Secondary Breast Augmentation

Mitchell H. Brown, M.D., M.Ed.
Ron B. Somogyi, M.D., M.Sc.
Shagun Aggarwal, M.D., M.S.
Toronto, Ontario, Canada

Learning Objectives: After studying this article, the participant should be able to: 1. Assess common clinical problems in the secondary breast augmentation patient. 2. Describe a treatment plan to correct the most common complications of breast augmentation. 3. Provide surgical and nonsurgical options for managing complications of breast augmentation. 4. Decrease the incidence of future complications through accurate assessment, preoperative planning, and precise surgical technique.

Summary: Breast augmentation has been increasing steadily in popularity over the past three decades. Many of these patients present with secondary problems or complications following their primary breast augmentation. Two of the most common complications are capsular contracture and implant malposition. Familiarity and comfort with the assessment and management of these complications is necessary for all plastic surgeons. An up-to-date understanding of current devices and techniques may decrease the need to manage future complications from the current cohort of breast augmentation patients. (Plast. Reconstr. Surg. 138: 119e, 2016.)

Breast augmentation has consistently been one of the most commonly performed plastic surgery procedures. According to statistics from the American Society of Plastic Surgeons, more than 3 million breast implants have been inserted for primary augmentation in the United States since 2005.¹ As a result, there has been a steady increase in the number of reoperations or secondary breast implant procedures being performed. Implant outcome studies report reoperation rates in primary breast augmentation as high as 36 percent.²⁻¹⁰ Any surgeon who performs aesthetic or reconstructive breast surgery will need to become increasingly familiar with techniques to manage the secondary breast implant patient.

Multiple publications have described approaches to the breast augmentation patient designed to maximize outcomes and minimize the likelihood of complications and reoperations.¹¹⁻¹⁶ General principles focus on several pillars: patient selection,¹² patient education,¹³ preoperative planning and implant selection,¹² precise surgical technique, and a defined process for postoperative care.¹⁷ These principles highlight the fact that prevention of complications is the most effective way to reduce reoperation rates.

The causes for reoperation are multifactorial. Deviation from accepted principles will predispose the patient to avoidable complications. Examples include the selection of oversized implants, failure to optimize soft-tissue cover over the implant, traumatic pocket dissection with resultant blood in the periimplant space, excessive handling of the breast implant, and failure to maintain a strictly aseptic surgical environment. Some reoperations are inherently unavoidable and may relate to longitudinal patient factors such as pregnancy, weight fluctuations, or hormonal changes within the breast. Regardless of the cause, reoperations result in added risk to the patient. They are costly to both the patient and the surgical practice and, most important, it is never as easy as with the initial procedure to obtain an optimal surgical result.

Disclosure: The authors have no conflicts of interest to disclose.

From the Department of Surgery and the Division of Plastic and Reconstructive Surgery, University of Toronto; and North York General Hospital and Women’s College Hospital. Received for publication April 26, 2015; accepted February 22, 2016.

Copyright © 2016 by the American Society of Plastic Surgeons. DOI: 10.1097/PRS.0000000000002280
The most common indications for secondary surgery are size change, capsular contracture, implant malposition, and implant rupture. Ordering and incidence of each complication varies between different outcomes studies.\(^5,6,8,10\) (Reference 5 Level of Evidence: Therapeutic, II; Reference 6 Level of Evidence: Therapeutic, III; Reference 10 Level of Evidence: Therapeutic, IV). These may be classified into three categories (Table 1): (1) related to the surgical procedure, (2) related to soft-tissue changes, and (3) related to the implant. The presentation of the clinical problem may be quite variable. A thorough history is important. This may range from a single, well-documented primary procedure to a history that includes multiple operations, several surgeons, and poor documentation. Required information is listed in Table 2. Whenever possible, previous operative notes should be obtained. Physical examination is performed as with any aesthetic breast patient; however, particular attention must be paid to the location of previous scars and the volume, quality, and distribution of soft tissues. The chest wall, muscles, and breast tissue should be examined independently, looking for asymmetry and abnormalities that may have predisposed to complications such as malposition or rotation.

No matter how complex the clinical presentation, there are three options for treating the secondary implant patient. The first option is to do nothing. In the absence of an undiagnosed mass, implant rupture, or infection, there is no absolute indication for surgical intervention. Often, these patients have undergone several procedures. Any subsequent operations will include the potential for an adverse outcome, possibly necessitating yet another operation.

