



Complications in breast augmentation: maximizing patient outcomes with some surgical solutions to common problems

Bradley P. Bengtson

Key points

- We learn most from complications and our difficult revision patients.
- The key to maximizing patient outcomes and developing best practices is through refining the process of breast augmentation and minimizing complications.
- Common major complications of breast augmentations will be presented, along with some techniques for surgical revision.
- Specific techniques are discussed for capsular contracture, fold malposition, symmastia.
- Extrusion/potential infection will be presented.
- Capsular flap and neopocket techniques will be described in augmentation revision patients for malposition including the inframammary fold and symmastia.



Introduction

Learn from the mistakes of others.

You will never live long enough to make them all yourself

Sam Levenson

It has been said, 'If you do not have any complications, then you are not performing enough surgery.' Complications and revision surgery are inevitable. Although our goal for surgical revisions should be zero and 'perfection', every plastic surgeon even a month into practice understands this goal is unattainable. One of my surgical mottos is: Pursue perfection, but accept excellence. Breast augmentation by its nature is elective and, because implants will not last forever, every patient we augment will require a breast revision surgery. The key to minimizing patient complications, maximizing patient outcomes and enhancing our surgical lives is to constantly pursue and improve the process of breast augmentation, determine which complications we can actually impact and lower, and then choose to make the necessary changes in our practices to achieve these goals. I am the first to recognize that changing the way we practice is difficult. Many studies have shown that once a physician develops a routine for more than 5–7 years, few will change. Hopefully, after reviewing this brief chapter you will be challenged to look specifically how you are performing breast augmentation and as necessary adapt and change your approach to avoid the complication versus just viewing this chapter as correcting or enhancing a complication once it occurs.

As surgeons, unless we document, follow, photograph, are self-critical and objectively measure our patients and outcomes, we will underestimate our complications and overestimate the number of procedures we perform, and quite frankly the quality of our results. The turning point for me was beginning the Style 410 cohesive gel implant study. Being involved in an FDA, CRO reviewed, highly scrutinized new implant study brings with it immediate accountability. I would encourage each surgeon reading this text to make a conscious commitment to begin today to start a patient database (sample format included) tracking all of their breast augmentation patients and their outcomes. Once you make this choice and begin following your patients in this way, then can begin the positive patient cycle shown in Tables 18.1 and 18.2. So where

Table 18.1 Reporting outcomes data

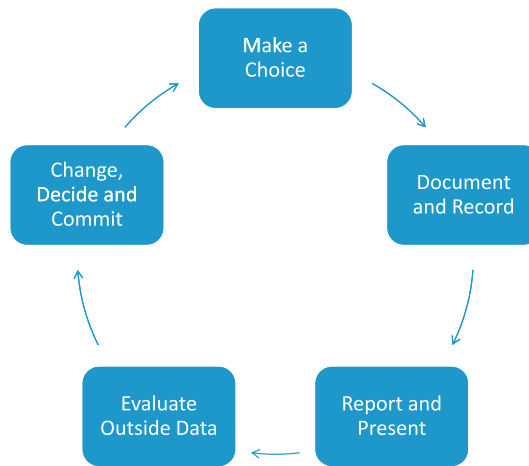
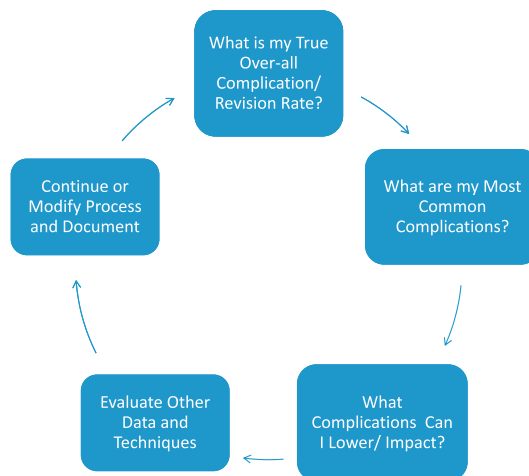


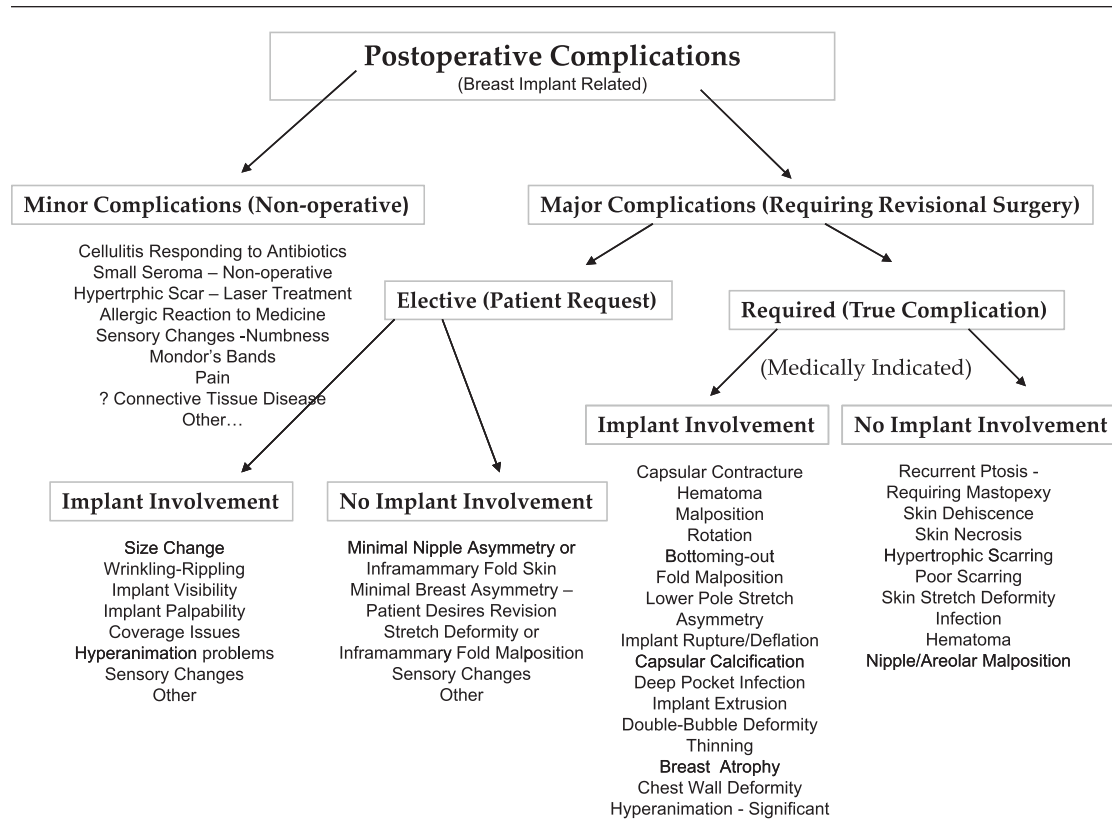
Table 18.2 So where is this going?



is this all going? We need to understand that breast augmentation is a process and that equally important as a refined meticulous surgical technique is pre-operative patient assessment and education, implant selection and tissue based planning, and defined post-operative follow-up. We should constantly review our ever-advancing science and technique, evaluate data and documented experiences and constantly move toward 'excellence'. It is with this background and approach that I have prepared this chapter.

Complications may be presented in many different formats and ways. By their nature, they are difficult to

Table 18.3



categorize with many patients having multiple problems such as malposition, thinning of overlying tissues, palpable and visible wrinkling and rippling simultaneously. We must also be careful not to create a new problem while we are correcting another, such as creating a fold malposition while correcting a capsular contracture. Shown here in Table 18.3 is one method. It has been modified since its initial publication (Bengtson 2005) and is not perfect but helps to show the most common complications in breast implant surgery. It also is not an excuse or an attempt to minimize a complication. All complications are not however equal in significance, and stratification is helpful in sorting both importance and frequency.

