

Not All Breast Explants Are Equal: Contemporary Strategies in Breast Explantation Surgery

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Summary: Breast implant removal and replacement has been a common secondary breast procedure in the long-term maintenance of breast augmentation, but more recently growing concerns about silicone-related systemic illness, breast implant-associated anaplastic large cell lymphoma (BIA-ALCL), and changing perceptions of aesthetic beauty have seen breast implant removal without replacement become increasingly requested by patients. Explantation can be challenging, especially when performed with a total capsulectomy. Currently, there is no evidence regarding whether a partial or total capsulectomy has any effect on BIA-ALCL risk mitigation in patients that have textured implants without disease. Total capsulectomy with incomplete resection of a mass can contribute to hyperprogression of BIA-ALCL and death. There have also been cases of BIA-ALCL diagnosed years after removal of the textured device and “total capsulectomy.” Therefore, the common practice of simple prophylactic capsulectomy in a textured implant to mitigate future disease has not been established and at the current time should be discouraged. In addition, aesthetic outcomes can be quite variable, and patients should have appropriate preoperative counseling regarding the indications and contraindications for explantation, associated risks, financial implications, and postoperative appearance. The authors review salient aspects related to the planning and management of breast implant removal. (*Plast. Reconstr. Surg.* 147: 808, 2021.)

INDICATIONS FOR EXPLANTATION

The indications for implant removal are numerous and have included not only complications associated with breast implants such as implant rupture or capsular contracture but also the patient’s desire for a change for aesthetic reasons.^{1,2} More recently, there has been an increasing demand for implant removal based on patient concerns with the safety of their implants or their concerns that the implants may be contributing to a systemic illness.^{3,4}

Capsular Contracture

Studies report rates of capsular contracture ranging from 2.8 to 18.9 percent for augmentation patients, and recent large-scale

and long-term analyses have provided new insights.^{5–10} It has long been accepted that total capsulectomy is the most effective treatment for

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capsular contracture, demonstrating superiority over partial capsulectomy and capsulotomy; however, in a recent systematic review by Wan and Rohrich, that assumption was challenged based on evidence demonstrating that site change, implant exchange, and addition of acellular dermal matrix was significantly associated with lower capsular contracture recurrence rates.¹¹ Thus, in the face of a refractory capsular contracture, explantation or implant exchange is warranted. In patients with subpectoral implants, a complete capsulectomy is associated with an increased risk of chest wall injury and pneumothorax as the capsule is dissected off the chest wall.¹² In some cases, the capsule is excised anteriorly but retained posteriorly to minimize soft-tissue trauma, with the new implant placed anterior to the dissected capsule (Fig. 1).¹² There has also been good evidence the use of a neosubpectoral pocket with placement of acellular dermal matrix significantly reduced the risk of capsular contracture recurrence, but this would require maintaining the capsule.¹³ Finally, a retrospective review by Swanson concluded that capsulotomy alone for capsular contracture demonstrated good results with low rates of recurrence.¹⁴

Implant Rupture

Rupture of a silicone implant is an indication for implant removal.^{15,16} Diagnosis of silicone gel implant rupture is usually achieved using magnetic resonance imaging or ultrasound.¹⁷⁻¹⁹ Although recommendations concerning the appropriate use of ultrasound, magnetic resonance imaging, and mammography for rupture detection is at present still not fully agreed on, there is agreement that a ruptured implant is an indication for removal, with or without exchange to a new device. Whereas the capsule does not generally need to be removed for an isolated rupture, a significant rupture with a thickened capsule or silicone embedded in the capsule (preventing complete removal with washings) may warrant capsulectomy.^{15,16}

Silicone Implant Illness or Breast Implant Illness

An emerging issue facing plastic surgery is concern by patients that their implants are the

A “Hot Topic Video” by Editor-in-Chief Rod J. Rohrich, M.D., accompanies this article. Go to PRSJournal.com and click on “Plastic Surgery Hot Topics” in the “Digital Media” tab to watch.



Fig. 1. (Above) Breast implant illness patient. Nearly total (partial) capsulectomy performed for submuscular capsule that is extremely thin, making a total capsulectomy technically challenging and inappropriate for this patient. (Center) Small portion of extremely thin capsule retained on the chest wall. (Below) The retained capsule following destruction with cauterization. Notice that the capsule is obliterated, with the chest wall nearly devoid of any remaining capsule.

cause of a myriad of symptoms referred to in the news and social media by the term “breast implant illness.” Silicone implant illness is characterized

by a nonspecific and generalized constellation of symptoms that include malaise, fatigue, fibromyalgia, headache, and other patient-reported complaints. Early on, a few studies on breast implant explantation have noted an improvement in systemic and non-breast-related symptoms after surgery. In 1997, Peters et al. reported on 100 patients presenting for explantation during the silicone moratorium.²⁰ These patients were divided into three groups. Group 1 did not meet diagnostic criteria for rheumatic or autoimmune disease and demonstrated a greater than 80 percent improvement in physical symptoms and 93 percent improvement in psychological well-being following explantation. Group 2 had rheumatic but not autoimmune disease and would have an initial improvement (placebo effect) but with recurrence in symptoms at 6 to 12 months. Group 3 had a diagnosed autoimmune disease and showed no improvement of symptoms or autoantibody levels and went on to suffer from the autoimmune disease. A review of 240 explantation patients by Melmed in 1998 found that patients reported a decrease in flu-like symptoms, depression, and fatigue after implant removal.²¹ Rohrich et al. in 2000 demonstrated that in patients who underwent explantation, improvements were documented for musculoskeletal symptoms, general pain, and mental health.²² In addition to these earlier studies, some case reports and cohort studies over the past several decades have reported the resolution of specific autoimmune disorders or systemic illnesses following breast implant removal, including sarcoidosis, arthralgia, and Raynaud syndrome. De Boer et al. conducted a review of 23 case reports and cohort studies dating from 1994 to 2014, in which 75 percent of a combined 622-patient sample noted improvements in their overall health and systemic illnesses after removal of their breast implants. However, explantation alone helped to alleviate symptoms in only 16 percent of patients who were definitively diagnosed with an autoimmune disorder.²³ As a result, patients who desire explantation to address symptoms relating to an autoimmune condition should be counseled that adjuvant therapy will likely be needed as well, and that implant removal will not necessarily be a curative option for any systemic symptoms.