The second option is implant removal with or without soft-tissue modification. The only way to assure a patient that they will not require further surgery related to an implant is to remove the implant entirely. Explantation may be performed alone or combined with techniques such as mastopexy, lipofilling, or even reduction, in patients whose breasts have enlarged since their initial implant insertion (Fig. 1).

The third option is revision, performed with either a single-stage or a two-stage approach. There are multiple techniques for revising the unsatisfactory outcome in breast augmentation. An important principle is to avoid repeating previous procedures that failed. If a malposition recurred after a capsulorrhaphy, a different approach should be considered. If a contracture recurred after a capsulotomy without implant replacement, a more aggressive option would be indicated. It is best to do everything possible in the next procedure to definitively correct the patient’s problem. This may include implant replacement, addition of internal support devices, or the use of autogenous tissue. These women have undergone multiple operations, and everything should be done to try to make the next one the last. The remainder of this article focuses on two of the most common indications for revision surgery: capsular contracture and implant malposition. As a final caution, revision patients

---

**Table 1. Classification of Causes Resulting in Secondary Surgery**

<table>
<thead>
<tr>
<th>Related to the operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selection of incorrect procedure (implant versus mastopexy)</td>
</tr>
<tr>
<td>Suboptimal surgical instrumentation</td>
</tr>
<tr>
<td>Failure to optimize soft-tissue cover</td>
</tr>
<tr>
<td>Overdissection/underdissection of the pocket</td>
</tr>
<tr>
<td>Overrelease/underrelease of muscle</td>
</tr>
<tr>
<td>Excessively traumatic pocket dissection</td>
</tr>
<tr>
<td>Iatrogenic implant damage</td>
</tr>
<tr>
<td>Postsurgical fluid collection</td>
</tr>
<tr>
<td>Related to soft-tissue changes</td>
</tr>
<tr>
<td>Stretching and thinning of tissue</td>
</tr>
<tr>
<td>Development of ptosis</td>
</tr>
<tr>
<td>Elongation of lower pole</td>
</tr>
<tr>
<td>Atrophy of tissues</td>
</tr>
<tr>
<td>Breast tissue/glandular hypertrophy</td>
</tr>
<tr>
<td>Related to the implant</td>
</tr>
<tr>
<td>Rupture</td>
</tr>
<tr>
<td>Capsular contracture</td>
</tr>
<tr>
<td>Malposition</td>
</tr>
<tr>
<td>Rippling (^5)</td>
</tr>
<tr>
<td>Implant edge visibility</td>
</tr>
<tr>
<td>Palpability</td>
</tr>
<tr>
<td>Rotation</td>
</tr>
</tbody>
</table>

---

**Table 2. Useful Information in the Secondary Implant Patient**

<table>
<thead>
<tr>
<th>Chronological List of Previous Operations include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
</tr>
<tr>
<td>Date</td>
</tr>
<tr>
<td>Surgeon and location</td>
</tr>
<tr>
<td>Procedure</td>
</tr>
<tr>
<td>Name of procedure</td>
</tr>
<tr>
<td>Indication for surgery</td>
</tr>
<tr>
<td>Preoperative breast measurements</td>
</tr>
<tr>
<td>Tissue thickness (objective or subjective)</td>
</tr>
<tr>
<td>Tissue stretch (objective or subjective)</td>
</tr>
<tr>
<td>Base width (objective or subjective)</td>
</tr>
<tr>
<td>Sternal notch–to-nipple distance</td>
</tr>
<tr>
<td>Nipple-to-IMF distance (maximum stretch)</td>
</tr>
<tr>
<td>Pocket location</td>
</tr>
<tr>
<td>Incision(s) used</td>
</tr>
<tr>
<td>Use of devices (ADM, mesh, other)</td>
</tr>
<tr>
<td>Implant</td>
</tr>
<tr>
<td>Same or new implant</td>
</tr>
<tr>
<td>Implant fill</td>
</tr>
<tr>
<td>Implant shape and projection</td>
</tr>
<tr>
<td>Implant surface</td>
</tr>
<tr>
<td>Implant size</td>
</tr>
</tbody>
</table>

IMF, inframammary fold; ADM, acellular dermal matrix.
may present with unexpected intraoperative findings (Fig. 2). It is important to be prepared for this, by discussing possible scenarios with the patient before surgery, and by having the tools available to manage any possible finding.

