection, Capsule Formation, and Other Issues

True "rejection" of an implant is extremely rare. The hard silicone plastic used to make the implant shell is one of the most biologically non-reactive materials known. However, breast implants, like any other foreign material placed in the body, can become infected and require removal.

The body normally forms a layer of scar tissue around any artificial material implanted beneath the skin. In most women the "capsule" that forms in response to a breast implant remains thin and pliable. In some patients the capsule is unusually strong and results in a firm breast. The variability in capsule formation is a reflection of each individual's biologic response to an implant. As a result, this factor is both unpredictable and uncontrollable.

Excessive capsule formation can be painful and distort breast shape. This condition, called "capsular contracture", may require surgery to relieve symptoms. Fortunately, severe capsular contracture is rare.

Saline implants, like all man-made devices, wear out eventually. The majority last at least ten years but the actual lifespan of currently used implants is unknown. When the implant shell fails after many years the saline fluid is released and is absorbed by the body without harm. The situation becomes obvious when this occurs because the breast goes flat almost immediately. Replacement requires a short surgical procedure performed on an outpatient basis. It is best if the implant is replaced within seven to ten days of deflation, if possible. Gel implants ultimately suffer the same fate and the outer capsule may rupture. In the case of gels, however, this event may be undetectable as the capsule, which has formed over time, acts as an outer shell keeping the gel in place. Because the gel of current implants is "cohesive", a rupture of the outer shell would not necessarily require surgery since the implant remains in one piece. Whether the implant is removed or left in place is decided by mutual agreement of the patient and the surgeon and this may be decided over time and often depends more on how the breast looks and feels.

Saline implants have some aesthetic limitations compared to silicone gel implants. In thin patients, rippling of the upper breast skin can occur. This may require adjustment by surgery if the ripples are quite prominent. Sometimes a small fold in the implant cover can be felt through the skin. Although this may be of concern when discovered for the first time, this is harmless and does not require treatment.

For all the reasons above, I generally recommend silicone gel implants for your reconstruction and rarely if ever use saline implants anymore. For more information about breast implant safety, go to *www.breastimplantsafety.org.*

The Role of Tissue Expanders in Implant Reconstruction

A mastectomy normally removes a variable amount of breast skin with the nipple. The amount removed depends on tumor size and also the location of the biopsy scar. The skin circulation and its healing ability are also compromised by mastectomy. Both of these factors prevent the immediate placement of a permanent implant at the time of mastectomy in virtually all patients. If sufficient skin is removed during the mastectomy, immediate placement of the final breast implant will not be possible as we would need more skin to create a breast shape. Tissue expansion is a process that replaces the missing skin in preparation for placement of a permanent implant later.

A tissue expander is a balloon like device made from elastic silicone rubber. It is inserted into a pocket under the skin and muscle of the chest. It is similar in construction to a saline implant but the shape is different, it has an adjustable capacity, and it contains a metal port for fluid injection.

The expander is usually placed in its collapsed form at the time of mastectomy. Beginning about two weeks after surgery fluid is introduced by needle into the tissue expander to partially inflate it. This is repeated during weekly office visits to gradually expand the skin of the chest. Expansion is completed in approximately eight weeks. Four weeks are then allowed for the skin to stabilize and loosen. After this time the tissue expander is replaced with an implant as a separate surgical procedure. If needed, an augmentation, a reduction, or a lift of the opposite side is usually performed at the same time.

Many women ask why two procedures are mandatory. The main reason is that it is not possible to control the shape accurately enough to match the opposite breast as skin expansion progresses. Therefore, a second procedure is required both to place a permanent implant of the appropriate volume and to tailor the expanded skin into a natural breast shape. In addition, it is often necessary to adjust the expander pocket position on the chest as well as redefine the natural crease under the breast.

Tissue expanders, like implants, can become infected. Although this happens rarely, the expander usually must be removed if this happens. After the infection has subsided it is safe to begin the process again.