In addition, it should be noted that improvement in symptoms following explantation is variable and that breast implants alone may not be the cause of any specific autoimmune or systemic illness.²⁴ To date, there are no studies demonstrating a cause-and-effect relationship between silicone

implants to what is now termed breast implant illness that encompasses a range of patient-described symptoms whose links to implants have not yet been confirmed or investigated.^{25,26} No test for breast implant illness currently exists, as patients with breast implant illness present with a diverse range of symptoms that inconsistently result in abnormal laboratory or medical examinations. Nevertheless, patient complaints about breast implant illness should be taken seriously, and symptomatic patients should be given the option of implant removal with or without capsulectomy (Fig. 2). In patients concerned about breast implant illness, whereas a nearly total or total capsulectomy may be considered based on the clinical scenario and in consultation with the patient considering the risk and benefits, there is no indication for an en bloc capsulectomy, and the use of this term and this type of treatment should be discouraged and reserved only for confirmed malignancy (Fig. 3).

Breast Implant-Associated Anaplastic Large Cell Lymphoma

Breast implant-associated anaplastic large cell lymphoma (BIA-ALCL) is associated with textured breast implants and has been the focus of research and discussion in the plastic surgery community.²⁷ As of August of 2019, 573 cases had been reported by the U.S. Food and Drug Administration, with the most common symptoms being seroma, pain and/or swelling in the breast, capsular contracture, overlying skin rash, and a mass or lump around the implant.²⁸ The current incidence of BIA-ALCL varies based on the type of implant. Patients should be counseled that BIA-ALCL is not breast cancer, that it often follows an indolent course, and that removing the implants and surrounding capsules is often sufficient to achieve complete remission.²⁹ The capsule, peri-prosthetic effusion, and any associated masses should be completely removed with the implants based on evidence provided by Clemens et al., who demonstrated that among BIA-ALCL patients, en bloc resection with explantation resulted in better overall survival and event-free survival outcomes compared to radiation therapy, chemotherapy, partial capsulectomy, or no capsulectomy.^{30,31} Whereas leaving a part of the capsule when performing a capsulectomy may be appropriate for other indications such as capsular contracture or breast implant illness, when treating BIA-ALCL, a complete and total capsulectomy surrounded by a contiguous rim of healthy margin (en bloc capsulectomy) is warranted (Fig. 4). Incomplete