Before proceeding with any secondary implant surgery, it is imperative for the patient to be fully educated as to their options and the expected outcomes and potential implications of each decision that is made by both the surgeon and the patient. Accurate documentation of procedure options and informed consent is critical in these challenging clinical cases.

**CAPSULAR CONTRACTURE**

Capsular contracture is common and results from excessive periimplant fibrosis. Industry-sponsored core studies with 10-year follow-up report rates of approximately 2.4 to 18.9 percent for primary augmentation and 10.1 to 26.8 percent for reconstruction.2,3,5,6,8

**Cause and Classification**

The cause of capsular contracture is multifactorial. Potential causes include bacterial biofilm or subclinical infection, inflammation caused by soft-tissue trauma, silicone gel bleed, hematoma, seroma, and irradiation.

The subclinical infection theory is supported by both laboratory and clinical evidence.18–21 Breast implants become contaminated with bacteria from the breast skin and gland at the time of insertion or sometime after. These dormant bacteria produce a biofilm layer that binds irreversibly to the implant and shields the bacteria

Fig. 1. Recurrent capsular contracture treated with explantation, capsulectomy, and mastopexy. (Above) Preoperatively. (Below) Six months postoperatively.

Fig. 2. An unexpected intraoperative finding in a malposition correction.
from antibiotics and antiseptics. Once this biofilm reaches a certain threshold, overwhelming host defenses, local inflammation and subsequent fibrosis occurs, resulting in capsular contracture.

Multiple factors have been implicated in the cause of capsular contracture. Occasionally, a clearly defined cause such as implant rupture or hematoma occurs. Less evident causes that include bleeding within the pocket, surgical trauma, or other factors related to surgical technique may be responsible. It is important to always consider the potential role for subclinical infection or biofilm. As a result, strong consideration should be made for treating contracture aggressively, which would include an implant exchange and placement of the implant in a new soft-tissue environment.

Arbitrarily, capsular contracture can be classified as early (<6 months from surgery) or late (>6 months). The former is more often related to intraoperative factors that include bleeding and surgical trauma, and perioperative complications such as hematoma, seroma, and frank infection. The latter is more likely associated with biofilm.

**Prevention**

Capsular contracture is difficult to treat, making prevention extremely important. A review of the literature illustrates multiple strategies that have been suggested for prevention. These focus on incision location, pocket location, implant fill and surface, surgical technique, and a consistent postoperative care protocol (Reference 13 Level of Evidence: Therapeutic, IV). Prevention strategies are summarized as follows:

1. There is evidence to support preoperative antibiotics at the time of induction. However, little evidence exists in support of postoperative antibiotics. The use of prophylactic antibiotics in association with high-risk procedures has been established in orthopedic patients with joint prostheses. This approach has not been commonly adopted by most plastic surgeons performing breast implant surgery.
2. Nipple shields are used in an attempt to prevent local contamination. Wixtrom et al. demonstrated positive cultures from 35 percent of nipple shields, indicating the exposed nipple as a potential source of implant contamination.
3. Preference is given for an inframammary fold incision, allowing the surgeon to avoid dissection within the actual breast tissue. A Danish prospective study using a registry of 2277 women confirmed that surgical routes other than the inframammary fold incision were associated with a relative risk of capsular contracture of 5.8 (95 percent CI, 1.9 to 13.0). These findings were confirmed by Namnoum et al. in a study analyzing over 4400 patients.
4. An atraumatic dissection is carried out to minimize inflammation and the presence of blood or serous fluid within the pocket.
5. Consideration is given for a textured surface device. Evidence exists supporting a lower rate of capsular contracture with textured devices in the subglandular plane. This benefit needs to be balanced with the potential for increased bacterial contamination within the pores of a textured surface.
6. Higher gel cohesiveness within devices from the same manufacturer have been shown to reduce contracture rates. Whether this is a true difference in contracture as opposed to a variable response to deformation from external compression has yet to be determined.
7. Following pocket dissection, irrigation is performed before implant insertion. Adams et al. found a 1.8 percent capsular contracture rate in primary augmentation and a 9.5 percent rate in reconstruction with the use of triple-antibiotic solution containing 50,000 units of bacitracin, 1 g of cephalixin, and 80 mg of gentamicin in 500 ml of normal saline. Evidence also exists to support the use of 50% povidone iodine and 50% saline solution.
8. The “no-touch technique” is used to minimize implant contamination. This includes new surgical gloves before implant handling, an introduction sleeve or funnel to minimize contact between the implant and skin surface, and minimal manipulation of the implant following insertion.
9. It is important to have a defined postoperative protocol that provides education for the patient and opportunity for reassessment by the surgeon. The authors use displacement massage for smooth implants. Although this is common practice, it is important to note that there is no evidence-based information available to document the efficacy of displacement massage. Although this needs further study, such exercises are not recommended for textured or shaped devices, where stability of the device within the breast pocket is desired.
Management

