



SINGLE-STAGE BREAST RECONSTRUCTION WITH WISE PATTERN AND INFERIOR AUTODERM FLAP FOR MAMMARY HYPERTROPHY

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Breast reconstruction with prosthetic devices has become increasingly common as safety and patient satisfaction have become well documented. In the United States, 93,083 breast reconstructions were performed in 2010.¹ Device reconstructions accounted for 74,872 (80%) of these. The most common device reconstruction is a multiple-stage immediate reconstruction with a tissue expander placed at the time of mastectomy (62,081; 83%). Once an aesthetic volume is achieved through tissue expansion, a second stage is performed in which the expander is removed and replaced with a permanent device. This may also be followed with a nipple reconstruction at a later stage. Most skin-sparing mastectomies are performed using linear incisions. Some groups have recently documented using a Wise pattern with excellent results in large-breasted patients.²

Studies have shown good outcomes with immediate and delayed as well as single-stage and multiple-stage (tissue expander to implant) reconstructions. The safety of these devices has also been documented in patients undergoing chemotherapy and radiation, which has led some leading cancer centers to develop protocols of placing a permanent prosthesis prior to administering radiation.³ Recently, studies have also been published documenting the expansion of previously irradiated skin, which has long been considered only for autologous reconstructions.⁴

To create evidence-based medicine standards, breast reconstruction outcomes have been studied for a variety of data points, such as adjuvant therapies (XRT/chemotherapy), medical comorbidities (diabetes mellitus), body mass index (BMI), and social history (tobacco use). However, given the variety of procedures, as well as surgeon and/or patient preference, no general consensus or universal algorithm has been adopted.

Typically, the overall goal of breast reconstruction is to create breast symmetry and natural contour. The difficulty most often encountered with device reconstructions is creating a more natural ptotic breast, which is even more challenging in unilateral reconstruction when trying to match the unaffected side. The anatomic limitation of device reconstruction (single or multiple stage) is coverage of the lower pole of these devices. Devices placed in a complete submuscular position may have a tendency to displace superiorly.

To create lower-pole fullness, yet still provide complete tissue coverage, acellular dermal matrices have been used. These are typically placed from the inferior border of the released pectoralis major muscle to the recreated inframammary fold. Laterally, these matrices, or a serratus fascial flap, may be used to provide complete coverage. Complications rates with acellular dermal matrices differ in the literature but have been reported to include higher rates of seroma and infections.^{5,6}

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As procedures become better understood, patients and surgeons are considering fewer staged and simpler procedures, especially as economic concerns become more profound.⁷ More surgeons are offering single-stage reconstructions rather than multiple-stage ones.^{8,9} The technique described applies to women who have mammary hypertrophy and desire single-stage reconstruction using their own tissues for complete implant coverage.

INDICATIONS FOR AUTODERM

My personal protocol is to offer patients the best reconstruction using the fewest stages and the least amount of implantable material for their size preference.

- **Single-Stage:** If a woman is happy with her current size or is amenable to a smaller size, then I try to perform their reconstruction immediately with an implant. If complete muscle coverage is not possible after raising the pectoralis major muscle and a serratus fascial flap, then I use an acellular dermal matrix (ADM) for lower pole coverage.
- **Two-Stage:** If the patient prefers to be larger than her current size, or if skin sparing is not an option, then my preference is to place a tissue expander. I first try to provide the expander with complete muscle coverage by raising the pectoralis major muscle (and rectus fascia if necessary) inferiorly as well as a serratus fascial flap laterally. If complete coverage is not possible because of a long distance between the pectoralis major muscle and the inframammary fold, or if there is a large size discrepancy from a skin and muscle mismatch, I will use a lower-pole ADM.

This protocol has allowed me to develop a breast reconstructive ladder that focuses on implant coverage (muscle with or without ADM) and the skin envelope. There was a challenge in women who had mammary hypertrophy (size D and larger), which created a very large skin-to-implant coverage discrepancy. These patients typically required a large amount of skin removal and placement of an ADM with a large expander. This was typically done at the expense of aesthetics and increased the complication rates of mastectomy skin flap necrosis and its sequelae of exposed biomaterials and devices.