By adopting a standardized approach to the process of breast augmentation, complications may not be eliminated but untoward events and revisions can be minimized. We should also improve over time. I will be presenting a few of the most common complications in breast augmentation revision, suggest ways to

minimize or prevent their occurrence, and describe some current approaches and techniques to correct, improve or enhance a specific complication and include specific patient case studies and outcomes.

Specific complications and background

Capsular contracture

Actual techniques in treating patients with capsular contracture depend upon multiple factors. Some of these include: the style and generation of the device, the position of the current implant pocket, if any complications occurred at the primary operation, the degree of glandular atrophy and coverage over the implant, any calcification of the capsule, prior size, manufacturer and surface of the implant, to name a few. If you did not perform the prior operation(s),

obtaining the prior operative note and medical record is important along with weighing and assessing the implant intraoperatively. Saline implants not only have greater projection and radial diameter when inflated, they also weigh more. The shell of the implant has weight and adds 7–15% to the final weight of the device. Saline devices are filled at surgery, the shell has weight, and saline is more dense than gel. Silicone gel devices are pre-filled and their mL or weight includes the shell.

Options for revision in a patient with a capsular contraction have been well delineated. BASPI and additional options include: capsulotomy only, capsulectomy—partial or complete, capsular flap or neopocket with collapse of the capsule placing the new implant on top of the prior capsule, changing pocket planes, usually subglandular to partial subpectoral or dual-plane, and more recently adding a soft tissue matrix such as Alloderm or Strattice. It should also be mentioned that implant removal with or without capsulectomy may be performed without replacement. This is always an outpatient. The true etiology of capsular contracture is unknown; however the most common theories include a low-grade bacteria: bacterial theory and the hypertrophic scar theory secondary to blood, fluid or tissue trauma. It is likely that one or both play a role in each individual patient. Because the exact etiology is unknown, similar to deep vein thrombosis, I recommend doing everything possible to lower the incidence of capsular contracture or prevent it. In addition, technical points to maximize success and limit recurrence include: meticulous hemostasis and atraumatic technique, use of surgical drains with any capsulectomy, antibiotic irrigation such as the Adam's solution, perioperative antibiotics, and the use of op-site or tegaderm over the nipple. If implant rupture is suspected placement of a protective barrier drape over the entire incision area and chest/breast region will limit contamination and silicone skin contact (Figure 18.1).

Further background

The most common patient presentations include a subglandular capsular contraction where a position change is performed following capsulectomy and implant removal or a patient with a prior partial submuscular implant that has developed a capsular con-

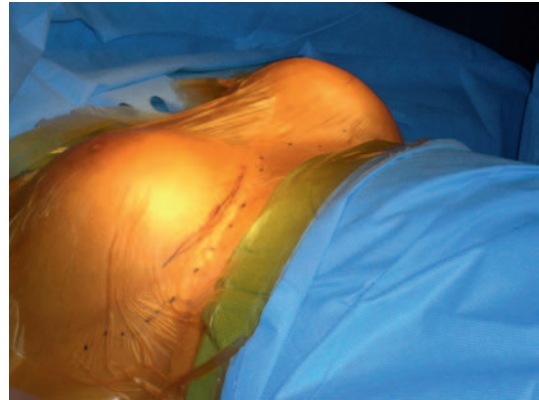


Figure 18.1 In cases of suspected implant rupture, a large op site dressing may be placed over the operative field including well below the incision to prevent contamination and skin–silicone contact. It also has the added benefit of decreasing contamination with coverage of the nipple.

tracture. Patient examples of each of these scenarios will be presented.

Capsular contraction

- Baker IV capsular contracture and an early generation silicone device placed in the subglandular position with visible distortion and asymmetry.
- Proper pre-operative informed consent including management of patient expectations and implant range and patient asymmetry information documented.
- Patient goals and desires are discussed and factored.
- Tissue based planning is performed and documented taking into consideration the measurements including the base width of the breast (BW), skin stretch (SS) or breast elasticity, sternal notch to nipple distances (SN-N), nipple to inframammary fold distances (N-IMF), contribution of the breast parenchyma. Assessment of the patient's chest wall and any breast ptosis and breast asymmetry are recorded.
- Surgical marking of the midline, IMF and pre-operative measurements are performed.
- Implant selection is confirmed.
- The new IMF incision is preferred and has been found to have the lowest complication rate and recurrent capsular contracture rate, although

periareolar may be used. The incision can be very accurately positioned directly in the IMF based on 'High Five', a selector device or other planning methods.

Operative technique for correction capsular contraction

- Large op-site dressing is applied to the entire field if implant rupture is suspected (Figure 18.1).
- A minimum of a 5 cm incision is made directly in the predetermined IMF.
- Pocket position is determined with partial submuscular prioritized for both soft tissue coverage and reduction of recurrent capsular contracture.
- New virgin pocket with heavily textured implant.
- Short acting anesthetics and muscle paralysis are used with multiple anti-nausea agents.
- In the case of a prior subglandular implant, if an older generation, thick or calcified, the entire capsule is removed including the implant preferably without capsulotomy (Figure 18.2). If a newer generation device is encountered, and thinning is present, the capsule against the muscle may be removed and anterior capsule left intact. This is dramatically facilitated with a double handle retractor, spatula retractor, lighted retractor, suction and consideration for tumescent fluid (Figure 18.3).
- In the case of a prior submuscular implant, a neopocket with capsular flap is made or a capsulectomy, complete or partial, may be performed (Figure 18.4).
- Atraumatic and bloodless precise pocket dissection is performed with prospective hemostasis either with creation of a new submuscular pocket or a

Case 1

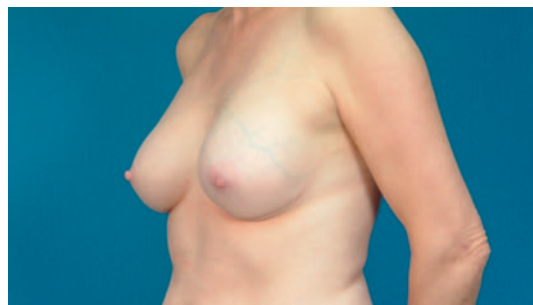


Figure 18.2 This patient had bilateral Baker IV capsules following a subglandular implant with 240 mL smooth silicone implants 16 years prior to surgery. Her tissue-based planning measurements included a 13 cm breast base width, 3 cm of skin stretch, 22 cm SN-N distance, and 8.5 cm N-IMF distances. Style 410 FM 350 g implants were placed in the partial submuscular, dual-plane placement position with her result shown at 5 years with no recurrence of capsular contraction and implants in good position.



Figure 18.3 Instrumentation for breast augmentation revision cases is similar to primary cases. Spatula, retractor along with the double handle, lighted retractors and smoke evacuators are extremely helpful. 2-0 vicryl is used to set the IMF, 3-0 vicryl for a deep running closure and 4-0 monocryl for the subcuticular layer.

neopocket with a capsular flap method or capsulectomy.

- I prefer to begin the pocket dissection centrally proceeding laterally being careful not to over-dissect the lateral pocket, then defining the fold maintaining a fascial shelf when possible with prospective hemostasis with monopolar cautery coagulating the perforating vessels as they come in above the muscle insertions, then medial and high in the pocket.
- The muscle fibers, including false insertions on the ribs are dissected free with preservation of the sternal insertions.
- Hand-in-glove pocket dissection is performed for form stable implants. Lateral pocket dissection is implant independent but for smooth devices the superior or cranial pocket is developed to the second rib.