Patients undergo treatment for capsular contracture either to manage aesthetic changes to the breast or to treat symptoms such as localized pain. Minor degrees of contracture (Baker grade II) are often managed conservatively.

Although surgery remains the mainstay of treatment, nonsurgical methods have been proposed. Medical treatments have gained recent attention, especially leukotriene antagonists such as zafirlukast (Accolate; AstraZeneca, London, United Kingdom) and montelukast (Singulair; Merck, Kenilworth, N.J.). Scuderi et al. demonstrated a reduction in pain and breast distortion with the use of zafirlukast. Leukotriene triggers smooth muscle contraction in bronchioles, and thus the use of antileukotriene agents has been suggested for modifying the muscle response associated with early stages of contracture. These drugs have several side effects, including the potential for hepatic toxicity, and their use targets the inflammatory response rather than the root cause of the contracture. At present, these treatments have had minimal impact on the management and prevention of capsular contracture.

Surgical treatment is all encompassing with best efforts to reduce recurrence. Explantation (with or without soft-tissue modification) is an excellent option where sufficient breast volume exists and the patient is amenable. When an implant is desired, strong consideration is made for placing a new implant in a new environment. Reuse of the old implant is avoided. This approach will help to address the underlying cause of subclinical infection or biofilm. Although an open capsulotomy is a recognized treatment option, this does not create a new environment for the implant. A new environment can be created by means of capsulectomy or site change; however, this treatment decision must be weighed against the increased amount of dissection and tissue trauma with these more aggressive approaches.

When capsular contracture occurs around a subglandular implant, surgical options include a complete capsulectomy and reinsertion of a new implant in a subglandular pocket, or partial or total capsulectomy and site change to a subfascial or subpectoral pocket. It is the author’s preference that a site change be considered, as the subpectoral pocket supports lower capsular contracture rates and offers additional soft-tissue cover. If a subpectoral site change is performed, closure of the previous subglandular pocket is essential to prevent window shading of the pectoralis muscle and relocation of the implant into the old subglandular space. This can be achieved in one of four ways. (Table 3).
the old subglandular space and mastopexy. This video is available in the “Related Videos” section of the full-text article on PRSJournal.com or available at http://links.lww.com/PRS/B763.

If a previous subpectoral pocket was used, options for treatment include capsulectomy and insertion of a new device in the subpectoral pocket. If complete capsulectomy is either problematic or undesirable, a neosubpectoral pocket may be considered. This pocket, which has been well described by Spear et al.,36 is created between the anterior surface of the existing subpectoral capsule and the posterior surface of the muscle (Level of Evidence: Therapeutic, IV).

The use of acellular dermal matrices deserves special mention in the capsular contracture patient. Lower contracture rates in the presence of acellular dermal matrix have been reported in several studies.37,38 Capsule formation does not occur in areas where the implant contacts the acellular dermal matrix surface, and thus the acellular dermal matrix may prevent a circumferential capsule from developing (Fig. 3). This inhibition of uniform capsule formation by acellular dermal matrix has been noted by other authors.37 Additional benefits of an acellular dermal matrix may include stabilization of the position of the pectoral muscle, support of the implant under the pectoral muscle, and addition of soft-tissue cover in patients with atrophic breasts. It is important to note that acellular dermal matrix adds some level of complexity and cost to the procedure. Additional risks reported with the use of acellular dermal matrix have included infection, inflammation, seroma, and implant malposition.39–41

Specific surgical treatment depends on the individual patient. Factors to consider include whether capsular contracture is unilateral or bilateral, history of previous occurrences of capsular contracture, the current implant characteristics, the current pocket placement, and whether adherence to strict prevention strategies were followed in the initial operation. We illustrate the management of capsular contracture through several clinical cases.