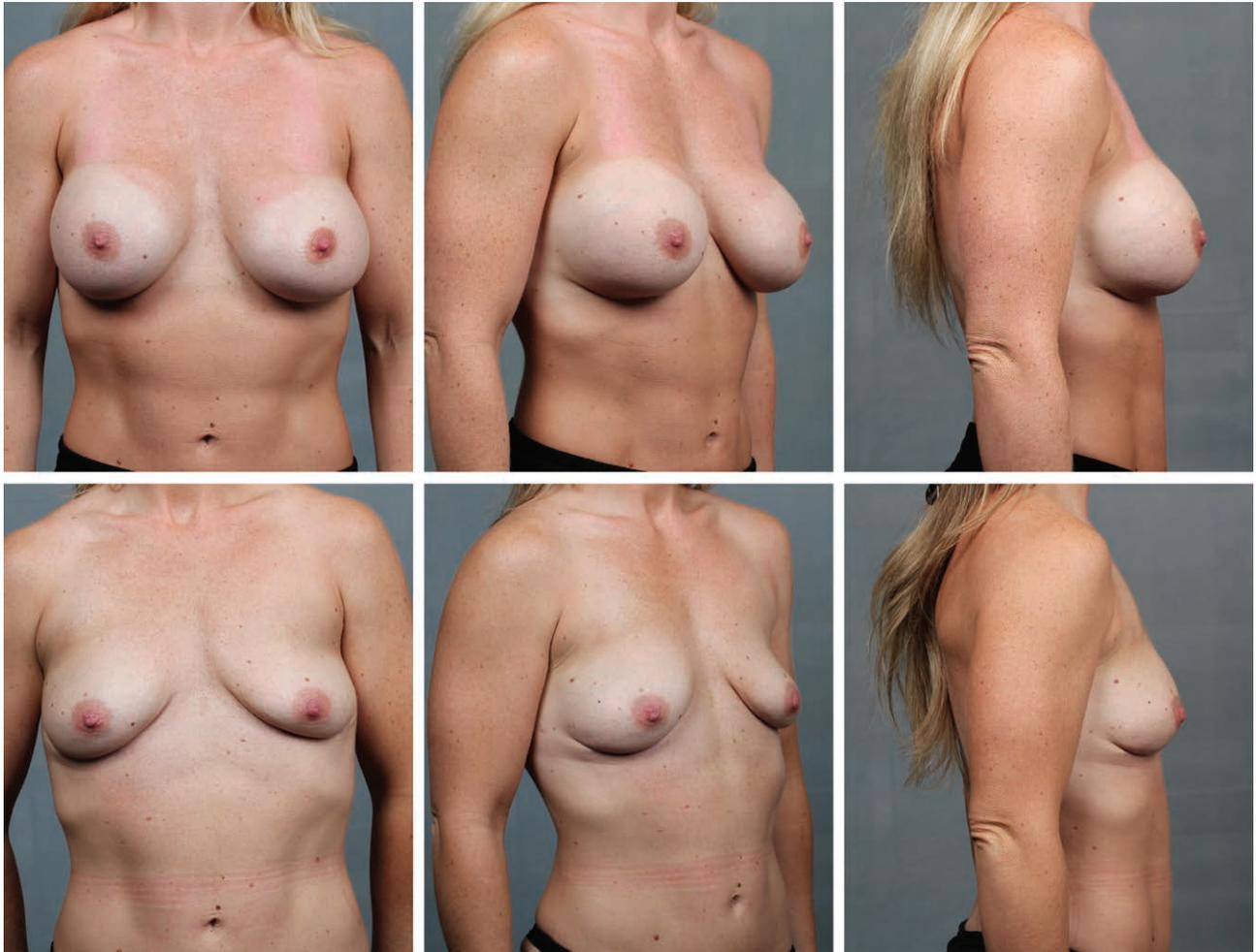


Fig. 2. A patient who underwent nearly total (partial) capsulectomy only for breast implant illness with no adjunctive procedures. Preoperative and 6-month postoperative views are shown.

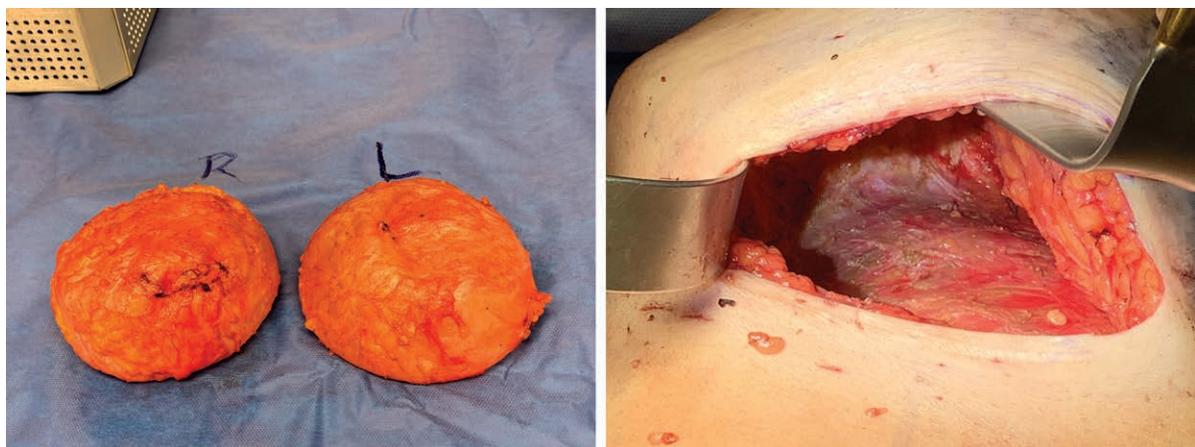


Fig. 3. (Left) Bilateral implants and capsules removed in situ with total capsulectomy from a patient with subglandular implants and concerns of breast implant illness. (Right) The subglandular pocket devoid of implant and capsule is shown. This type of total capsulectomy with implants remaining in situ for the explantation should not be inaccurately described as an en bloc resection, which is a much more extensive resection and reserved for the treatment of cancer.

removal and persistent margins are associated with recurrence and disease progression.

We must clearly separate the idea of performing an en bloc resection for a diagnosed BIA-ALCL patient in contrast to prophylactic procedures used to address cancer risk in a healthy patient that has a textured breast implant. Currently, there is no evidence whether a partial or total capsulectomy has any effect on risk mitigation in patients that have textured implants, but no disease. Lack of data creates a challenge for each surgeon to determine the appropriate course of action with textured devices. Some surgeons may find logic for performing a prophylactic capsulectomy in an otherwise healthy patient undergoing removal of a textured device if it is easily performed and creates minimal additional morbidity such as in a subglandularly placed device. Also, if when performing a simple removal or exchange of the implants and an abnormal capsule is encountered, marked by either thickening, fluid, or mass, it may be appropriate to proceed with excision of the abnormal portion of the capsule followed by appropriate pathologic evaluation. Prophylactic capsulectomy, total or nearly total with treatment of the retained posterior capsule by cautery capsulectomy (electrocautery scorch) or chemical

capsulectomy (a variably prolonged capsule soak with povidone-iodine, antibiotic, antiseptic, and/or any medication), have been mentioned for cancer risk mitigation in asymptomatic textured implant patients. However, importantly, there are no current evidence-based data to support any of these practices or techniques.³² At M. D. Anderson Cancer Center, we are aware of three patients with a history of previous “total capsulectomy” performed for capsular contracture with textured to smooth implant exchange that still developed BIA-ALCL years later. These cases raise important questions, such as: What is pertinent to remove for cancer prevention and are total capsulectomies standardized across all surgeons? Designing prospective risk-mitigation studies to answer these questions are challenging considering that the vast majority of patients with textured surface implants will never develop BIA-ALCL. Note that incomplete resection of a mass can also contribute to hyperprogression of BIA-ALCL, a well-described oncologic phenomenon where the retained mass begins to grow more rapidly or may metastasize.³³ Currently, without supporting data, each surgeon will ultimately need to counsel patients on the best course of treatment with the understanding that a prophylactic capsulectomy may or may not