In this patient population, especially if they prefer to undergo a size decrease, I have found it is better to focus on the aesthetics of a standard Wise pattern. Further, given that these patients have excess skin, there is no need to use an ADM, because there is an abundance of well-vascularized dermis, especially at the lower pole.

TECHNIQUE

I place the patient in a standing position and mark the sternal notch, midline, and IMF, including a medial extension. The meridian is carried onto the abdomen to find the midpoint for IMF closure. I place a finger under the breast at the IMF and

transpose this point onto the breast for the new nipple position. I displace the breast medially and laterally (conservatively) to find the medial and lateral limbs. I mark these 10 cm.

It is essential to confirm that there is at least 4 cm between the IMF and the lower extent of the vertical limbs; otherwise there will not be enough device coverage inferiorly—that is, the superior border of the autoderm flap will not reach the inferior border of the pectoralis major flap). If there is less than 4 cm of flap, I revert to traditional reconstruction techniques.

In the operating room, with the patient in a supine position, I pinch the limbs together and bring them down to the IMF to check ease of closure. There should be limited or no tension, especially after mastectomy because of the vascular insult to the skin. While pulling the medial vertical limb to the IMF midpoint, I mark the medial horizontal endpoint by seeing how much skin folds over easily. I bring the lateral vertical limb to the IMF midpoint and mark the lateral extent that folds over easily. Laterally, there will always be extra skin laxity after a mastectomy, so I am usually more aggressive with skin pull.

While the general surgeon performs the sentinel lymph node biopsy, I deepithelialize the entire Wise-pattern area, leaving only the nipple. I remove the areola as a separate graft. If bilateral, I consider starting on the opposite side and then switching sides after the sentinel lymph node biopsy.

I make the horizontal dermis incision from medial to lateral and incise around the nipple only, leaving all other dermis intact. The mastectomy is performed through the large horizontal incision, which allows for complete access to the breast. The breast is removed en bloc with the nipple attached.

I begin the reconstruction by raising the pectoralis major off the chest wall and releasing it inferiorly from the rectus fascia. The pectoralis should also be released along the medial portion of the breast for a few centimeters to allow the implant to sit inferomedially. I sew the superior portion of the autoderm skin flap to the inferior border of the pectoralis major with a running 3-0 PDS suture.

If there is enough autoderm skin flap laterally to cover the implant completely, then I begin suturing it to the lateral chest wall with running 3-0 PDS suture. If there is not enough of the flap, I raise a serratus fascial flap for attachment to the lateral autoderm flap and pectoralis major muscle.

I measure the base diameter and choose an appropriate implant based on chest diameter and availability of soft tissue coverage as well as patient goals. Silicone sizers are usually needed for trialing. One trick that I use is to leave the running sutures untied while placing the implants. This allows pulling closed and releasing for silicone sizer placement.

Once the implants are chosen, I check for hemostasis and irrigate the breast with antibiotic solution. I place one drain in the implant pocket and one in the subcutaneous pocket at the inferior border of the autoderm flap and the IMF closure. I place another drain at the superior border of the pectoralis major muscle connecting to the axilla. I change gloves for implant placement and tie the previously placed running sutures to close off the implant pocket completely.

I close the wise pattern with simple interrupted sutures. A running absorbable suture may be used to achieve better skin alignment, especially at the IMF. I tend to leave a small amount of redundant skin at the IMF to provide extra tissue in case secondary closure is needed from wound healing issues. This also provides a small degree of extra lower pole fullness. When fully healed, the extra tissue may be excised in the office if not needed.

If skin flaps are well vascularized, which may be determined by obtaining bright red blood with a prick, I deepithelialize and place the areola as a skin graft. Where the nipple was removed from the center of the areola skin, I use a purse-string suture to close and give some semblance of a slightly projected nipple. I hold it in place with bolster dressing.

POSTOPERATIVE CARE

I use skin glue along the incisions and cover the drains with bio patches and Tegaderm dressing. A well-padded bra with gauze rolls laterally for compression is worn for 3 weeks. The patient may shower after 48 hours. I remove the drains when there is less than 20 ml of drainage in 24 hours.

