

An Update On Reconstructive Breast Implant Technology

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Introduction

Rebuilding a woman's God-given breast using human-made instruments and materials remains one of the biggest challenges that a plastic surgeon deals with. The naturally-beautiful shapes, contours, and proportions are often dramatically altered by the necessary treatments, particularly mastectomy and radiation. Though the human breast never defines who a woman is, it still is a meaningful part of feeling whole. The loss of breast symmetry can negatively affect the way that clothing fits, cause discomfort and skin irritation, and it impacts a person's self-esteem -- not to mention that it is a constant reminder of the breast disease they are fighting.

Biomedical engineers are constantly working with plastic surgeons to improve breast implant technology. We have come a long way since the first implants were placed in the early 1960's. Much of the public still assumes that all silicone implants are "bad," and that they leak and cause problems. This is not the case. The U.S.F.D.A. studied silicone gel implants for about 15 years in great detail and found no meaningful link between a breast implant and any medical disease. In the fall of 2006, silicone implants were re-released (with many design updates) for both cosmetic and reconstructive uses. Silicone-filled breast implants are still the more commonly used devices for breast reconstruction, although there are several very good saline-filled implant options available too. We are always in search of the perfect implant for our patients.

Mastectomy Surgery & Tissue Expanders

Any woman who has battled mastectomy surgery and undergone breast reconstruction efforts has likely had (or at least discussed) the concept of tissue expanders with their plastic surgeon. These are temporary devices placed in order to slowly stretch the remaining breast skin and tissues in preparation for further reconstruction techniques, either with a true breast implant or with the body's own tissues. These are basically "placeholders" and "skin stretchers" that are silicone shells designed to be periodically filled with saline (sometimes with air) in the surgeon's

office once the skin has healed. Yes, there are some cases where the true breast implant can be placed at the time of mastectomy, but it can be very difficult to get right on the first try and patients often require a second surgery to adjust them later anyway. That means the surgeon basically has to decide for you what size you'll be (which, we often will get wrong) and it maximally places stress on the skin incision which can lead to wound healing problems.

Mastectomy surgery affects the breast in several negative ways. First, a standard mastectomy that removes the nipple-areolar complex will, by nature of geometry, cause the breast to be flattened. We call this a "loss of projection." Secondly, the scar that forms leads to forces that make it very difficult to overcome that phenomenon. Also, mastectomy surgery requires that blood vessels (and nerves) that supply circulation and oxygen to the skin edges be removed. That leads to tissues that may not survive and cells that tend to leak fluid into the cavity left behind; hence the need for the dreaded drain tubes! Nipple-sparing mastectomy is an option in very select cases and that technique can help alleviate some of these issues --but not all-- of them.

We used to universally place these tissue expanders underneath the chest (pectoralis major) muscles, but more recently there is a trend to placing them above the muscles. I definitely prefer this technique today. Sometimes, we need to use a "sling" or support to help position the expanders/implants and provide some coverage & camouflage for them. Most commonly, we use a product called, "Alloderm." This comes from a human donor but it is not a transplant of cells. Instead, it is somewhat of the "silhouette" of the deep layer of skin (dermis) that acts as a scaffolding and your body will incorporate it into your own tissues. This is another area where scientists are trying to improve. The use of these products has actually decreased over the past year or so as we continue to study their effects.