Case 2

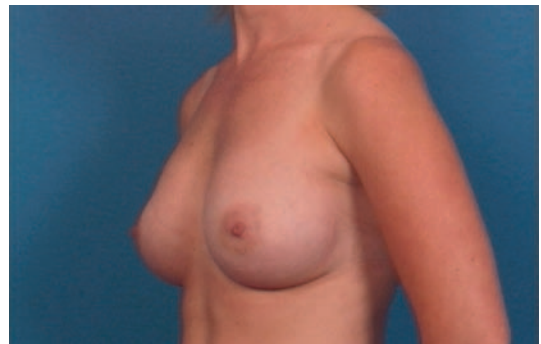
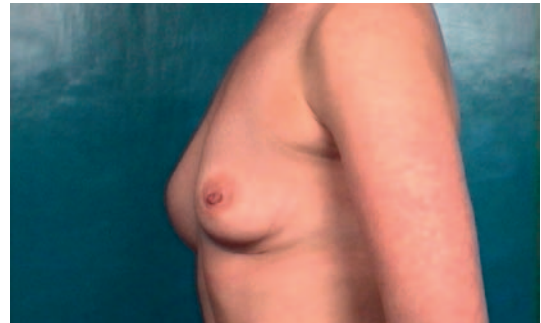


Figure 18.4 Implant deflation submuscular to submuscular with neopocket. This patient had a prior partial submuscular placement of 350 mL smooth saline implants 6 years prior to surgery. Her tissue based planning measurements included a 13.5 cm breast base width, 2 cm of skin stretch, 21 cm SN-N distance, and 9 cm N-IMF distances. Style 410 FM 440 g implants were placed back into a new partial submuscular, dual-plane placement position following a capsular flap, Neopocket procedure with her results shown at 30 months.

- Triple antibiotic irrigation using the Adam's solution (50 K units of bacitracin, 1 g of cefazolin and 80 mg of gentamicin in 250–500 mL physiological saline).
- No touch handling and placement of the implant is used with the surgeon touching the implant only and dipping his/her finger in antibiotic solution if pocket is re-entered including a glove change just prior to implant placement. Consideration for an insertion sleeve, particularly with textured devices (Figure 18.5).
- I like to put the implant in the first web-space of my left hand with constant pressure against the incision and spin the implant in with alternating index and thumb pressure versus a rocking back and forth from side to side motion.
- The patient is sat up at 90 degrees and symmetry checked. No blunt dissection with all additional pocket manipulation under direct vision with cautery and retractors.
- Closure is performed in multiple layers. I use a 2-0 vicryl to set or redefine the fold (Figure 18.6) followed by a 3-0 vicryl running suture to approximate the fascia and deep dermis followed by 4-0 monocryl running subcuticular closure.
- Particular attention is paid to the subcuticular closure medially and laterally to avoid a dehiscence and revision and the running suture approximates the incision completely.
- SteriStrips, Dermabond® or a silicone sheet bandage is applied.
- Drains should be considered mandatory for any patient having a capsulectomy.
- No straps or bands are used and bras are optional. The surgeon should not rely on any external forces to try to correct a pocket malposition but may be used for support. If used, the bra should be loose at the fold and not pulling the breast up with push up bras.



Figure 18.5 Insertion sleeve. A temporary plastic insertion sleeve is particularly useful when inserting heavily textured implants. I cut the sleeve in half and place antibiotic pocket irrigation fluid inside the pocket and sleeve. The assistant retracts and holds the twisted sleeve at the 6 o'clock position. After the implant is in position, fingers are inserted inside the sleeve lifting up the implant off the chest and the posterior or deep side of the sleeve is removed first followed by the anterior sleeve.

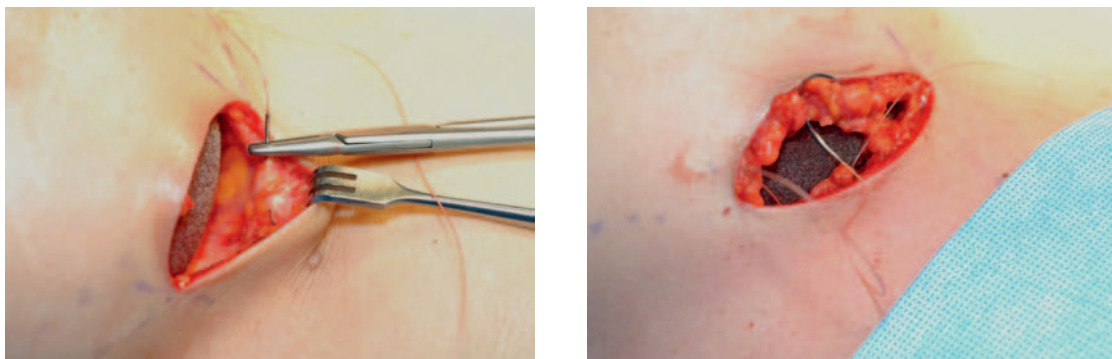


Figure 18.6 Fold reset. Securing of the inframammary fold position may be helpful in preventing malposition postoperatively. Keeping a fascial bridge medially, using a heavily textured implant facilitates maintaining position but even when using smooth devices the IMF may be further secured by placing a 2-0 vicryl suture in the chest wall and triangulating it to the superficial breast fascia. One or two sutures may be placed.

Complications in breast augmentation

- Fast track recovery program: full arm ROM beginning in recovery and immediate return to full normal routine activity, and dinner the night of surgery okay.

Operative steps reviewed

- Opsite™ if implant rupture suspected.
- Minimum 5 cm incision.
- Pocket position determined.
- Short acting anesthetics and muscle paralysis.
- Atraumatic, bloodless and precise pocket dissection.
- Intra-operative antibiotics and antibiotic pocket irrigation.
- No touch implant techniques—implant placement spun in.
- Confirm pocket and IMF symmetry—sitting position in OR.
- Multiple layer—complete closure.
- Bra optional but no push-up.
- Immediate range of motion (ROM).
- Fast track recovery program.

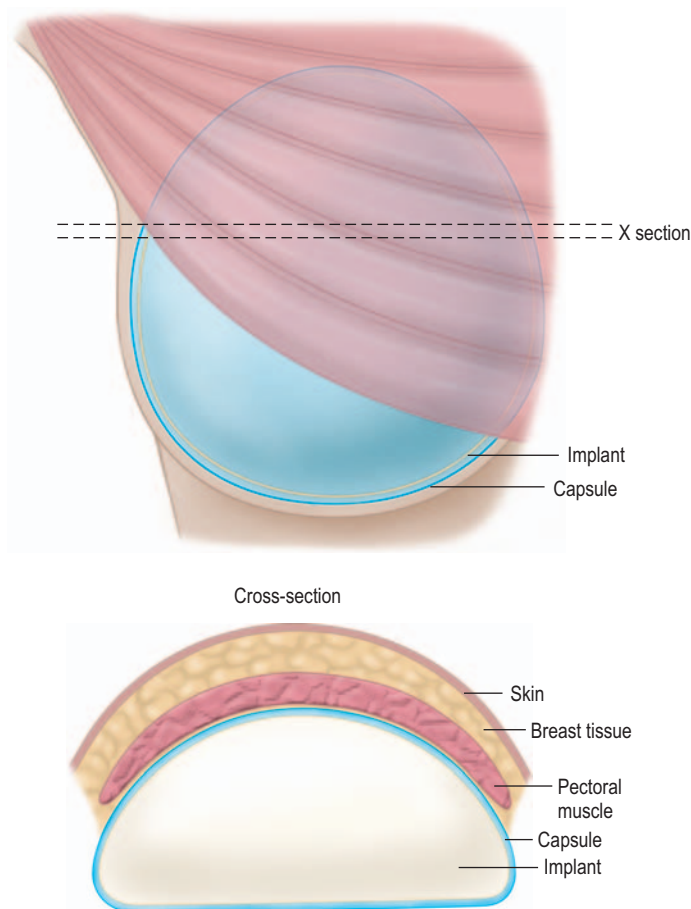


Figure 18.7 Capsular flap/neopocket procedure. The first description of the capsular flap is from Silver, presented at ASPS in Montreal in 1971. Its main application is where a prior implant already in the submuscular position is replaced back into the submuscular position, and it is particularly useful with heavily textured devices although it also works with smooth surface implants. Dissection is facilitated keeping the old implant in position and developing the plane between the anterior capsule and the pectoralis major. The old implant is then removed, capsule collapsed, trimmed and closed and the new implant is placed on top of the collapsed surface and back into the sub-pectoral space. The prior capsular space is shown where the previous smooth implant was present..