COMPLICATIONS

Complications are similar to those seen with other breast reconstruction techniques, including hematoma, seroma, infection, and skin flap necrosis. Hematomas are an emergency and require immediate surgical drainage. Seromas are less likely with complete autologous coverage. If they develop, they need to be aspirated and treated with compression. If there is concern for a deep seroma near the implant, ultrasound-guided drainage may be used. Recurrence may be treated by placing a seroma catheter, and some have advocated using sclerosing agents (such as doxycycline). For larger or chronic seromas, I prefer surgical exploration. If the fluid is clear and the result of a stat gram stain is negative, I tend to debride, wash out, and place a new drain. If the gram stain result is positive, and/or if the fluid is purulent, I perform a thorough debridement with device removal.

Infections are first treated with a course of oral antibiotics for 24 to 48 hours. If the erythema does not improve or more constitutional symptoms develop, the patient needs to be admitted for IV antibiotics and a consultation with an infectious-disease doctor. If IV antibiotics fail to improve the condition within 48 hours, or if the patient's condition worsens through lab values (WBC, CRP, ESR) or vital signs, then surgical exploration, debridement, and washout are warranted, most likely with implant removal.

Mastectomy skin flap necrosis is a dreaded complication that may not present for days after the procedure. Any significant compromise of the skin flaps noted during the procedure should lead to a delayed reconstruction. For threatened post-surgical flaps, I prescribe hyperbaric oxygen therapy, typically twice a day. Improvement is usually seen within 24 hours of therapy commencement. The advantage of an autoderm flap and complete muscular device coverage is that even if all mastectomy skin is lost, the device is still covered by another layer of well-vascularized tissue. I have also found that leaving all the dermis rather than removing the vertical portion provides

yet another protective layer. It has especially improved my T-junction healing rates.

OTHER CONSIDERATIONS

Simultaneous Areola Reconstruction

To perform a true one-stage breast reconstruction, the nipple-areola complex needs to be completed. Women with smaller breasts and small cancers may be offered nipple-sparing mastectomies to accomplish this. However, severe mammary hypertrophy may not allow it, based on blood supply and other anatomic issues. In these women, the areola may be placed as a skin graft, as previously described.

Symmetry Procedures

Another advantage of this procedure is the opportunity to perform a contralateral breast procedure in one stage for symmetry.

Complete Autoderm Flap Coverage

As the nuances of this procedure become better understood by studying long-term results, it will continue to be refined. The ultimate goal is to establish the measurements needed to perform complete autoderm flap coverage without raising the pectoralis major and guaranteeing a tension-free skin closure.