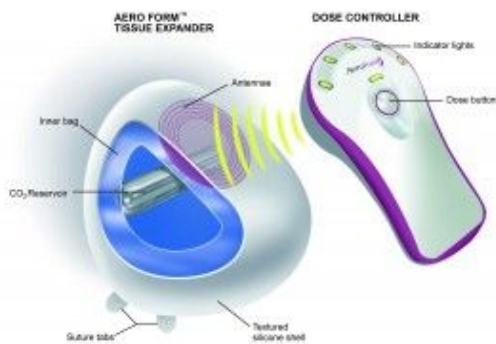
New Options in Tissue Expanders

I would say that the most commonly used tissue expanders today come in a variety of shapes and have a filling port that is built into the device itself. The surgeon can later find this filling port through the skin using a special magnet. Once the skin has been stretched to the appropriate size, a second procedure can be carried out to remove the expander and place the true breast implant in its place, or other options using the body's own tissues (flap surgery such as the DIEP flap, Latissimus Dorsi flap, TRAM flap, and others). Flap surgery is significantly more involved and really is an entire discussion on its own. I usually reserve that surgery for cases where radiation has damaged the breast skin beyond the ability to do any stretching or expansion.



Traditional Tissue Expander

There are some very interesting developments in tissue expanders! By far the most high-tech is a device called the “AeroForm AirXpander.” This is placed in the same manner as other expanders either at the time of mastectomy (“Immediate Reconstruction”) or after the mastectomy has healed and other treatments have been completed (“Delayed Reconstruction”). But, what’s amazing is that no injections (no needles) are required to fill the device. It’s done by remote control! Yes, the expander has a cartridge built into it holding compressed CO₂ gas and when the surgeon gives you the “green light” to begin, the patient has a remote control at home that will --very slowly-- deliver a charge of air. Pretty futuristic! They are expensive though, and so they are not widely-available in Kansas City yet. If you’d like to see Mrs. Sharon Payne and I discuss this device on KCTV-5, you can check out our “5-minutes of fame” here: (<https://youtu.be/b7oaOvbBE5M>).



AeroForm AirXpander



KCTV-5 Segment

The last tissue expander I'll highlight in this article is basically a rebirth of an older technology, but it's been improved and, I think, very promising. It's made by the Mentor company and called, "The Spectrum" implant/expander. Notice it's called "implant/expander." This device can be placed as a tissue expander like all of the others, but its filling port can be placed in the armpit (axilla), upper abdomen, or another location near the breast. That port is connected to the implant by small-diameter tubing. What's interesting is that, if the expansion goes well and the woman is pleased with the shape and size, this device can actually function as her true longer-term implant (ie., no need for a second surgery)! The surgeon simply does a small procedure to remove the port, but the implant stays as it is. I've actually used this on a couple of cosmetic breast augmentation cases too. It's nice there because the woman can decide even after the surgery about her sizing! The disadvantage is that it's filled with saline and not silicone gel, so it does not always have the ideal look and feel, but it's still a great option. Plus, I like that it is very pliable compared to all the other expanders mentioned here and thus, more comfortable I've found.



Expander/Implant

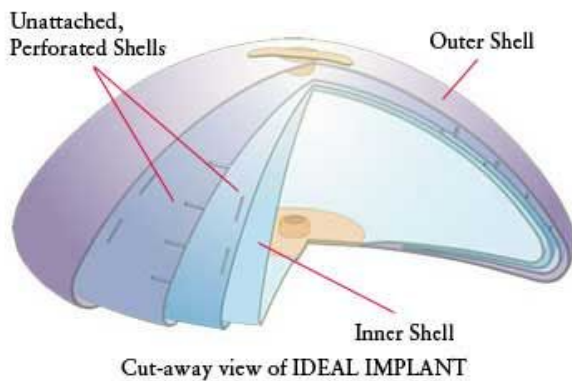
Mentor Spectrum Postoperatively Adjustable

Breast Implants

When the time has come for placement of the true breast implant (sometimes called, “2nd Stage”), women have many choices today. Breast implants are still of two basic constructions: a silicone outer shell filled with either saline (salt water) or silicone (of some variety). Each variety has undergone significant improvements, even in just the past 5 years. They each have pros and cons, and your plastic surgeon is the expert to help you with these choices.