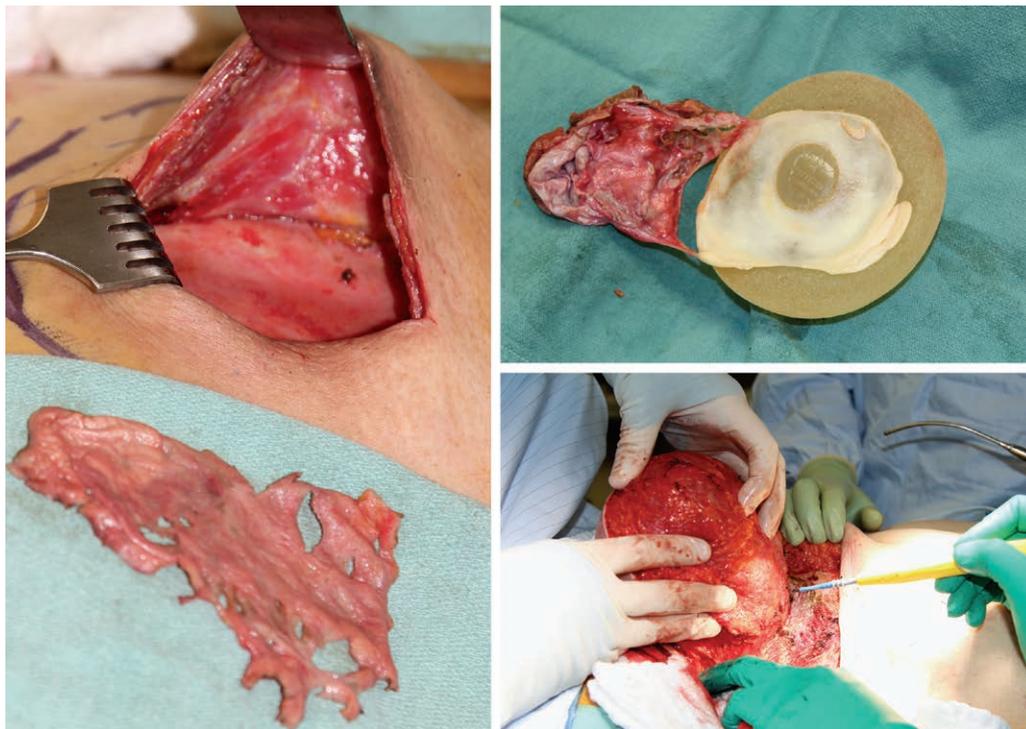


Fig. 4. (Left) Partial capsulectomy for radiation-induced contracture. (Above, right) Total capsulectomy for double-capsule formation. (Below, right) En bloc resection of BIA-ALCL. There is no evidence that a partial or total capsulectomy affects future BIA-ALCL risk of patients with textured implants.

reduce the patient’s risk of future BIA-ALCL, is associated with increased operative complexity and morbidity, often impairs the final aesthetic result, and is associated with a greater financial burden. In asymptomatic patients, explantation alone or exchange to a smooth implant may be appropriate treatment, is less costly, and has a much lower risk profile.

Patient Preference

Unsatisfactory breast aesthetics caused by age-related changes, pregnancy, weight gain or loss, or changes in public opinion concerning breast implants may result in a non-medically related desire for explantation. In a single-surgeon study by Paydar et al. at the University of California, Irvine, over 30 percent of the patients presented for breast implant removal because of negative publicity surrounding breast implants or unsatisfactory aesthetics attributable to changes in body habitus.³⁴ As the body acceptance movement gains popularity on social media platforms and concern regarding the safety of silicone implants persists, an increase in the number of patients who seek breast implant removal is anticipated.^{2,10,24,35}

**EXPLANTATION TECHNIQUES:
MANAGING THE CAPSULE**

The management of the capsule requires a thorough understanding of the indications for the explantation (Table 1). The capsule may be considered “friend or foe.” The capsule can provide support for the soft-tissue envelope. The appropriateness as to whether capsule removal is indicated is not always clear and can be quite controversial based on the various indications.

If the capsule is calcified, has a mass present, or is embedded with silicone product, removal of the capsule is warranted. In addition, patients concerned with breast implant illness will desire any retained silicone left behind by rupture, particle shedding, or gel bleed be removed as completely as possible and will therefore be best served with removal of the entire capsule to ease concerns with inadequate treatment. A confirmed diagnosis of BIA-ALCL requires an en bloc resection. A capsular contracture itself is not necessarily an indication for a capsulectomy if no implant is to be replaced, and sometimes can be used advantageously, as in the simultaneous implant exchange with fat procedure.³⁶

Capsulotomy

Capsulotomy is the simplest, and safest, of the procedures used to manage the capsule in explant patients. Despite this, it has traditionally been considered inferior to capsulectomy as a treatment for capsular contracture. In a recent study by Swanson, it was demonstrated that capsulotomy may be an effective treatment for capsular contracture patients; however, this remains controversial.¹⁴ A V-Y method similar to the one used in scar release has been proposed as an alternative technique for capsule release.³⁷

The advantages of a capsulotomy include preservation of support for the overlying skin envelope when soft-tissue coverage is thin, improved circulation for the overlying breast skin soft-tissue envelope especially when a mastopexy is planned, and improved pocket control and support for the implant if an implant replacement is planned. Capsulotomies are not adequate in cases of BIA-ALCL, complicated capsular contractures such as calcified capsules, when silicone is embedded in

Table 1. Management of the Capsule in Breast Explantation Patients Depends on the Indication for Explantation

Procedure	Definition	Indication for Capsulectomy
Capsulotomy	Performing full-thickness incision through the periprosthetic capsule without removing capsular tissue	<ul style="list-style-type: none"> • Aesthetic deformity • Capsular contracture • Patient preference
Partial or anterior capsulectomy	Excising a portion of the capsule, often the anterior lamellae, while leaving some of the capsule intact	<ul style="list-style-type: none"> • Aesthetic deformity • Capsular contracture • Patient preference • Implant rupture
Total capsulectomy	Excising the entirety of the breast implant capsule; capsule need not be removed in one piece but is completely excised	<ul style="list-style-type: none"> • Aesthetic deformity • Capsular contracture • Patient preference • Implant rupture • Silicone implant illness
En bloc capsulectomy	Excising margin of normal-appearing tissue around the capsule as part of the specimen that also contains the implant, an intact implant capsule, and associated masses	<ul style="list-style-type: none"> • BIA-ALCL

the capsule, or when an associated capsular mass is identified (Fig. 5).