PATIENT EXAMPLES

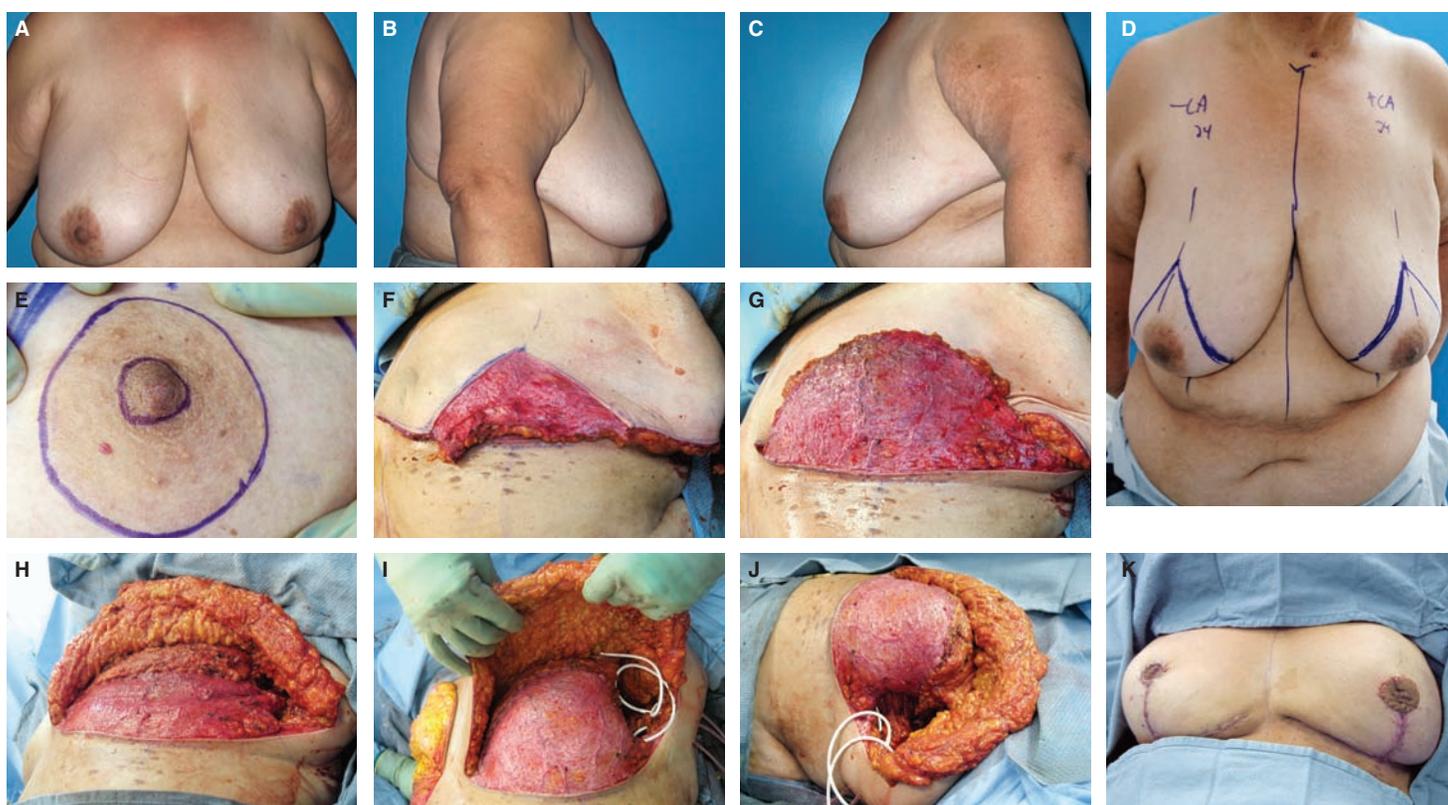


Fig. 1 A-K

This woman presented with invasive cancer of the left breast; the right breast was cancer free (Fig. 1, A through C). The skin was marked preoperatively (Fig. 1, D). The areola was marked for skin graft and nipple removal with a mastectomy specimen (Fig. 1, E). The superior flap was deepithelialized with the dermis left intact (Fig. 1, F). The autoderm (inferior) flap was created (Fig. 1, G). The inferior autoderm flap was attached to the inferior border of the pectoralis major muscle (Fig. 1, H). The implant was completely covered with vascularized tissue (Fig. 1, I and J). From the left breast a 1221 g specimen was removed. A 600 cc, silicone smooth round high-profile implant was inserted, and an areola skin graft was placed. The right breast was reduced by removing a 436 g specimen. Immediately postoperatively the areola skin graft can be seen on the left, with a matching reduction on the right (Fig. 1, K).