CASE REPORTS

Case 1

This patient presented with bilateral Baker grade III capsules (Fig. 4). She had previous breast augmentation with smooth round gel implants in a subglandular plane. She has a thin soft-tissue envelope. This patient was managed with explantation,
Case 2
A 58-year-old patient with previous augmentation mastopexy presented with a Baker grade II capsule on the right, Baker grade III capsular contracture on the left, and significant breast asymmetry (Fig. 5). She had a Wise pattern mastopexy at the time of subpectoral augmentation. Intraoperative findings showed a normal complete capsulectomy, site change to a subpectoral pocket, suture closure of the subglandular space, and the use of textured round gel implants appropriate for her breast width.

Case 3
The patient in case 3 had four previous procedures to treat recurrent capsular contracture (Fig. 6). The implants, initially subglandular, were previously changed to subpectoral. She now presents with a Baker grade III contracture on the right, whereas the left side remains soft. The patient prefers not to undergo surgery on her soft, left breast. Surgical management included a complete right capsulectomy. Because of significant window shading of the pectoralis muscle, and to control the implant position, acellular dermal matrix was added as a pectoral extender and marionette sutures were used to secure the acellular dermal matrix in place. (See Video, Supplemental Digital Content 3, which discusses management of capsular contracture with capsulectomy, site change, and use of acellular dermal matrix as a pectoral extender. This video is available in the “Related Videos” section of the full-text article on PRSJournal.com or at http://links.lww.com/PRS/B764.)

IMPLANT MALPOSITION

Assessment
Implant malposition, defined as a wrong or faulty position of an implant, is one of the leading causes of reoperation. Although not all
malpositions can be avoided, adherence to best practice principles will assist in minimizing the frequency of this complication. Many factors may be responsible for a malposition; however, once it is established, the fundamental issue is a problem with the implant pocket: too large, too small, or wrong position (Fig. 7). It is important to note that not all abnormal breast shapes are a result of implant malposition. Capsular contracture and soft-tissue ptosis may at first appear to be a malposition; however, their underlying cause is different and must be recognized as such (Fig. 8).

Understanding the factors that lead to malposition is essential to both prevention and successful management of an established malposition. These factors can be divided into five basic categories: patient factors, procedure selection, implant selection, surgical technique, and postoperative management.

Patient factors include those related to the patient’s musculoskeletal anatomy; the quality, amount, and distribution of the breast tissue; and the characteristics of the overlying skin envelope. Skeletal abnormalities such as pectus excavatum will medially displace an implant, whereas pectus carinatum will lateralyze implants. A strong, high-demand pectoralis major muscle can lead to superior malposition. A tight or high inframammary fold that requires lowering can lead to an inferior malposition; and a thin, atrophic, poor-quality skin envelope can lead to malposition in any direction.

Procedure selection, including the choice of appropriate implant pocket and access incision, is the next important consideration. Medial malposition is more likely with subglandular implant placement, as the pectoralis muscle is unable to function as a medial border of the pocket. Lateral malposition, however, is more common with subpectoral augmentation because of the lateralizing effects of repeated muscle contraction. Transaxillary incisions may predispose to superior malposition secondary to inadequate release of the inferior pectoralis origin, and inframammary incisions may predispose to inferior malposition as a result of partial disruption of the native inframammary fold. Consideration should be
given to repairing the inframammary fold at the time of augmentation. This is performed primarily with sutures. In situations of failed suture repair, internal support matrices may be required.

Recent clinical trial data have demonstrated a significantly higher overall rate of malposition in implants placed through axillary incisions and implants placed in the subglandular pocket.

Video 3. Supplemental Digital Content 3 discusses management of capsular contracture with capsulectomy, site change, and use of acellular dermal matrix as a pectoral extender. This video is available in the “Related Videos” section of the full-text article on PRSJournal.com or at http://links.lww.com/PRS/B764.
Implant selection must include thoughtful consideration of both size and surface. A dimensional approach to implant selection that focuses on patient measurements instead of volume alone decreases reoperations and improves patient outcomes. Several algorithms have been described. Implants that are too large may not only violate the natural breast footprint but will predispose to multidirectional malposition, excessive soft-tissue stretching, parenchymal atrophy, implant edge visibility, and visible traction rippling. Implant surface may also play a role in the incidence of malposition. Several studies have demonstrated lower rates of malposition with the use of a textured device. This may be attributable to enhanced tissue integration, but it should be recognized that the overall procedure is different with smooth versus textured devices. When using a textured surface implant, the pocket more closely matches the implant

Fig. 7. Classification of malposition by direction: (above, left) superior, (above, right) inferior, (below, left) medial, and (below, right) lateral.