Partial Capsulectomy

In a 2016 study of trends among members of the American Society of Plastic Surgeons, partial capsulectomy (anterior capsulectomy) was reported as the most common modality for the treatment of capsular contracture, with 46.1 percent of surgeons opting for partial capsulectomy and 35.1 percent opting for total capsulectomy.³⁸ The decision between a partial and total capsulectomy is sometimes best made in the operating room based on the location of the implant. When the implant has been placed in a submuscular plane, attempting to remove the posterior section of the capsule may injure the chest wall.¹² In these cases, the posterior capsule is often cauterized in an attempt to destroy the remaining capsule that may be laden with biofilm. In addition, scoring the posterior portion of the capsule has been suggested to facilitate closure of the implant pocket if implant exchange is not being performed.³⁹

Total Capsulectomy

Total capsulectomy is defined as the removal of the anterior and posterior capsule. Although some in the lay press and on social media have referred to an en bloc resection as removal of the capsule and implant as a single unit, this is an inaccurate use of this oncologic term. An en bloc resection includes removal of the entire capsule

and implant including obtaining healthy margins of tissue, removal of any associated masses, and/or lymph nodes. Whereas an en bloc resection is appropriate for the treatment of the established diagnosis of BIA-ALCL as described by Collins et al. and Loghavi et al., it is not indicated for the treatment of suspicious, nonmalignant diseases or prophylactic operations.^{33,40}

Total capsulectomy is a more extensive procedure that carries a higher risk of bleeding and other perioperative complications compared to partial capsulectomy or capsulotomy.^{12,32,41} Achieving intact removal of the capsule may be more difficult for implants placed in a submuscular plane. In addition, total capsulectomy with intact capsule is challenging when the capsule is very thin and fragile. In these cases, complete excision may not be possible and strip capsulectomy is performed instead. Alternatively, it is strategically appropriate to remove the capsule in sections as needed as long as the entire capsule is eventually successfully removed. The decision to proceed with a total capsulectomy should be considered carefully, taking into account the specific indications for performing a capsulectomy, the risk tolerance of the patient, and the specifics of the procedure.

En Bloc Capsulectomy

En bloc capsulectomy is defined as an oncologic procedure in which a margin of normal-appearing tissue around the capsule is removed



Fig. 5. Capsulectomies and not capsulotomies are indicated when the capsule has disease, including a mass, calcifications (*left*), or silicone embedded in the capsule (*right*).

as part of the specimen that also contains the implant, an intact implant capsule, and associated masses.^{30,31} Currently available evidence indicates the use of en bloc capsulectomy only in patients with an established diagnosis of BIA-ALCL before the surgical intervention. For patients without concern for breast implant-associated malignancy, there is no evidence supporting the excision of healthy tissue around the capsule, and doing so increases the risk of surgery and the difficulty in achieving an aesthetic outcome after explantation. For nononcologic indications, there is currently no evidence of additional benefit in en bloc capsulectomy as compared to total capsulectomy, and performing the former procedure increases the risk of injury to the patient.

Although plastic surgery is a field in which patient's preferences regarding reconstructive and aesthetic procedures are paramount, the surgeon ultimately determines what procedure is indicated and may be performed safely to achieve the patient's goals. En bloc removal of capsule, implant, and healthy surrounding tissue is exclusively indicated for patients with a diagnosis of BIA-ALCL. Although patient preference is important to consider when determining how to care for a patient, it is not as critical as performing the correct procedure for the patient with an acceptable risk profile. Therefore, these risks and benefits must be carefully and accurately discussed with the patient to ensure the most appropriate procedure is performed on each patient based on the surgeon's evaluation and clinical judgment, the patient's clinical scenario and concerns, and the currently available evidence-based data to guide the ultimate recommendation and treatment course.

EXPLANTATION TECHNIQUES: ADJUNCTIVE AESTHETIC PROCEDURES

Implant removal will change the appearance of the breast, and procedures such as mastopexy and/or fat grafting are often necessary to maintain satisfactory aesthetics after explantation. In a study by Peters et al., 33 percent of patients who underwent explantation alone felt disappointed in their breast appearance and 13 percent felt mutilated. This is in contrast to implant exchange in which only 14 percent of patients reported feeling disappointed and none felt mutilated.²⁰ In addition, Netscher conducted a study of 85 consecutive breast implant removal patients using external raters and found that patients received lower aesthetic scores if they did not undergo mastopexy

or reconstruction after explantation.⁴² Currently, for patients who choose not to undergo implant exchange, or for whom implant exchange is not indicated, a variety of options exist to improve the postoperative appearance of the breast.

Mastopexy

A mastopexy is often the best choice to remove excess breast skin in patients requiring additional aesthetic management after implant removal. Rohrich and Parker created an algorithm to determine the optimal timing and approach for patients undergoing mastopexy after explantation, which takes into account the level of breast ptosis and the patient's risk factors for complications.⁴³ Some patients will choose to undergo a mastopexy at a delayed staged to take a "wait-and-see" approach, which can be quite appropriate after adequate counseling on the anticipated outcome without the mastopexy.