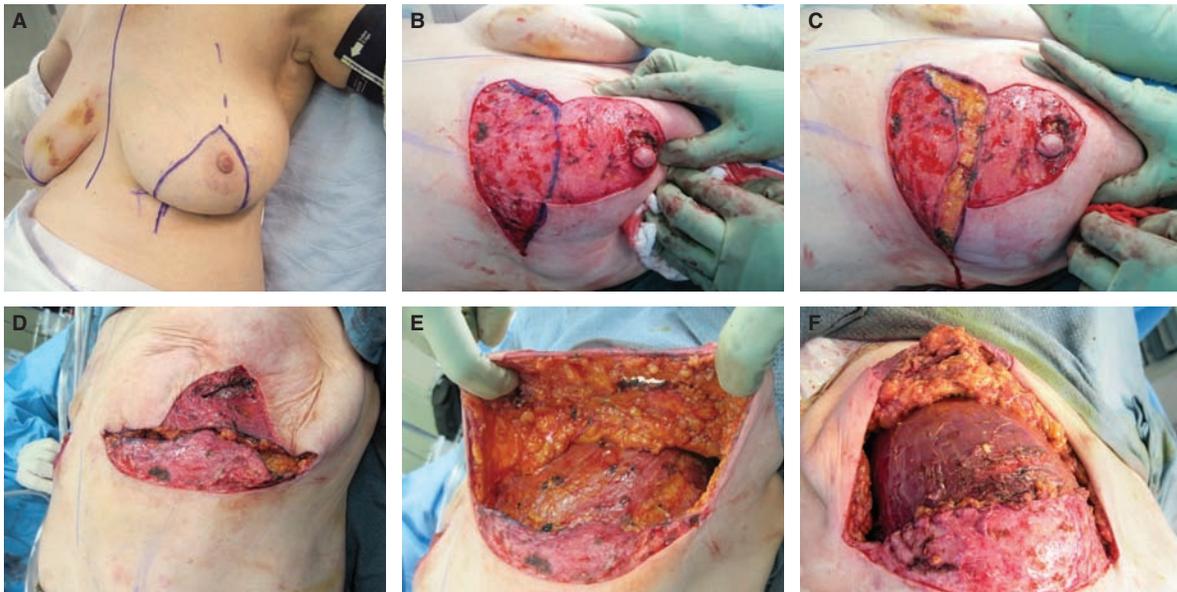


Fig. 2 A-F

This woman presented with multicentric invasive and ductal carcinoma in situ (DCIS) of the right breast. She had a right mastectomy and a prophylactic mastectomy on the left side. Preoperatively she was a C-cup size. The patient was marked preoperatively (Fig. 2, A). The flap was deepthelialized (Fig. 2, B) and a horizontal incision was made for the mastectomy and nipple incision (Fig. 2, C). From the right breast 561 g of tissue was removed and 728 g from the left breast (Fig. 2, D). After mastectomy, 350 cc smooth round high profile silicone implants were placed. The autoderma flap was attached to the inferior border of the pectoralis major muscle to completely cover the implant (Fig. 2, E). The implant was covered (Fig. 2, F).