The expansion process causes a sensation of pressure in the chest which can be uncomfortable. The amount of pressure created is directly related to the amount of fluid added to the expander at each visit. This amount is adjusted on an individual basis so that discomfort is minimized.

Immediate Breast Reconstruction with Breast Implants

If you are an implant candidate, and Dr. Zenn and your surgical oncologist will evaluate you to see if you are a candidate for a nipple-sparing or skin-sparing mastectomy. If you are a candidate, you may be eligible for an immediate single stage reconstruction without the need for tissue expansion.

Many surgeons may tell you that you are having “immediate” reconstruction but are putting in a tissue expander, in which case your final implant will not be placed for about 3 months, after expansion is completed. True “immediate” reconstruction would place the final implant. You may see this referred to in the scientific literature as “Direct-to-Implant” reconstruction, “One-Stage” reconstruction, or the “Zenn Delay” reconstruction. In these cases, there will be enough healthy, viable skin left after mastectomy that a final implant can be placed under a “sling” constructed of pectoralis muscle and with the assistance of a biologic substitute called Acellular Dermal Matrix or ADM (Dermacell™, Alloderm™, Stratus™,etc.). Most candidates will be a C cup or smaller or candidates for nipple sparing mastectomy where the entire breast envelope will be saved. If possible, I will leave your chest muscles alone and support the implant with the ADM only. This greatly reduces pain associated with the reconstruction and long term avoids muscle related problems like movement of the breasts when the muscles contract. Risks and complications of implant reconstruction remain but the tissue expansion process is avoided.

The advantage of saving the breast skin and nipple for patients is an unparalleled cosmetic result and a chance for a one-stage reconstruction. Unfortunately, the incidence of skin and nipple loss with "nipple sparing mastectomy (NSM)" can be as high as 40% in reported series. This level of risk has been unacceptable to me and my patients so I have developed strategies to reduce this problem to near zero. First, at the time of mastectomy I use technology (SPY ICG laser angiography) to evaluate the blood supply to the skin after mastectomy to see if it is safe to proceed. Studies have shown this to be quite accurate. Secondly, for patients who would not normally be candidates for NSM due to previous surgery, radiation, or anatomy, I perform the "Zenn Delay" procedure.

The "Zenn Delay"

Because the skin of the breast and the nipple receive their blood supply from the breast tissue, after mastectomy the breast skin envelope is in shock and has unreliable blood supply. Often, it is the act of reconstructing the breast itself that increases the stress on blood supply and causes nipple or skin loss. The "Zenn Delay" uses the tried and true technique of "surgical delay" to ensure the best possible blood supply to the skin and nipple. After mastectomy, the incision is closed by the breast cancer surgeon and no reconstruction is performed for a period of two weeks. During this time, the skin envelope sits relaxed and unstressed on the chest and the blood supply strengthens, mainly by development of new blood vessel connections. Two weeks after the initial mastectomy, implant reconstruction can proceed electively without fear of nipple or skin loss. This procedure can be performed as an outpatient and most patients can be back to work in 2 to 3 weeks.

The Staged Immediate Breast Reconstruction or "Zenn Delay" technique was first reported in the literature by Dr. Zenn in 2015 in *Plastic and Reconstructive Surgery*, the official journal of the American Society of Plastic Surgeons. The article outlined some its advantages:

- No incidence of nipple or skin loss. All patients were successfully reconstructed.
- The procedure can be performed in "high risk" patients such as those with previous radiation to the breast, previous breast surgery (lumpectomy, breast reduction, breast augmentation, breast lifts), or large breasted women.
- Allows final pathology to be known prior to performing the reconstruction. Typically, one week is required for a final reading on pathology and this information usually dictates the need for chemotherapy, radiation therapy, or further surgery that might change a reconstructive plan.
- Allows patients to keep their own general breast surgeon and still have access to Dr. Zenn and his expertise. Once the mastectomy has been completed by the general surgeon, the patient is discharged from the hospital, usually after an overnight stay. In addition to follow up with the general surgeon for pathology review, patients follow up with Dr. Zenn at one week for a wound check then at two weeks for the actual reconstructive surgery.