Saline implants offer the potential for a smaller surgical incision since they are inserted as a flat “balloon” and then inflated with saline during surgery (silicone implants are filled and sealed from the factory). Also for that reason, saline implants offer a bit more flexibility in sizing during surgery to accommodate for left & right breast differences. If the shell does leak, the body simply absorbs the saline and it can be replaced via a fairly straightforward procedure. When a silicone gel implant leaks, that gel cannot be absorbed by the body (it generally gets walled-off with scar tissue). Surgery to remove that implant and leaked gel can be more involved.

The main disadvantage of the saline implants is that they tend to feel more like a water balloon whereas the silicone implants are more natural in feel and have less rippling of the device at the edges. Recently, we have a new version of the saline implant called the IDEAL IMPLANT. It seeks to offer all of the advantages of a saline implant but with the look and feel of silicone. It does this by an ingenious structure of several shells in one device with small valves (baffles) that allow the saline to move within the implant in a more controlled way. The IDEAL IMPLANT is FDA approved and is gaining popularity, but can be difficult to order these days.



IDEAL IMPLANT

The “buzz word” today in silicone-filled breast implants is the “gummy bear” implant. That’s sort of the lay term for “cohesive” silicone gel. Engineers have been able to make the silicone thicker such that it, even if the shell ruptures, the gel --for the most part-- does not leak outside of it. It’s almost like cutting open a little rubber bouncy ball (for lack of a better description). These are great devices and are a major advancement in breast implant technology. They remain very soft as well.



Cohesive Silicone Implant

The shaped (tear drop) implants used to be very popular choices for some surgeons & patients. They are in the anatomical shape of a breast as opposed to the round implants we use. I've moved away from these implants because, in my experience, they have a tendency to rotate once placed in the body and can end up creating poor results. Plus, they require a felt-like texture on their surface and we have concerns about how that may interact with the body. There is an extremely rare type of localized lymphoma that has been identified called, "ALCL," and it seems to be much more commonly associated with textured surface implants. That was the source of a major recall of one brand of implant, called the "Style 410."

No breast implant should be considered a lifetime device. They require monitoring and eventual replacement. Your plastic surgeon will guide you through that process. Please reach out to your surgeon if you ever have concerns.

Final Thoughts

Plastic surgeons like me tend to be drawn to caring for women battling breast disease and the disfigurement that ensues from the necessary treatment. It's a real journey that we really have to walk together. Sir Harold Gillies (regarded as one of the Fathers of Plastic Surgery) wrote in 1957 that, "Plastic Surgery is the constant struggle between beauty and blood supply." I think that really is true in that we are always aiming at perfection but limited by what the body's tissues can handle. The Twin Arcs that are the symbol of our main organization of plastic surgeons, The American Society of Plastic Surgeons, is rumoured to represent the constant striving for perfection. The arcs look like a perfect circle from a distance, but up close you can see that they don't exactly meet, symbolizing that we aren't quite there yet.



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I'm certainly not perfect, our treatments & devices are not perfect, and we are at the mercy of "Mother Nature" in terms of healing. We shoulder the responsibility as surgeons for both the good and the bad outcomes. Morbid obesity, smoking, and prior radiation are among the most common health problems that will lead to failure of breast surgery and your surgeon may recommend not doing any reconstructive surgery until these are addressed. Infections, skin loss, implant removal, and less than ideal cosmetic results are extremely frustrating for all of us, and we never forget that our patients suffer the most when that happens. Fortunately, we have a number of women who are absolutely thrilled with their results (sometimes even better appearances than before treatment), and that keeps us motivated to take care of the next patient. I'm humbled by the graciousness of my patients and I honestly think women battling breast cancer are among the strongest of people.

Best wishes to all of those battling this disease! Ultimately, what we all are striving for is the cure for cancer. I lost my younger brother (who leaves behind a wife and three young boys) to adrenal cancer in 2017, and so I have a very close and constant reminder with me of how much cancer hurts. Thank you very much for reading! I hope it was helpful, and I thank you for your support of the Bra Couture organization!

Dr. Paul Leahy