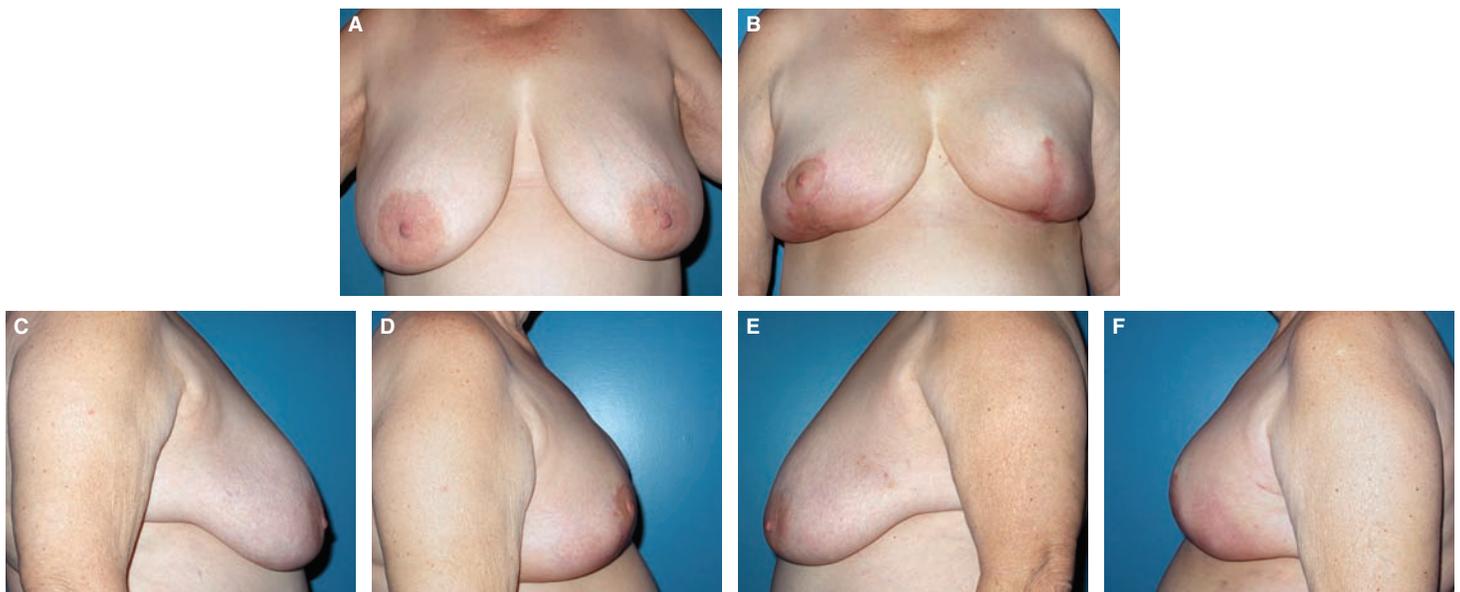


Fig. 3 A-F

This patient is shown before and after surgery for invasive breast cancer of the left breast. There was no cancer in the right breast, and her preoperative cup size was DD. A specimen of 1009 g was removed from the left breast, and a 500 cc silicone smooth round moderate plus implant was placed. The right breast was reduced by 290 g. The results are shown at 3 months postoperatively (Fig. 3, A through F).

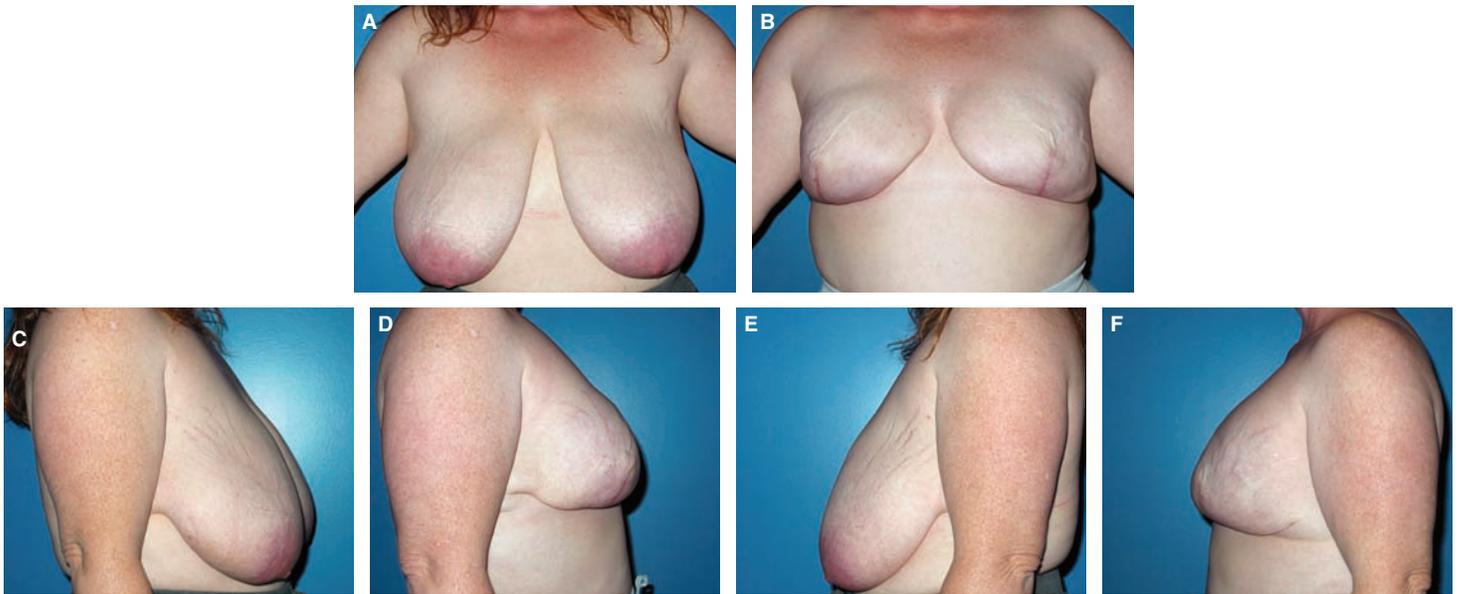


Fig. 4 A-F

This patient is shown before and after surgery for invasive breast cancer of the right breast. The left breast underwent prophylactic treatment. Her preoperative cup size was DDDD. A specimen of 956 g was removed from her left breast, and a 600 cc silicone smooth round high-profile implant was placed. A specimen of 1108 g was removed from the right breast, and a 600 cc silicone smooth round high-profile implant was placed. She is shown 2 months postoperatively (Fig. 4, A through F).