Mastopexy alone may be insufficient for patients who require a reorientation of breast volume or additional breast volume. Combining mastopexy with fat grafting has been described to simultaneously address ptosis and loss of volume (Fig. 6). A Brazilian study of 26 explantation patients noted good satisfaction rates and no major complications with this technique.⁴⁴

Fat Grafting

For those patients who require postexplantation augmentation with autologous tissue, fat grafting may be an option. In 2012, Del Vecchio described a method of simultaneous implant exchange with fat, which used preexpansion in the subcutaneous space of the breast and a two-phase fat transfer technique after explantation (but with retention of the capsule).³⁶ A Belgian study published in 2015 analyzed the outcomes of 160 breasts in 80 patients who underwent immediate grafting with 300 to 600 ml of autologous fat after implant removal. In that study, the formation of cystic masses, presumably caused by fat necrosis, occurred in 5.6 percent of the studied breasts, and overall patient satisfaction was measured at 83 percent in postoperative surveys.⁴⁵ The breasts of patients who received lipofilling after implant removal were also rated as more attractive, natural, symmetric, and feminine compared with their preoperative appearance, as reported in a study of public and expert opinion performed by Mess.⁴⁶ Patients should be counseled that fat grafting cannot provide the same guarantee of volume as an implant, because of individual differences in the absorption and loss of fat.

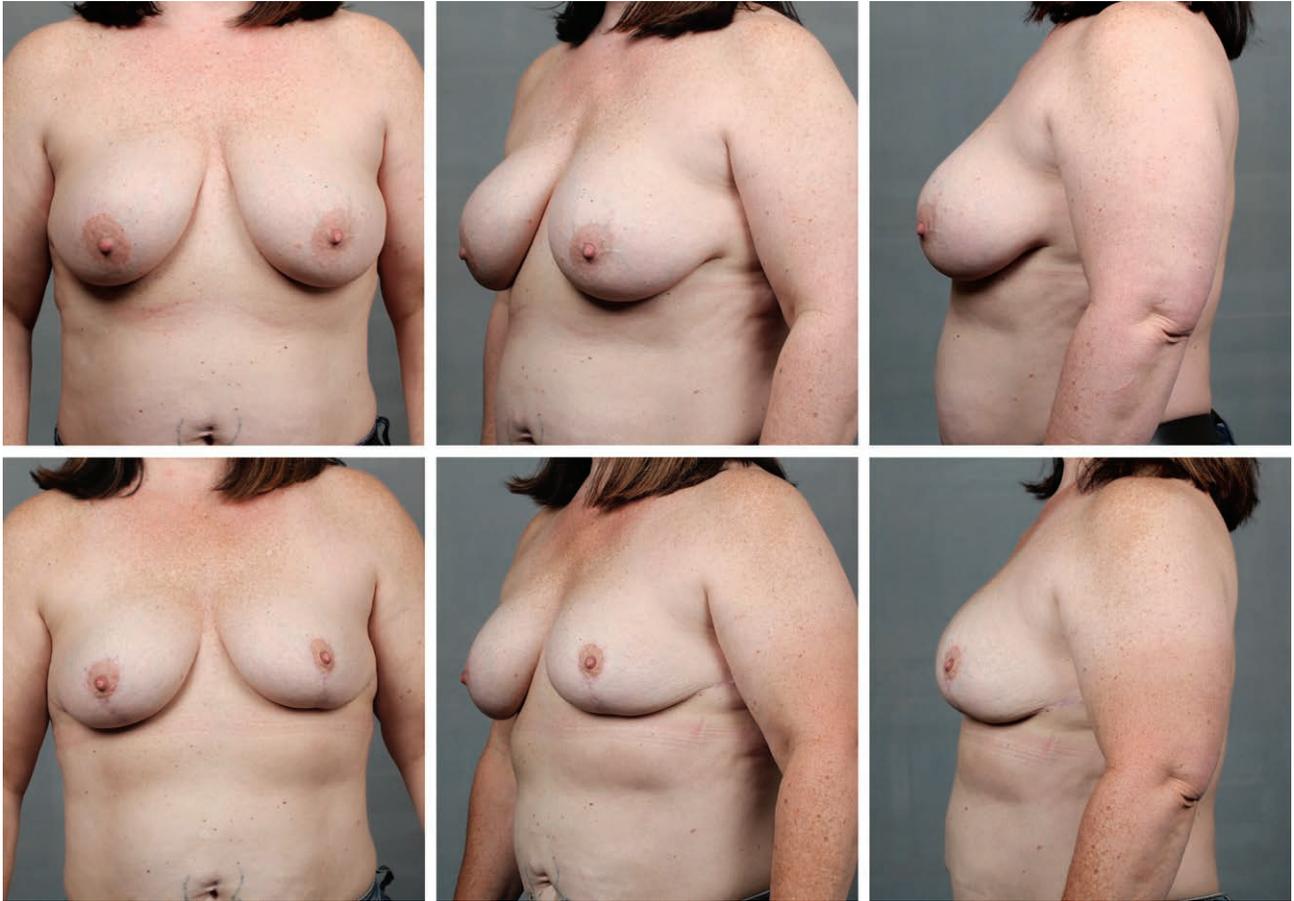


Fig. 6. A 48-year-old woman who underwent explantation with total capsulectomy, superior-based mastopexy with autoaugmentation, and fat grafting. Preoperative (*above*) and 1-year postoperative (*below*) views are shown.

Autoaugmentation with Flaps

Options for autoaugmentation of the breast after implant removal are relatively limited. Previous surgeons have described the use of free flaps such as

deep inferior epigastric perforator flaps to restore missing volume to the breast. These free flaps may be attempted as a final resort if implant exchanges are not possible or desired, but introduce donor-site



Fig. 7. (*Left*) Autoaugmentation is accomplished with an inferior dermoglandular island of tissue based on the superomedial pedicle. (*Right*) Rotation of the island flap into the subareolar, central portion of the breast, will provide volume and core projection.

morbidity.⁴⁷ As an alternative, techniques described by Hönig et al. and Gurunluoglu et al. have combined mastopexy with an deepithelialized inferior dermoglandular flap to reorient existing breast volume (Fig. 7).^{39,47,48} Although this technique is not widely practiced, studies have reported good patient-reported outcomes and low complication rates with autologous autoaugmentation.^{49,50}

CONCLUSIONS

Although evidence-based research strongly supports implant rupture, capsular contracture, and ALCL as indications for explantation with particular types of capsulectomy, it is ambiguous for breast implant illness or connective tissue disease. Nonetheless, patient preference, risk tolerance, and safety should be considered in the management of the breast explantation patient.