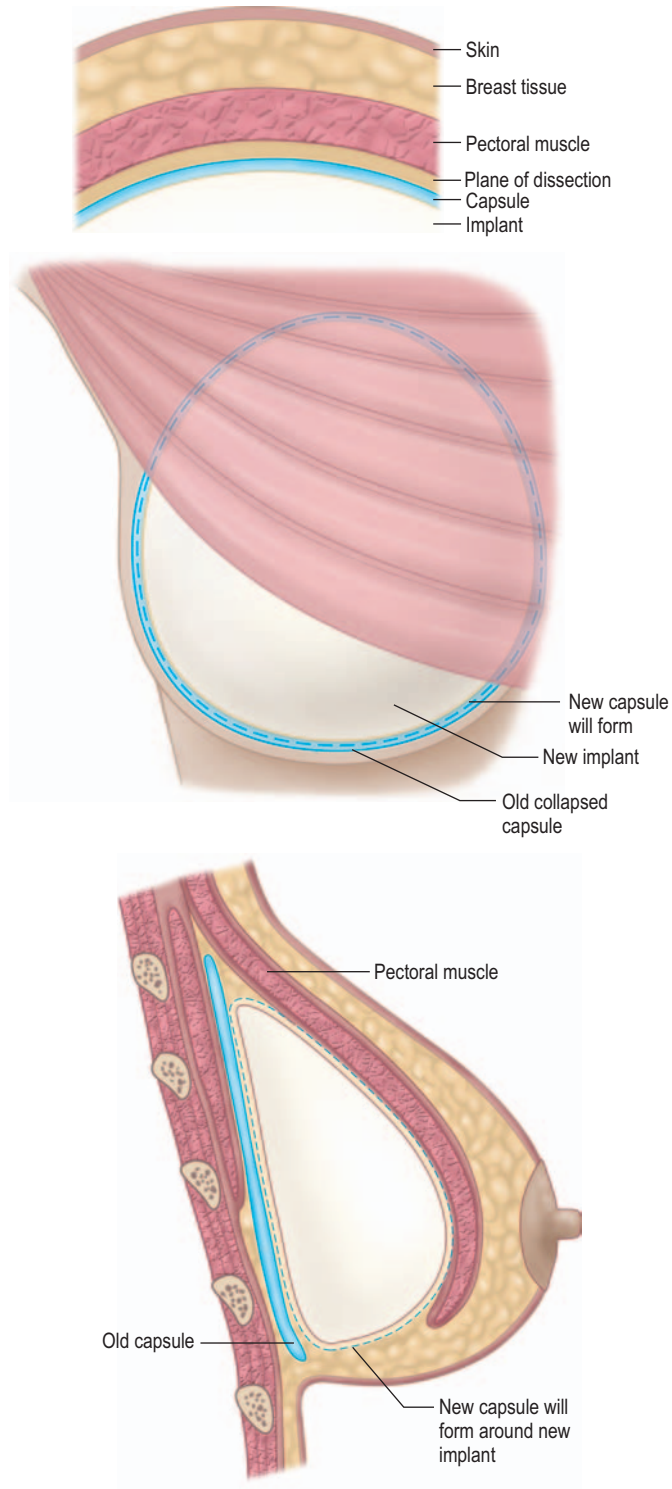


Figure 18.7 Continued.

Special technique: capsular flap neopocket procedure description

Utilization of capsular tissue in breast revision surgery is not a new concept. Both Silver in 1971 and Snyder in 1975 have described using the posterior capsule as an additional layer for breast augmentation revision. Per Heden in *Clinics of Plastic Surgery* in 2001 brought this technique back to the forefront noting that the new Style 410 cohesive gel implants require a brand new virgin pocket. Interestingly, in 1992 in a pig model we experimentally showed the rich vascularity of capsular tissue and showed it could support a skin graft. Clinically, we now have used this technique in over 200 patients for a variety of clinical situations including its original description for exposure of an implant and capsular contraction, as well as symmastia repair, malposition and areas of thinning and tissue weakness. I have found the posterior capsule useful but more unreliable centrally and more difficult to dissect. I prefer to use the anterior capsule layer if the patient's soft tissues are 2 cm thick, or at least 1 cm using the 410 device.

Capsular flap procedure

- The typical patient benefiting from this procedure has an implant in the partial subpectoral position and has a capsular contraction.
- It is useful with smooth devices and really mandatory when replacing with a heavily textured implant.
- A minimum 6 cm incision facilitates the dissection as does local infiltration or tumescent technique.
- Proper instrumentation is also critical with a double handled retractor, spatula retractor, Bovie extender, and smoke evacuator (Figure 18.3).
- The implant is left in place and a new plane is dissected on top of the anterior capsular surface and below the pectoralis.
- Care is taken not to over-dissect the pocket particularly when repairing a symmastia or malposition and placing a textured anatomical implant.
- Following dissection superiorly the medial and lateral pocket dimensions are defined.
- Capsulotomy at the base of the implant is performed and additional capsule trimmed and capsule closed on tension with a 3-0 vicryl to avoid sliding
- New implant is positioned with no touch technique following antibiotic pocket irrigation.

- A surgical drain is placed and closure performed in layers as previously described including a 2-0 vicryl setting of the inframammary fold.
- Still photographic images are shown (Figure 18.7).

Malposition

Implant malposition is the second most commonly reported complication in breast augmentation and thus revisional breast surgery. Malposition may be subdivided into:

1. Lateral malposition.
2. Fold malposition.
3. Lower pole stretch deformity / fold remaining intact.
4. Double bubble deformity/fold malposition or implant breast diameter mismatch.
5. Symmastia /loss of sternal muscle attachments.
6. A combination of these deformities.

Although not all, the vast majority of implant malpositions are preventable and may result from ignoring tissue based planning principles or not basing the implant selection on breast tissue assessment such as choosing an implant with too wide a base diameter, or over-projecting device based on the patient's soft tissue stretch. Malpositions may also result from a technical error with over-dissection of the lateral breast pocket or inframammary fold, or excessive release of the pectoralis muscles off of the sternum (symmastia). Patients should be informed that creating cleavage is not surgically recommended and informed about the consequences of symmastia with release of pectoralis major off of the sternum. Cleavage definition should be accomplished with bras or clothing. Additionally, malposition may occur when any device overpowers the breast soft tissues and their weight exceeds the internal support of the breast and soft tissues. This is extremely variable patient to patient, but the surgeon and the patient should accept that the larger and heavier the implant, the greater the likelihood of malposition. Other factors that affect malposition include genetics with poor skin tone, and degree of ptosis, and whether a concurrent mastopexy is performed; prior weight loss and pregnancies may all affect stretch deformities; however, many cases are preventable.

Another factor resulting in lower pole stretch and the degree of force being applied to the lower pole of the breast is implant style. Saline implants result in a

greater degree of lower pole stretch than gel devices. In addition, there is much less stretch to the lower pole with Style 410 highly cohesive gel implants. In my first 300 primary augmentation patients the average stretch with up to 6 year follow-up is 2 cm on stretch and 1 cm at rest. Likely, the main reason for this is the heavily textured devices' interface with the submuscular pocket capsule helping to hold the device up, resulting in less pressure on the base of the breast.