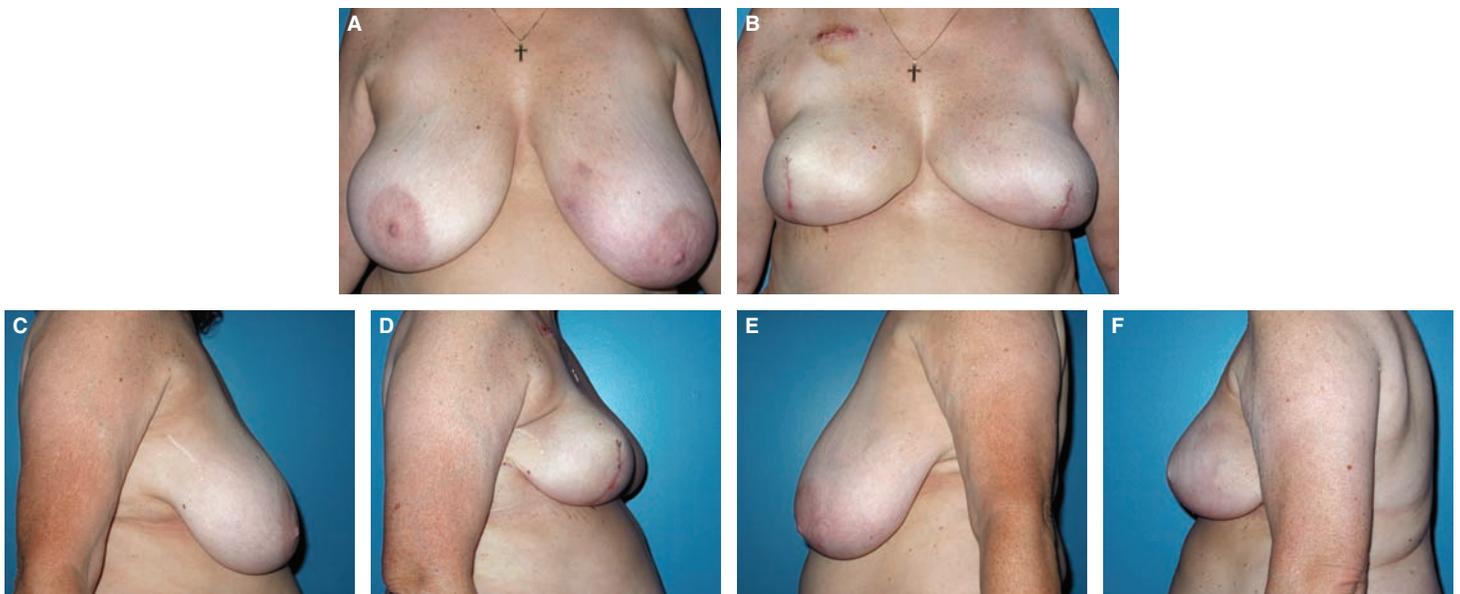


Fig. 5 A-F

This patient is shown before and after surgery for cancer of the left breast. She had a history of lumpectomy and radiation therapy in her right breast. Her preoperative cup size was 40 DD. A specimen of 1215 g was removed from the left breast, and one of 1092 g was removed from the right. Silicone smooth round high-profile implants of 550 cc were placed in each breast. She is shown 2 months postoperatively (Fig. 5, A through F).

CONCLUSION

Single-stage breast reconstruction with a Wise pattern and inferior dermal flap (autoderm) for severe mammary hypertrophy blends many of the guiding principles of plastic surgery from blood supply, spare parts, lifeboats, and aesthetics as well as relevant topics for healthcare today, such as economics. Single-stage aesthetically based and reconstructive procedures with well-vascularized flaps for complete device coverage has added to the breast reconstructive armamentarium.

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PICAS: 46p6 wide by 30P deep
OR
INCHES: 7.75 wide by 5