Fig. 8. Pseudomalposition: (left) contracture and (right) soft-tissue ptosis.
dimensions, resulting in less mobility of the implant under the breast tissue.

Safe and effective surgical technique to prevent malposition begins with accurate preoperative planning and proceeds with precise, atraumatic technique that closely follows the surgical markings. Prospective hemostasis with every effort made to avoid unnecessary trauma to the margins of the pocket, including the rib perichondrium, will limit postoperative inflammation,

Fig. 9. An algorithmic approach to the surgical management of implant malposition.
seroma formation, and hematoma. Postoperative fluid collections are a common cause of malposition because of unintentional expansion of the implant pocket. Technical errors including overdissection or underdissection of the pocket must be avoided. Care should be taken to ensure that any release of the pectoral muscle is performed precisely and symmetrically. The use of intraoperative sizers is reasonable; however, the surgeon should make certain that sizers are not allowed to overdissect a pocket, as this will predispose to eventual malposition. Precise closure with restoration of fascial support is important, especially when access is through the inframammary fold. (See Video, Supplemental Digital Content 4, which displays a technique for reconstituting the inframammary fold following primary breast augmentation through an inframammary approach. This video is available in the “Related Videos” section of the full-text article on PRSJournal.com or at http://links.lww.com/PRS/B765.)

A thoughtful approach to postoperative care that includes comprehensive patient education, effective support of the surgical site, and timely follow-up is important. There is no consensus regarding the use of postsurgical garments. Some surgeons recommend a surgical bra for at least several weeks. Garments are variable and fit each patient differently; thus, it is incumbent on the surgeon to ensure that the garment is not promoting an early malposition. Occasionally, an implant stabilizer or bandeau may be used to maintain lower pole position in the face of a tight pectoral muscle or tight lower pole. Postoperative displacement massage is routinely recommended with the use of smooth surface devices. Although each surgeon’s protocol may differ slightly, it is important that the patient be properly instructed and shown how to perform massage. Incorrect early massage can result in an abnormal implant position. Early and regular follow-up of the augmentation patient is also necessary, as detection and management of a fluid collection, hematoma, or early malposition can be addressed at this stage to limit their influence on long-term malposition.

Fig. 10. Preoperative views of right inferior malposition secondary to overrelease of the right inframammary fold and compressive force exerted on the implant from the mastopexy (above). This was treated with a right inferior strip capsulectomy and the use of permanent sutures to secure the capsular edge to rib periosteum. Her implant size was also decreased by 50 g and her mastopexy revised (below).
Management

Although there are many causes of malposition, once it has occurred, the fundamental issue is a problem with the implant pocket. Treatment options can be divided into two groups: (1) adjust the existing pocket or (2) change to a new pocket (Fig. 9).

Adjusting the Pocket

Nonsurgical options to adjust an implant pocket include using external compression, taping, shoestrings, or specialized garments. If instituted early, these simple techniques may be successful. Once a malposition has been established, however, nonsurgical options are of limited value.

Surgical options for adjusting the implant pocket include capsulodesis, strip capsulectomy and repair, capsulorrhaphy, internal capsule flaps, thermal shrinkage, or a combination of these techniques. Often, a mirror image capsulotomy is required opposite to where the capsule is adjusted to allow the implant to sit in the correct position and to take pressure off the repair during the healing process (Fig. 10).

The surgeon must often deal with tissues that are thin and attenuated. In many cases, the normal anatomical position of the muscle has been disturbed. In these situations, the addition of internal support matrices may be beneficial.

A soft-tissue support matrix can be used in a number of different ways. For soft-tissue coverage, it can be used to augment a thin atrophic capsule. To reduce the size of a large pocket or a pocket that is overextended in one direction, it can be sutured within the apex of a capsulorrhaphy to reinforce the capsular repair (Fig. 11).

Fig. 11. Previous failed inferior repair on a right breast using capsulodesis (left). This was treated with a superior capsulotomy and reinforcement of the inferior capsule with acellular dermal matrix sutured along the native inframammary fold (right).