The general risks of breast implant reconstruction using "Zenn Delay" are similar to those of standard two-stage expander-implant reconstruction and include bleeding, infection, loss of implant, implant malposition, and the need for revisional surgery. Different from tissue expander techniques, the final implant is placed at two weeks, not two or three months. Additionally, because the natural skin envelope of the breast is used, the final results look much more natural.

Reconstruction with Body Tissue

A breast mound can also be created with tissue borrowed from another part of the body. Breasts reconstructed in this fashion are soft and have a natural shape. It is therefore much easier to match the remaining breast with this technique. Fewer procedures are required to complete the reconstruction compared to implant techniques. The reconstruction is permanent and rarely requires "touch up" procedures later in life only if the reconstruction ages differently from the natural breast or there are weight changes over time. There are disadvantages to using your own tissue. There will be a scar left at the site where the tissue is taken from. The operation takes a long time and

therefore has more surgical risks. The recovery from surgery is longer, typically months, not weeks like implant reconstruction. The most common area used to donate tissue for breast reconstruction is the lower abdomen. This is called a TRAM flap or DIEP flap. The back tissues can be used sometimes and this is called a latissimus dorsi flap. Often times an implant must be used with the latissimus dorsi flap to create adequate breast projection. This can be done at the time of mastectomy or in a delayed fashion. The buttock, or gluteal area, is also used but only in special situations.

TRAM Flap Reconstruction

You must have sufficient tissue in the lower abdomen to be a candidate for this procedure. The scar that results when the abdomen is used is conspicuous in that it extends from side to side at a level midway between the navel and pubic hair area. "Tummy tucks" that are done for purely cosmetic reasons have a lower scar. The contour of the abdomen following a TRAM flap procedure is usually improved but the abdomen is never perfectly flat, particularly in those who are significantly overweight to begin with. It must be kept in mind that the primary goal of this procedure is to reconstruct the breast, not tighten the abdomen. Complete recovery from this procedure takes six to eight weeks.

The excess skin and fat from the lower abdomen is moved to the chest area by sliding it underneath the upper abdominal skin to reach the mastectomy site. The tissue remains attached to one of the abdominal muscles which is loosened enough to allow the tissue to move upward. The rectus muscle provides blood supply to the skin and fat tissue that will form the breast.

Use of the muscle can result in abdominal weakness because one of the two main abdominal muscles is no longer functional. Use of the entire muscle is also responsible for much of the abdominal discomfort experienced immediately after surgery. After recovery from surgery, most women do not notice a change in abdominal strength or abdominal function after sacrifice of one of the muscles. If two muscles are sacrificed, the change in strength is more noticeable however most women continue to be fully functional.

Free TRAM flap or DIEP flap

There is another technique to move tissue from the abdomen. Instead of sliding the fat and skin tissue still attached by muscle, the entire piece of tissue is completely detached from the body, moved to the chest, and then its blood vessels are reattached using microsurgery. A large block of tissue that is completely detached from the body in this way is referred to as a "free flap". Only a small amount of muscle is harvested with a free TRAM flap, so initial recovery is easier than a standard TRAM.

If possible, a free TRAM can be harvested with no muscle, just the perforating blood vessels. This is called a perforator flap (Deep Inferior Epigastric Perforator flap or DIEP flap). The decision regarding how much muscle will be harvested will be made by your surgeon in the operating room depending on your anatomy. I no longer perform these microsurgical procedures and if you are interested in being evaluated for this I can refer you to a specialist in your area.

Although there are distinct advantages to a free flap approach to TRAM reconstruction, there is one major potential problem. In a certain percentage of patients the microsurgery portion of the procedure is not successful. If this happens the entire piece of transferred tissue is lost. Breast reconstruction must then be done by another technique at a later date. The donor site scar remains and great effort will have been expended in an unsuccessful attempt to reconstruct the breast. Women who smoke and those who have other risk factors such as obesity and diabetes are more likely to have this problem. However this same group derives the most benefit from a microsurgical approach because of the superior circulation provided to the tissue by this technique. Those who have a history of back problems are also good candidates for the microsurgical option because only a small portion of one abdominal muscle is used.