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REFERENCES

1. Spear SL, Parikh PM, Goldstein JA. History of breast implants and the Food and Drug Administration. *Clin Plast Surg*. 2009;36:15–21, v.
2. Cole NM. Consequences of the U.S. Food and Drug Administration-directed moratorium on silicone gel breast implants: 1992 to 2006. *Plast Reconstr Surg*. 2018;141:1137–1141.
3. American Society of Plastic Surgeons. 2010 report of the 2009 statistics. Available at: <https://www.plasticsurgery.org/documents/News/Statistics/2009/plastic-surgery-statistics-full-report-2009.pdf>. Accessed July 1, 2019.
4. American Society of Plastic Surgeons. 2018 national plastic surgery statistics. Available at: <https://www.plasticsurgery.org/documents/News/Statistics/2018/plastic-surgery-statistics-report-2018.pdf>. Accessed July 1, 2019.
5. Headon H, Kasem A, Mokbel K. Capsular contracture after breast augmentation: An update for clinical practice. *Arch Plast Surg*. 2015;42:532–543.
6. Spear SL, Murphy DK; Allergan Silicone Breast Implant U.S. Core Clinical Study Group. Natrella round silicone breast implants: Core Study results at 10 years. *Plast Reconstr Surg*. 2014;133:1354–1361.
7. Blount AL, Martin MD, Lineberry KD, Kettaneh N, Alfonso DR. Capsular contracture rate in a low-risk population after primary augmentation mammoplasty. *Aesthet Surg J*. 2013;33:516–521.
8. Calobrace MB, Stevens WG, Capizzi PJ, Cohen R, Godinez T, Beckstrand M. Risk factor analysis for capsular contracture: A 10-year Sientra study using round, smooth, and textured implants for breast augmentation. *Plast Reconstr Surg*. 2018;141(Sientra Shaped and Round Cohesive Gel Implants):20S–28S.
9. Liu X, Zhou L, Pan F, Gao Y, Yuan X, Fan D. Comparison of the postoperative incidence rate of capsular contracture among different breast implants: A cumulative meta-analysis. *PLoS One* 2015;10:e0116071.
10. Coroneos CJ, Selber JC, Offodile AC II, Butler CE, Clemens MW. US FDA breast implant postapproval studies: Long-term outcomes in 99,993 patients. *Ann Surg*. 2019;269:30–36.
11. Wan D, Rohrich RJ. Revisiting the management of capsular contracture in breast augmentation: A systematic review. *Plast Reconstr Surg*. 2016;137:826–841.
12. Lee HK, Jin US, Lee YH. Subpectoral and precapsular implant repositioning technique: Correction of capsular contracture and implant malposition. *Aesthetic Plast Surg*. 2011;35:1126–1132.
13. Maxwell GP, Gabriel A. Non-cross-linked porcine acellular dermal matrix in revision breast surgery: Long-term outcomes and safety with neopeectoral pockets. *Aesthet Surg J*. 2014;34:551–559.
14. Swanson E. Open capsulotomy: An effective but overlooked treatment for capsular contracture after breast augmentation. *Plast Reconstr Surg Glob Open* 2016;4:e1096.
15. Collis N, Litherland J, Enion D, Sharpe DT. Magnetic resonance imaging and explantation investigation of long-term silicone gel implant integrity. *Plast Reconstr Surg*. 2007;120:1401–1406.
16. Seigle-Murandi F, Lefebvre F, Bruant-Rodier C, Bodin F. Incidence of breast implant rupture in a 12-year retrospective cohort: Evidence of quality discrepancy depending on the range. *J Plast Reconstr Aesthet Surg*. 2017;70:42–46.
17. Ikeda DM, Borofsky HB, Herfkens RJ, Sawyer-Glover AM, Birdwell RL, Glover GH. Silicone breast implant rupture: Pitfalls of magnetic resonance imaging and relative efficacies of magnetic resonance, mammography, and ultrasound. *Plast Reconstr Surg*. 1999;104:2054–2062.
18. Hold PM, Alam S, Pilbrow WJ, et al. How should we investigate breast implant rupture? *Breast J*. 2012;18:253–256.
19. Maisel Lotan A, Retchkiman M, Tuchman I, Binenboym R, Gronovich Y. Analysis of 109 consecutive explanted breast implants: Correlation between suspected implant rupture and surgical findings. *Aesthetic Plast Surg*. 2016;40:739–744.
20. Peters W, Smith D, Fornasier V, Lugowski S, Ibanez D. An outcome analysis of 100 women after explantation of silicone gel breast implants. *Ann Plast Surg*. 1997;39:9–19.
21. Melmed EP. A review of explantation in 240 symptomatic women: A description of explantation and capsulectomy with reconstruction using a periareolar technique. *Plast Reconstr Surg*. 1998;101:1364–1373.
22. Rohrich RJ, Kenkel JM, Adams WP, Beran S, Conner WC. A prospective analysis of patients undergoing silicone breast implant explantation. *Plast Reconstr Surg*. 2000;105:2529–2537; discussion 2538–2543.
23. de Boer M, Colaris M, van der Hulst RRRWJ, Cohen Tervaert JW. Is explantation of silicone breast implants useful in patients with complaints? *Immunol Res*. 2017;65:25–36.
24. Rohrich RJ, Kaplan J, Dayan E. Silicone implant illness: Science versus myth? *Plast Reconstr Surg*. 2019;144:98–109.
25. Magnusson MR, Cooter RD, Rakhorst H, McGuire PA, Adams WP Jr, Deva AK. Breast implant illness: A way forward. *Plast Reconstr Surg*. 2019;143(A Review of Breast Implant-Associated Anaplastic Large Cell Lymphoma):74S–81S.
26. American Society for Aesthetic Plastic Surgery. Breast implant illness: Frequently asked questions/talking points. Available at: <https://www.surgery.org/sites/default/files/downloads/BII-Talking-Points-FINAL-1.15.19.pdf>. Accessed July 1, 2019.