Fig. 12. Preoperative view of a left inferiorly malpositioned implant that was recently changed from a subglandular to a subpectoral pocket. The pectoralis muscle has migrated superiorly (left). This was corrected with the use of acellular dermal matrix as a pectoral extender to create a complete pectoral/acellular dermal matrix pocket for the implant and better definition of the inframammary fold (right).
Where the pectoralis muscle has been over-released or superiorly retracted, a support matrix can be used as a pectoral muscle extender and sutured to the native inframammary fold insertion. This method also provides improved definition to a previously violated or newly translocated inframammary fold (Fig. 12). Occasionally, the soft-tissue damage is so extreme that tissue matrices are necessary to completely redefine a potential implant pocket (Fig. 13).

**Changing the Pocket**

Changing the pocket allows the surgeon to discard the problematic pocket and to surgically create a new pocket to the desired dimensions.

---

**Fig. 13.** Preoperative view of a complex multidirectional malposition. This patient has already had implants in both subglandular and subpectoral pockets and currently has a Baker grade III contracture with right medial and inferior malposition, rippling, and nipple asymmetry (*left*). This was treated with capsulectomy, acellular dermal matrix–assisted pocket creation, and implant replacement (*center and right*).

**Fig. 14.** Preoperative views of a superior malposition secondary to inadequate release of the inferior pectoralis insertions. She also has recurrent overlying soft-tissue ptosis (*above*). This was treated by conversion from total submuscular pocket to a dual-plane pocket and revision mastopexy (*below*).
A malposition of a subglandular implant is most commonly changed to a submuscular or subfascial pocket. In these cases, the original pocket must be closed to prevent the implant from migrating back into the old pocket, and the pectoral muscle must be secured inferiorly to prevent excessive window shading (Table 3). Exchange of a subglandular implant into a neosubglandular pocket, either above or below the existing capsule, represents a third option. This can be considered only in the presence of adequate soft-tissue cover, and care must be taken to ensure that the retained capsule does not restrict adequate overlying soft-tissue expansion.

Similarly, a subpectoral implant can be changed to a subglandular or subfascial pocket, in the presence of adequate soft-tissue cover. Occasionally, superior malposition results from the implant sitting in a complete submuscular position. This can most easily be corrected through conversion to a dual-plane pocket. Dissection is performed inferiorly on top of the old capsule until the inferior edge of the muscle is identified. An anterior capsulotomy is performed at that level and the implant is allowed to slide down into the new dual-plane pocket (Fig. 14).

The neosubpectoral pocket is a powerful option when managing subpectoral malposition. This allows for a new controlled pocket while maintaining the advantages of a subpectoral position. After dissecting the neopocket, the old pocket is closed with plication sutures. Figures 15 and 16 demonstrate a neopocket with both a medial and a multidirectional malposition.

Adjuvant techniques may be used to address contributing factors of the malposition, such as a

---

**Fig. 15.** Complex multidirectional malposition in a patient that has already undergone seven breast operations (left). Her implants have already been in both subglandular and subpectoral pockets. She underwent a conversion to neosubpectoral pockets with careful dissection to correct both inferior and medial malposition (right). She also underwent a scar revision and insertion of smaller implants

**Fig. 16.** Preoperative view of bilateral medial malposition secondary to insertion of large, smooth, round implants and overrelease of the medial pectoralis muscle (left). This was treated with creation of a neosubpectoral pocket and insertion of narrower implants (right).
capsulectomy in the case of capsular contracture or exchange of implant, where the patient would benefit from a different implant material or size. Often, soft-tissue modification is required and may include mastopexy, lipofilling, or correction of soft-tissue asymmetry. Depending on the degree of deformity, surgery may be performed in either one or two stages. When an implant exchange is indicated, textured surface implants may assist with stability of the implant in the new pocket.

**SUMMARY**

The number of women who have undergone breast implant insertion continues to grow annually. Adoption of a thoughtful process for primary implant surgery is important in the battle to minimize complications and reoperations. Regardless, all plastic surgeons who perform breast surgery will be faced with an increasing volume of secondary procedures. Among these, capsular contracture and implant malposition are most prevalent. Prevention is critical, and the management of established problems requires a comprehensive and thoughtful approach.

Mitchell H. Brown, M.D., M. Ed.
Department of Surgery
University of Toronto
790 Bay Street, Suite 410
Toronto, Ontario M5G 1N8, Canada
drbrown@torontoplasticsurgery.com

**REFERENCES**


Copyright © 2016 American Society of Plastic Surgeons. Unauthorized reproduction of this article is prohibited.