Gluteal "Free Flap" Reconstruction

Both the upper and lower buttocks are another source of skin and fat for breast reconstruction. There is a mild flattening of the buttock contour but this is imperceptible in normal clothing. If a larger piece of tissue is necessary to make the breast, a depression can sometimes be created at the donor site which is more evident. The best candidates for a gluteal free flap reconstruction are women less than 45 years of age who have a flat abdomen (no TRAM donor site) and a small or medium size breast with little natural sag.

Breast reconstruction with buttock tissue requires microsurgery because the tissue must be completely detached from the body in order to move it to the chest. The role of microsurgery, just as described above as an option in TRAM flap reconstruction, is to restore circulation to the transplanted block of skin and fat tissue. This procedure is also associated with a two to four percent chance of failure resulting in complete loss of the transplanted tissue.

Selection of a Reconstruction Technique

The best method of reconstruction is influenced by a variety of factors including the size and the degree of sagging of the breasts, and the amount of tissue available in possible donor sites such as the abdomen, back, and buttock. Either an implant or tissue reconstruction is favored based on these physical characteristics. Over my career, half of my patients are reconstructed with implants, the other half use their own tissue.

Your preference can be accommodated when more than one method is suitable provided that you have a thorough understanding of the pros and cons of each alternative. A comparison of implant and tissue reconstruction below:

	Expander Placement or Immediate Implant	Zenn Delay	Tissue Reconstruction
Surgery	Two separate 1- 2 hour procedures (one if DTI)	One 2 hour procedure	One 6 - 8 hour procedure
General Anesthesia	Required	Required	Required
Hospitalization	Overnight with mastectomy, Outpatient if done later	Outpatient	4-5 days with or without mastectomy
Scars	No new scars	No new scars	Additional donor site scar
Shape	No natural sag, flat across the front; firm	Natural shape perky, firm	Natural shape, droop consistency, very soft
Opposite breast	More changes usually required to match	None unless size change desired	Less changes unless size change desired
Uncommon problems	Breast hardening with changing shape over time	May harden or ripple over time	Abdominal pain, bulge or weakness

Reconstruction after Radiation - A Special Situation

Some women have had radiation therapy prior to reconstruction. This is most common in those who have previously been treated by lumpectomy and radiation. A mastectomy is usually recommended if a new problem develops in the same breast later. The difficulty with reconstruction is due to the detrimental effect that radiation has on skin circulation. The skin is permanently compromised and breast reconstruction performed in this setting is more prone to wound healing complications.

It is not possible to use tissue expanders to stretch radiated skin. Attempts to do so are associated with a very high failure rate. Even in those in whom expansion proves to be technically feasible, the aesthetic result is usually poor. If your breast surgeon feels that the tumor is not near the nipple, a NSM can be possible and a "Zenn Delay" would be recommended. If not, you will need new skin to the reconstruction site. A latissimus flap with tissue expander (see below) or an abdominal (TRAM/DIEP) flap is an excellent choice for those with the appropriate would likely be recommended, depending on your physical characteristics.

A flap of tissue can be taken from the back for breast reconstruction called the "Latissimus Dorsi Flap." This type of reconstruction involves a combination of both implant and tissue reconstruction techniques. It is called a latissimus dorsi flap since it uses one of the back muscles. This muscle helps with upper arm motion but is not essential for normal function. Through a diagonal back incision of ten to twelve inches, this muscle with its overlying fat and skin can be moved from the back to the mastectomy site. Unlike the TRAM flap there is usually not enough fat volume available to form a breast mound without the addition of a breast implant. Like implant reconstruction that does not have enough skin, a tissue expander is placed at the time of the latissimus dorsi flap and the permanent implant is placed later after the new skin is expanded.