Further background

Malposition of the inframammary fold is one of the more common complications and may occur as an isolated event or with a myriad of other deformities including lateral malposition. Fold malposition in my experience and corroborated by the literature is more common when a breast augmentation is performed from a distant site such as a non-endoscopically controlled transaxillary approach. The incidence of fold malposition in my previous practice through the transaxillary route was 17%, which is one reason why I have converted to the new inframammary incision.

It is critical to distinguish between a patient with IMF malposition versus lower pole stretch, because the treatment and surgical correction is different, recognizing some patients may have both. If I performed the primary operation, I record the measurements from the nipple to the fold on stretch, set the IMF and place the incision directly in the fold. Thus, if the incision is consistent in position, but the N-IMF has increased in length then lower pole stretch has occurred. If however there is an increase in the N-IMF distance and the incision is riding up on the breast, resulting in implant show below the incision, fold malposition has occurred. One method of fold malposition correction is shown. If lower pole stretch has occurred I resect a quarter-moon shape in the lower pole in an attempt to standardize the nipple to fold distance bilaterally. If there is both a fold malposition and stretch component, I perform both simultaneously.

Operative technique for correction of IMF malposition

- Symmetric markings of the midline and IMF are performed in the sitting or standing position. This may be facilitated with a level.
- I prefer a minimum of a 6 cm incision in the inframammary fold. If a skin resection is planned secondary to stretch this is included in the design.
- Senn retractors are placed below the incision and the plane between the capsule and subcutaneous space is dissected with Bovie cautery to just below the capsular space that has displaced.
- All surgery performed with precise, defined prospective hemostasis with no blunt dissection.
- With the implant still in position, dissection is then carried out cranially or superiorly 2 cm if no tissue matrix support is planned or to the lower border of muscle if acellular dermis or other material is planned.
- Capsulotomy at the inferiormost portion of the capsule is performed along the entire IMF so all capsule has been removed from beneath the skin in the area of fold malposition.
- Permanent sutures, I prefer 2-0 Ethibond™, are then placed securing the skin to the chest wall leaving a 6–8 mm ridge everted to have an edge to suture to.
- Two additional 4-0 polypropylene sutures are placed in a horizontal mattress fashion through skin, then chest wall or rectus fascia and out again and tied at the end of the procedure without a bolster. These are removed at 1 week.
- Any additional implant exchange or other pocket procedures are performed.
- The pocket is then irrigated with Adam's solution with intraoperative antibiotics administered in surgery and antibiotics initiated 2 days pre-operatively.
- No touch technique is used as described previously and implant placed back into the pocket with symmetry confirmed in the sitting position.
- The inferior leading edge of the capsule is then trimmed as necessary or imbricated upon itself as an additional layer of support further holding the implant up in position.
- If an acellular dermal matrix or other support is utilized, it is sutured to the leading edge of the pectoralis muscle as an extension and then into the IMF moving from lateral to medial after being tacked into position.
- Drains are used with any soft tissue matrix or for any bleeding whatsoever.
- Closure is then performed in multiple layers with 3-0 vicryl in the deep fascia, 4-0 monocryl in the deep dermis followed by a 4-0 monocryl subcuticular suture.
- A loose bra is applied along with a single panel from an abdominal binder for support beneath the breast.

- No bouncing motion or impact aerobics for 6 weeks and no downward pressure on the breast.
- I have had no recurrences with this technique in over 20 patients with up to a 7 year follow-up.

Operative steps reviewed

- Minimum 6 cm incision in IMF.
- Atraumatic, bloodless and precise pocket dissection.
- Antibiotics 2 days preoperatively intra-operative antibiotics and pocket irrigation.
- No touch implant techniques.
- Capsulectomy beneath skin below IM fold.
- Skin sutured with permanent suture back down to chest wall.
- Horizontal mattress reinforcing sutures.
- Confirm pocket and IMF symmetry, sitting position in operating room.
- Capsular closure for further support at fold.
- Multiple layer–complete closure.
- Minimal to no overcorrection on the table.
- Supportive bra and single panel binder below breast.
- No stress to IMF for minimum of 6 weeks.

Case 3

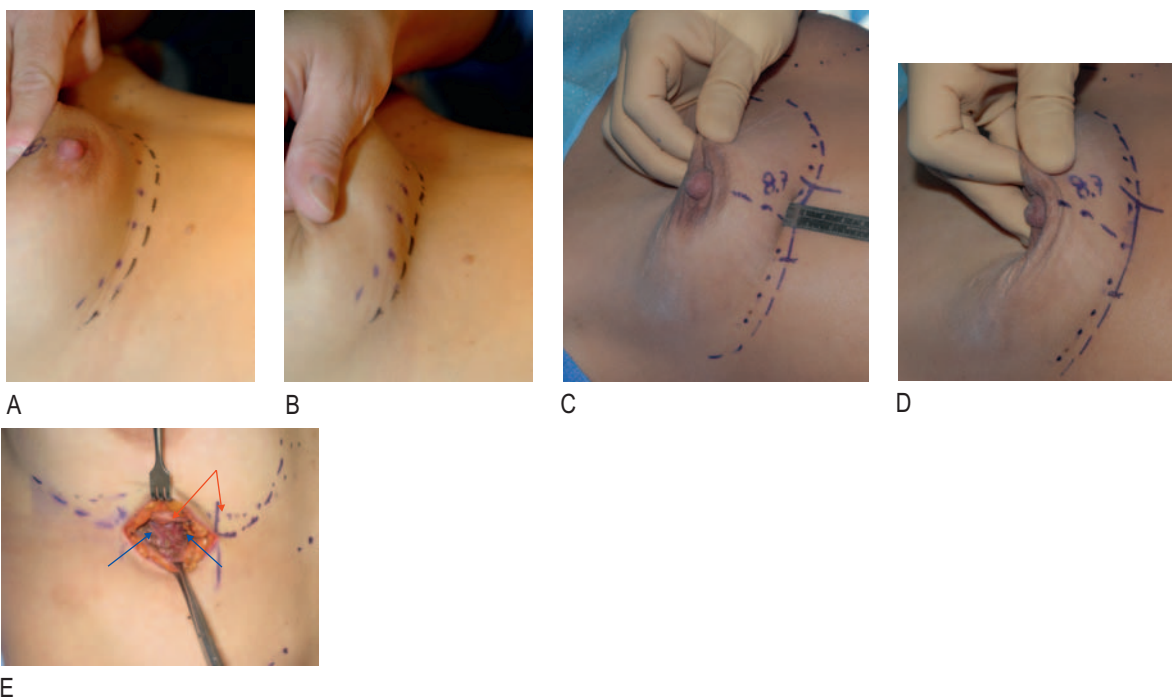


Figure 18.8 (A-D) Malpositioned IMF. There is a difference in the inframammary fold in the sitting/standing position and the actual fold anatomically as it inserts on the chest. Because of this anatomic difference, a breast implant may be lower than the pre-operative fold as transmitted to the skin. This is also the reason why the transverse inframammary scar rides up in a tight breast reduction closure when present. Muntan and Nava and Acland's group have nice histologic descriptions that give insight as to how this may occur clinically. (E) The red arrow denotes superficial fascia of the breast that transmits to the sitting fold location additional red arrow. The blue arrows show the true inframammary fold and location of the base of the implant.