27. Mccarthy CM, Loyo-berríos N, Qureshi AA, et al. Patient Registry and Outcomes for Breast Implants and anaplastic Large Cell Lymphoma Etiology and Epidemiology (PROFILE): Initial report of findings, 2012-2018. *Plast Reconstr Surg.* 2019;143(A Review of Breast Implant-Associated Anaplastic Large Cell Lymphoma):65S–73S.
28. U.S. Food and Drug Administration. Medical device reports of breast implant-associated anaplastic large cell lymphoma. Available at: <https://www.fda.gov/medical-devices/breast-implants/medical-device-reports-breast-implant-associated-anaplastic-large-cell-lymphoma>. Accessed July 1, 2019.
29. Leberfinger AN, Behar BJ, Williams NC, et al. Breast implant-associated anaplastic large cell lymphoma: A systematic review. *JAMA Surg.* 2017;152:1161–1168.
30. Clemens MW, Medeiros LJ, Butler CE, et al. Complete surgical excision is essential for the management of patients with breast implant-associated anaplastic large-cell lymphoma. *J Clin Oncol.* 2016;34:160–168.
31. Tevis S, Hunt KH, Clemens MW. Stepwise en-bloc resection of breast implant associated ALCL with oncologic considerations. *Aesthet Surg J Open Forum* 2019;1:1–12.
32. McGuire PA, Deva AK, Glicksman CA, Adams WP, Haws MJ. Management of asymptomatic patients with textured surface breast implants. *Aesthet Surg J Open Forum* 2019;1:1–3.
33. Collins MS, Miranda RN, Medeiros LJ, et al. Characteristics and treatment of advanced breast implant-associated anaplastic large cell lymphoma. *Plast Reconstr Surg.* 2019;143(A Review of Breast Implant-Associated Anaplastic Large Cell Lymphoma):41S–50S.
34. Paydar KZ, Kohan E, Hansen SL, Roostaiean J, Gradinger GP. Long-term effects of breast aging in patients undergoing explantation: Analysis of breast aesthetics from before augmentation to after explantation. *Ann Plast Surg.* 2013;70:427–431.
35. Cohen R, Irwin L, Newton-John T, Slater A. #bodypositivity: A content analysis of body positive accounts on Instagram. *Body Image* 2019;29:47–57.
36. Del Vecchio DA. “SIEF”—Simultaneous implant exchange with fat: A new option in revision breast implant surgery. *Plast Reconstr Surg.* 2012;130:1187–1196.
37. Dickson JK, Gorman M, Palmer J. The V-Y capsulotomy release for correcting capsular contracture. *J Plast Reconstr Aesthet Surg.* 2015;68:1768–1769.
38. Hidalgo DA, Sinno S. Current trends and controversies in breast augmentation. *Plast Reconstr Surg.* 2016;137:1142–1150.
39. Gurunluoglu R, Kubek E, Arton J. Dual pedicle mastopexy technique for reorientation of volume and shape after subglandular and submuscular breast implant removal. *Eplasty* 2013;13:e48.
40. Loghavi S, Medeiros LJ, Javadi S, et al. Breast implant-associated anaplastic large cell lymphoma with bone marrow involvement. *Aesthet Surg J* 2018;38.
41. Collis N, Sharpe DT. Recurrence of subglandular breast implant capsular contracture: Anterior versus total capsulectomy. *Plast Reconstr Surg.* 2000;106:792–797.
42. Netscher DT. Aesthetic outcome of breast implant removal in 85 consecutive patients. *Plast Reconstr Surg.* 2004;113:1057–1059.
43. Rohrich RJ, Parker TH III. Aesthetic management of the breast after explantation: Evaluation and mastopexy options. *Plast Reconstr Surg.* 2007;120:312–315.
44. Graf RM, Closs Ono MC, Pace D, Balbinot P, Pazio ALB, de Paula DR. Breast auto-augmentation (mastopexy and lipofilling): An option for quitting breast implants. *Aesthetic Plast Surg.* 2019;43:1133–1141.
45. Abboud MH, Dibo SA. Immediate large-volume grafting of autologous fat to the breast following implant removal. *Aesthet Surg J.* 2015;35:819–829.
46. Mess SA. Lipoaugmentation following implant removal preferred by plastic surgeons and the general public. *Plast Reconstr Surg Glob Open* 2018;6:e1882.
47. Gurunluoglu R, Shafiqhi M, Schwabegger A, Ninkovic M. Secondary breast reconstruction with deepithelialized free flaps from the lower abdomen for intractable capsular contracture and maintenance of breast volume. *J Reconstr Microsurg.* 2005;21:35–41.
48. Höning JF, Frey HP, Hasse FM, Hasselberg J. Inferior pedicle autoaugmentation mastopexy after breast implant removal. *Aesthetic Plast Surg.* 2010;34:447–454.
49. Kirwan L, Wazir U, Mokbel K. Breast auto-augmentation: A versatile method of breast rehabilitation. A retrospective series of 107 procedures. *Arch Plast Surg.* 2015;42:438–445.
50. Gurunluoglu R. Reply: Outcomes analysis of patients undergoing autoaugmentation after breast implant removal. *Plast Reconstr Surg.* 2014;133:218e–220e.