This type of reconstruction yields good results. It can be used in both the irradiated and non-irradiated patient, but does combine the disadvantages of both implant and tissue reconstruction methods. This technique leaves a donor site scar and is also subject to problems seen in implant reconstruction such as capsular contracture and implant deflation. In contrast to the TRAM flap however, using the back as a donor site is not associated with functional problems as a result of using the muscle. Hospitalization is only two days and recovery from the first surgery is only two weeks. The second procedure to change the expander for an implant is outpatient.

Steps in the Process of Breast Reconstruction

Breast reconstruction can never be totally completed in a single operation, regardless of the method used. The first one or two operations create the breast mound and establish symmetry by adjustment of the reconstructed breast, the normal breast, or both. The last step is nipple reconstruction, unless you have had nipple sparing surgery. The breasts are allowed to settle for several months prior to nipple reconstruction so that its position on the breast can be determined accurately.

Each of the separate stages in the reconstruction process requires general anesthesia. In select patients, nipple reconstruction can be performed with local anesthesia. Not all procedures require an overnight stay in the hospital. The later stages can usually be performed on an outpatient basis. There is considerable flexibility that allows each stage to be scheduled around work and family schedules.

Immediate Reconstruction vs. Reconstruction Later

Breast reconstruction can begin either around the time of mastectomy or several months later. The timing does not influence the quality of results unless a nipple sparing mastectomy (NSM) is possible. This gives the best cosmetic result in most cases and is preferred if your treatment plan includes post-operative radiation. After radiation, your options become more limited. The concept of immediate reconstruction is attractive because it saves on hospitalization, one general anesthetic, and the reconstruction is already underway while the mastectomy wound is still healing. "Zenn Delay" is offered to expand the pool of patients who can receive a direct

to implant reconstruction, when performing the reconstruction during the mastectomy is deemed too risky.

Immediate breast reconstruction using a tissue expander can be done even if there is a requirement for six months of chemotherapy after surgery. Expansion is completed in the office as usual but the next surgery (exchange for a permanent implant, reshaping of the breast, and opposite side adjustment) is delayed until one month after chemotherapy is finished. If a tissue reconstruction is performed the chemotherapy issue is usually not relevant as the major portion of the reconstruction is completed before chemotherapy is scheduled to start. If radiation therapy is in the treatment plan, a delayed reconstruction will likely be recommended if NSM is not possible. If radiation has been decided upon after placement of the tissue expander, expansion and possibly exchange to an implant can usually be completed prior to radiation therapy. When exchange to a permanent implant cannot be accomplished before the start of radiation, extra time (4-6 months) is allowed to let the skin heal from the radiation treatment prior to the exchange.

SUMMARY

In summary, you are considering being treated for the loss of one or both breasts by breast reconstruction. This is a quality of life issue. This surgery is elective and you do not need it in order to live a normal life-span. The goal of reconstruction is to restore the size, shape, and appearance of the breast(s) as closely as possible. This will aid in the restoration of body image and make it possible for you to wear virtually all types of clothing with confidence.

Medicine is not an exact science and breast reconstruction in particular is as much an art as it is a science. There are limitations with all currently available techniques. It is rare to be able to produce an exact duplicate of the normal breast. As is common in nature, the two breasts may vary somewhat in size, shape, or position following reconstruction. Surgical scars are permanent and variable in their final appearance. Complications can occur with any type of procedure and may require additional surgery for correction. Despite this, most women are very pleased with their results.

It is important that you are fully informed about the process of breast reconstruction. It is unlikely that all of your questions will be answered at the first consultation. You may have additional questions after you have considered the discussion further. It is often helpful to schedule a second consultation if there is confusion about a number of points.

I look forward to our future meeting.

Sincerely,

Michael R. Zenn, M.D., F.A.C.S.

Appointments: (919) 480-3885
DrZenn@zennplasticsurgery.com

rev. 12/17