Case 4

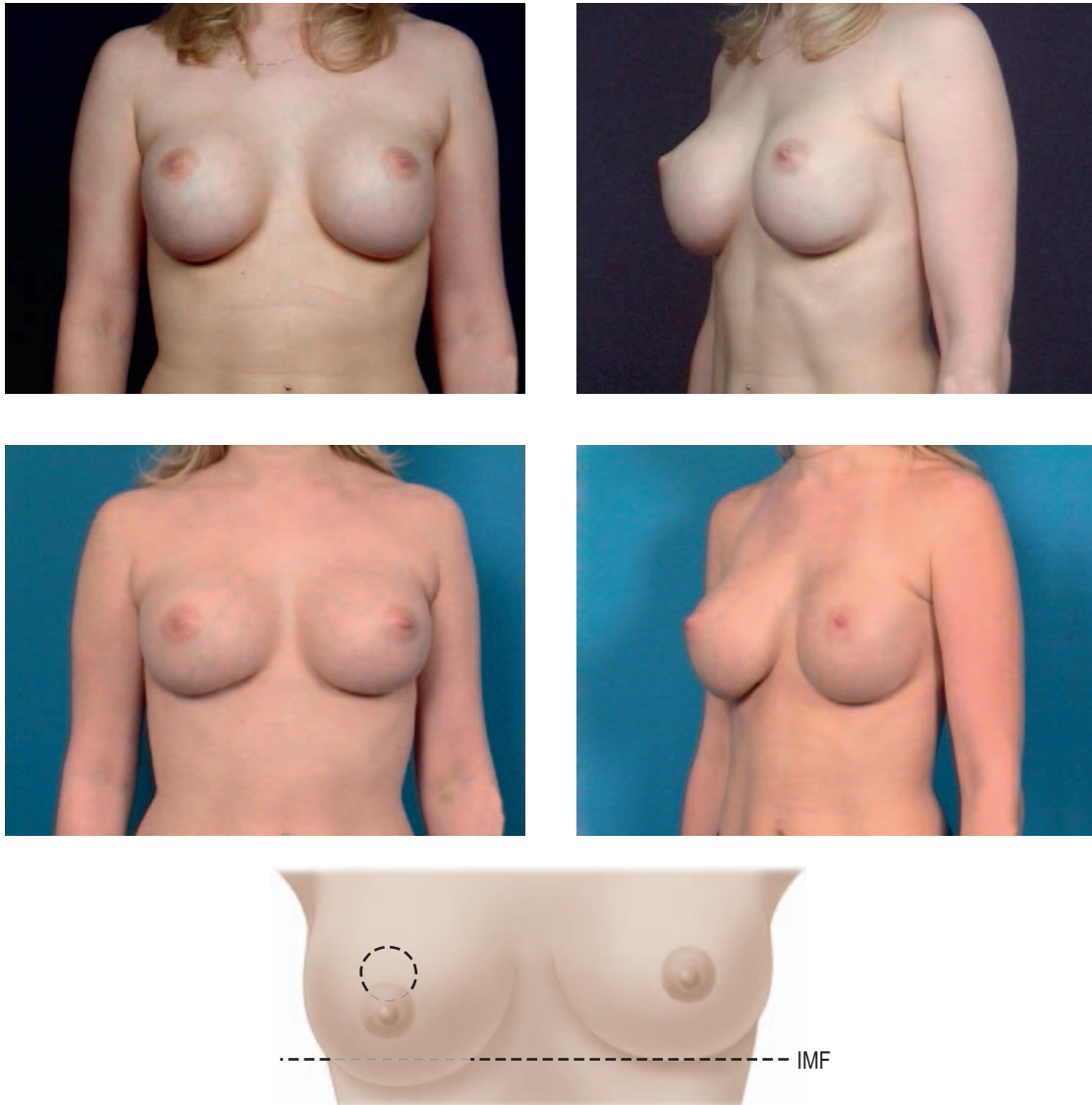


Figure 18.9 Malpositioned IMF. This patient had reconstruction of her IMF with the technique described. She had 390 mL smooth saline implants filled to 420 mL and when explanted secondary to the saline fill and shell weight equalled 450 g. Capsular flap was performed along with resection of the redundant capsule in the region below the fold with replacement and replacement utilizing a 397 mL Style 15 smooth silicone device. The fold was secured with 2-0 Ethibond® deep back down to the chest wall and further by horizontal mattress 4-0 polypropylene removed at 1 week. Her result is shown at 24 months.

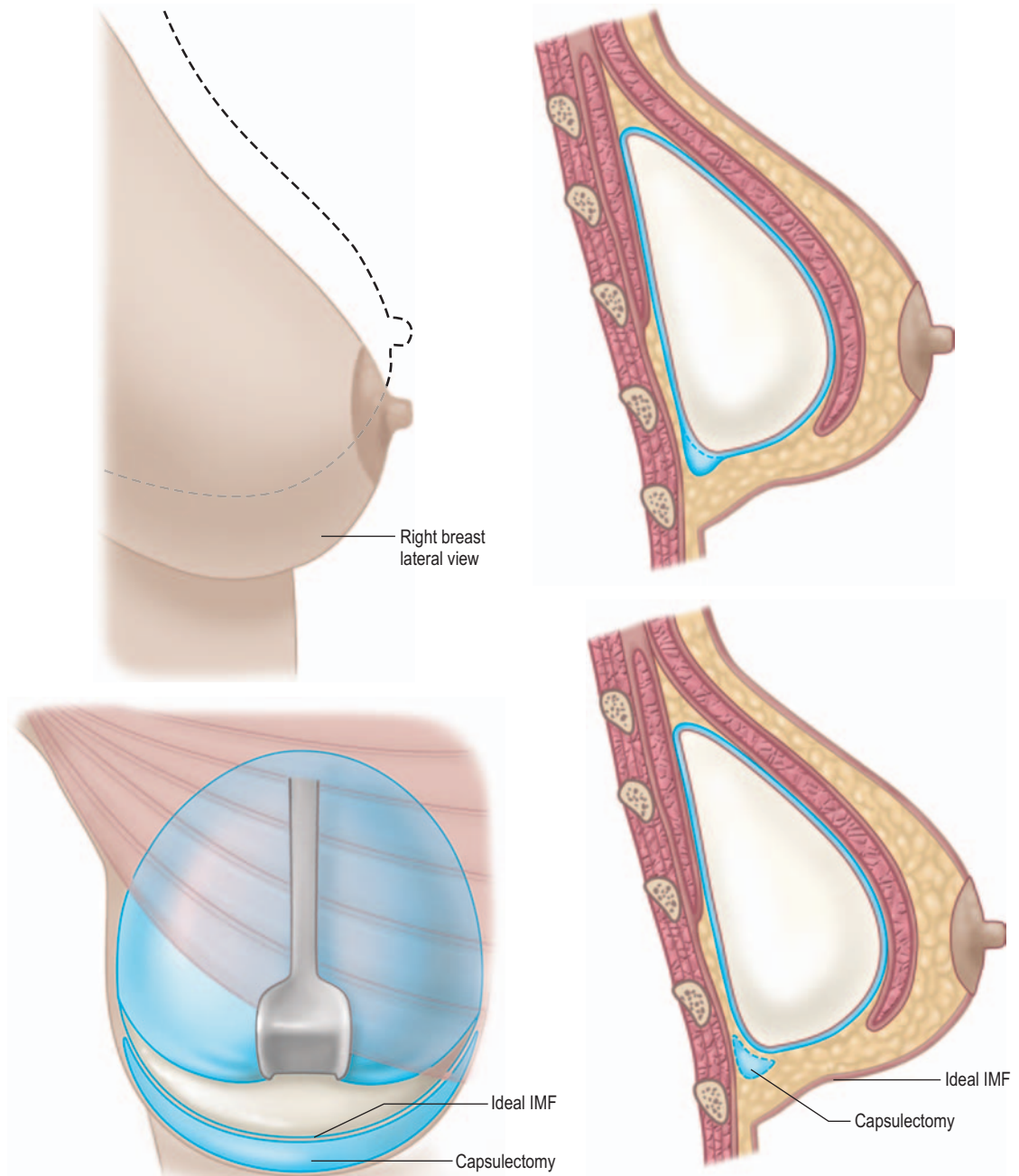


Figure 18.9 Continued.

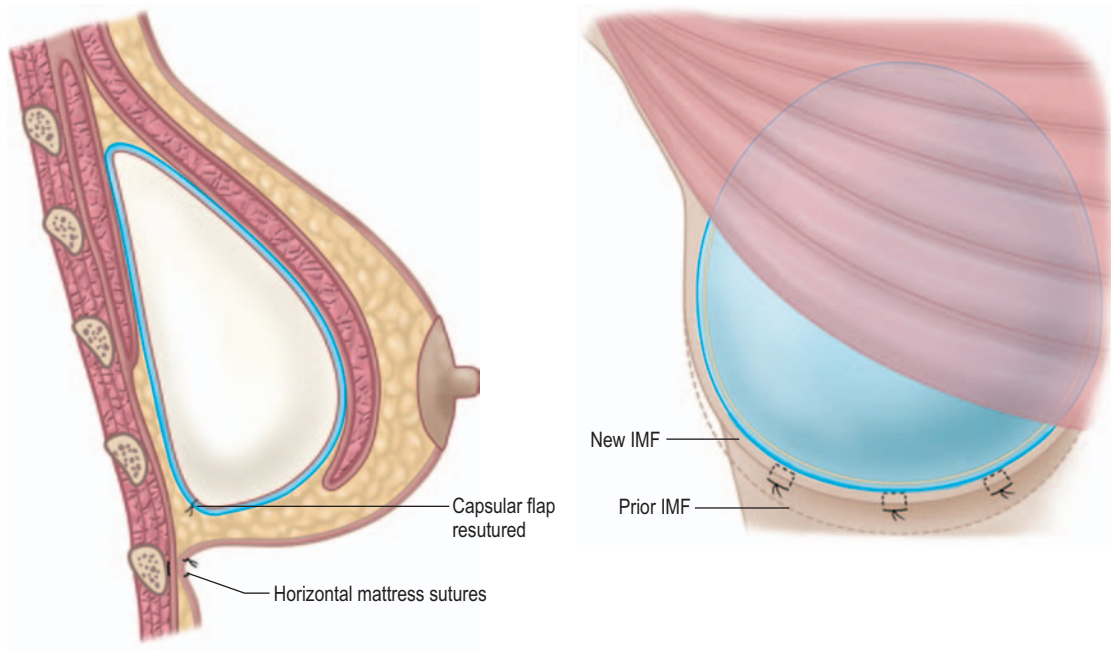


Figure 18.9 *Continued.*

Malposition symmastia

Symmastia fortunately occurs more infrequently than IMF or lateral malposition. This complex problem is a result of pectoralis muscle fibers being dissected off their sternal attachments. Although multiple stage reconstructions have been described, single stage revisions can be very effective. Correction is similar to IMF correction with suturing of the underlying capsule back down to the sternum, creation of a neopocket with a capsular flap and consideration for the reinforcement with a acellular dermal matrix.

Operative technique for symmastia correction

- General anesthesia is required.
- Pre-operative, intra-operative and post-operative antibiotics are utilized along with antibiotic pocket irrigation as previously described.
- A minimum of a 6 cm IMF incision is made or periareolar approach used.
- Capsular flap with a neopocket is made either elevating posterior capsule off the chest wall beginning 4–5 cm lateral to the desired medial implant position or if adequate anterior soft tissue coverage is indeed available (rare) a complete

neopocket as described above may be used. This is the desired approach and important (or total capsulectomy) if a textured shaped implant is used to avoid rotation.

- This also is an ideal indication for Strattice or other acellular dermal matrix to further reinforce the medial pocket and adding additional soft tissue coverage medially over the implant where visible wrinkling and rippling is a common concurrent problem.
- Suturing of the pre-sternal soft tissues back down to the chest wall may be performed for further reinforcement similar to a IMF repair if exposed.
- Drains are used and a multilayer closure is performed as described previously.

Operative steps reviewed

- Minimum 6 cm incision in IMF.
- Atraumatic, bloodless and precise pocket dissection.
- Antibiotics 2 days pre-operative, intra-operative antibiotics and antibiotic pocket irrigation.
- No touch implant techniques.
- Suturing of the soft tissues overlying the sternum may be helpful depending on capsular flap technique used.

- Skin may be sutured with permanent suture back down to chest wall but is not required.
- Consider additional soft tissue matrix support internally.
- Confirm pocket and IMF symmetry, sitting position in operating room.
- Final result achieved on the table. No over correction required.

Case 5



A



B

Figure 18.10 Malposition symmastia. This patient 3 years prior underwent submuscular placement of 300 mL smooth saline implants filled to 320 mL bilaterally and developed symmastia. Bilateral capsular flaps with neopockets were made and Style 410 FM 350 g implants were placed using the technique described with her post-operative result shown at 3 years.

Extrusion - infection

Background

Treatment of infections around a breast implant remains a controversial topic, although some recent studies have suggested retention of the implant except in the face of extensive purulence. Some articles included in the Further Reading section address this issue including BASPI. My surgical approach to this rare occurrence is similar to potential or near extrusion. If caught early with no Gram stain appearance of bacteria, debridement, irrigation, capsular flaps and or local muscle flaps may be effective without an interval time of explantation. With evidence of true bacterial contamination or frank purulence, I recommend an interval of explantation of a minimum of 3 months and preferably 6 months or longer.

Operative technique for near extrusion

- Patients are likely already on antibiotics. If they are not however a course is begun. In addition to peri-operative, and post-operative specific antibiotics, pocket irrigation is performed.
- Debridement of thinned damaged tissue preferably prior to actual exposure of the implant as soon as possible.
- Capsular flap elevation either the posterior capsule off of the chest wall, anterior turn down capsular flap, or both. Local muscle or fascial flaps particularly rectus abdominus muscle or fascia may also be utilized.
- Drains, implant placement with no touch techniques, and multiple layer closure as previously described is performed.

- Again, a soft tissue matrix for further support should be considered.

Operative steps reviewed

- Minimum 6 cm incision in IMF.
- Atraumatic, bloodless and precise pocket dissection.

- Antibiotics 2 days pre-operative, intra-operative antibiotics and antibiotic pocket irrigation.
- No touch implant techniques.
- Consider additional soft tissue matrix support.
- Confirm pocket and IMF symmetry—sitting position in operating room.

Case 6

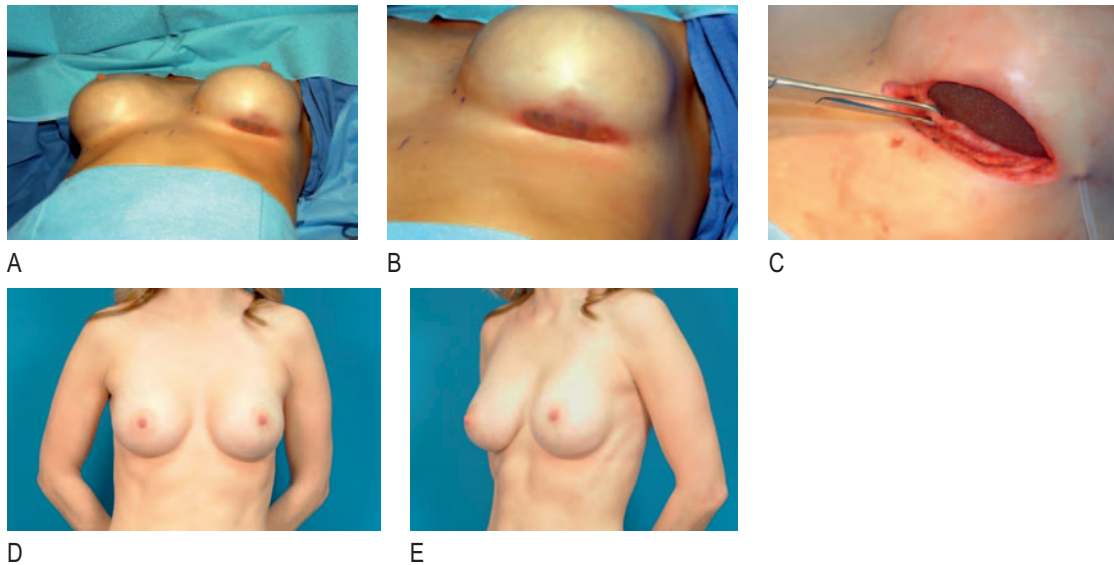


Figure 18.11 (A-C) Extrusion/infection. This patient had near extrusion following secondary augmentation revision with a Style 410 cohesive gel, 290 gm FF implant. She was immediately returned to surgery and the pocket was debrided and irrigated with antibiotic solution. The thin skin was resected and a posterior wall capsular flap was raised, a new implant placed and skin reapproximated over the capsular closure. She was kept on antibiotics for 2 weeks post-operatively and went on to heal primarily with no further skin breakdown, thinning, infection or capsular contracture. (D,E) Additional clinical photographs are shown at 1 year following revision.

Post-operative care

My post-operative care following revisional breast surgery is similar to primary augmentation except for activity instructions. I have patients resume normal routine activities within 48 hours, and provide detailed instructions for the first 6 weeks. It is vital that the post-operative instructions are seamlessly integrated into the pre-operative planning. In revision breast surgery, I limit vigorous physical activity for 6 weeks. Additionally, I have patients take an antibiotic for 1

week post-operatively and they typically are managing surgical drains. Because the etiology of capsular contracture is likely multifactorial and uncertain, I do everything I know of that may lower its incidence: electrocautery dissection, meticulous hemostasis and use of drains to minimize and limit blood and fluid collection, along with pocket antibiotic irrigation to decrease any bacterial load. In capsular contraction revision patients with smooth devices, I instruct on vertical implant displacement exercises twice daily for

30 s each compressing the breast up in the pocket and pushing medially. For highly cohesive implant patients, no implant massage is performed. For IMF and symmastia revisions and prior extrusion patients, I do not have them stress their repairs with any pressure.

The future of surgery

The future for breast augmentation is exciting. There is an initiative underway to improve the process of breast augmentation at all levels from pre-operative patient evaluation, education and informed consent to tissue based planning and implant selection to refining of surgical techniques and defined post-operative care. Advancing through this process, complications will decrease, patient experiences, results and satisfaction will increase and most importantly patients will benefit. In addition, breast implant technology continues to evolve and improve, and new materials such as acellular dermal matrices, techniques, procedures, and

instrumentation continue to progress. The future is bright, but our main focus should remain on reducing complications versus developing new technology and procedures to treat them.

Conclusion

Breast augmentation complications and revision breast surgery continue to be a challenge in plastic surgery with revision and reoperation rates remaining 15–30%. Change can indeed occur and rates dramatically decreased by advancing the entire process of breast augmentation, naming, claiming, recording and tracking our results and choosing to alter our approaches based on accurate outcomes data. Patients and surgeon will benefit directly. The best way to deal with a complication is to do what we can to completely avoid them in the first place. In the meantime, presented are some surgical solutions and methodology for correction of some very difficult problems. I hope they add to your armamentarium.

Further reading

- Adams WP. The process of breast augmentation: four sequential steps to optimizing outcomes for patients. *Plast Reconstr Surg* 2008; in press.
- Adams WP, Bengtson BP, Glicksman C et al. Decision and management algorithms to address patient and food and drug administration concerns regarding breast augmentation and implants. *Plast Reconstr Surg* 2004;114:1252–1257.
- Adams WP, Rios JL, Smith SJ. Enhancing patient outcomes in aesthetic and reconstructive breast surgery using triple antibiotic breast irrigation: six-year prospective clinical study. *Advances in breast augmentation*. *Plast Reconstr Surg* 2006;118(7Suppl):46S–52S.
- Adams WP, Teitelbaum S, Bengtson BP, et al. Breast Augmentation Roundtable. *Advances in breast augmentation*. *Plast Reconstr Surg* 2006; 118(7Suppl):175S–187S.
- Bengtson BP. Four Year Experience with style 410 highly cohesive gel implant. Presented at the American Association of Aesthetic Plastic Surgery Meeting, New Orleans, 2005.
- Brown MH, Shenker R, Silver S. Cohesive silicone gel breast implants in aesthetic and reconstructive breast surgery. *Plast Reconstr Surg* 2005;116:768–779.
- Burkhardt BR, Dempsey PD, Schnur PL et al. Capsular contracture: A prospective study of the effect of local antibacterial agents. *Plast Reconstr Surg* 1986;77:919.
- Handel N, Cordray T, Guitierrez J. Long-term study of outcomes, complications, and patient satisfaction with breast implants. *Plast Reconstr Surg* 2006;117: 757–767.
- Inamed directions for use and Inamed Corp. Silicone gel and saline implant PMA clinical trials. Available at: <http://www.fda.gov/cdrh/breastimplants/index.html>.
- Nava M, Quattrone P, Riggio E. Focus on the breast fascial system: a new approach for inframammary fold reconstruction. *Plast Reconstr Surg* 1998;102: 1034–1045.
- Mentor directions for use and mentor corp. Silicone gel and saline implant PMA clinical trials. <http://www.fda.gov/cdrh/breastimplants/index.html>.
- Muntan CD, Sundine MJ, Rink RD, Acland RD. Inframammary fold: a histologic reappraisal. *Plast Reconstr Surg* 2000;105:549–556.
- Rempel JH. Treatment of an exposed breast implant by a muscle flap and by fascia graft. *Ann Plast Surg* 1978;1:229.

- Spear SL, Bogue DP, Thomassen JM. Synmastia after breast augmentation. *Advances in breast augmentation. Plast Reconstr Surg* 2006;118(7Suppl):168S–171S.
- Spear SL, Bulan EJ, Venturi ML. Breast augmentation. *Advances in breast augmentation. Plast Reconstr Surg* 2006;118(7Suppl):188S–196S.
- Spear SL, Carter ME, Ganz JC. The correction of capsular contracture by conversion to 'dual-plane' positioning: technique and outcomes. *Advances in breast augmentation. Plast Reconstr Surg* 2006; 118(7Suppl):103S–113S.
- Spear S, Cunningham B. The breast implant safety supplement. *Plast Reconstr Surg* 2007; Dec.
- Spear SL, Howard MA, Boehmler JH et al. The infected or exposed breast implant: management and treatment strategies. *Plast Reconstr Surg* 2004;113:1634–1644.
- Tebbetts JB. Dual plane breast augmentation: optimizing implant soft tissue relationships in a wide range of breast types. *Plast Reconstr Surg* 2001;107:1255–1272.
- Tebbetts JB. A system for breast implant selection based on patient tissue characteristics and implant-soft tissue dynamics. *Plast Reconstr Surg* 2002;109:1396–1409.
- Tebbetts JB. 'Out points' criteria for breast implant removal without replacement and criteria to minimize reoperations following breast augmentation. *Plast Reconstr Surg* 2004;114:1258–1262.
- Tebbetts JB, Adams WP. Five critical decisions in breast augmentation using five measurements in 5 minutes: the high five decision support process. *Advances in breast augmentation. Plast Reconstr Surg* 2006;118(7Suppl):35S–45S.
- Wong CH, Samuel MM, Tan BK, et al. Capsular contracture in subglandular breast augmentation with textured versus smooth breast implants: a systematic review. *Plast Reconstr Surg* 2006;118:1224–1236.
- Wood S, Spear SL. What do women need to know and when do they need to know it? *Silicone Breast Implants: Outcomes and Safety Supplement, Plast Reconstr Surg* 2007;118(7Suppl):135S–139S.

