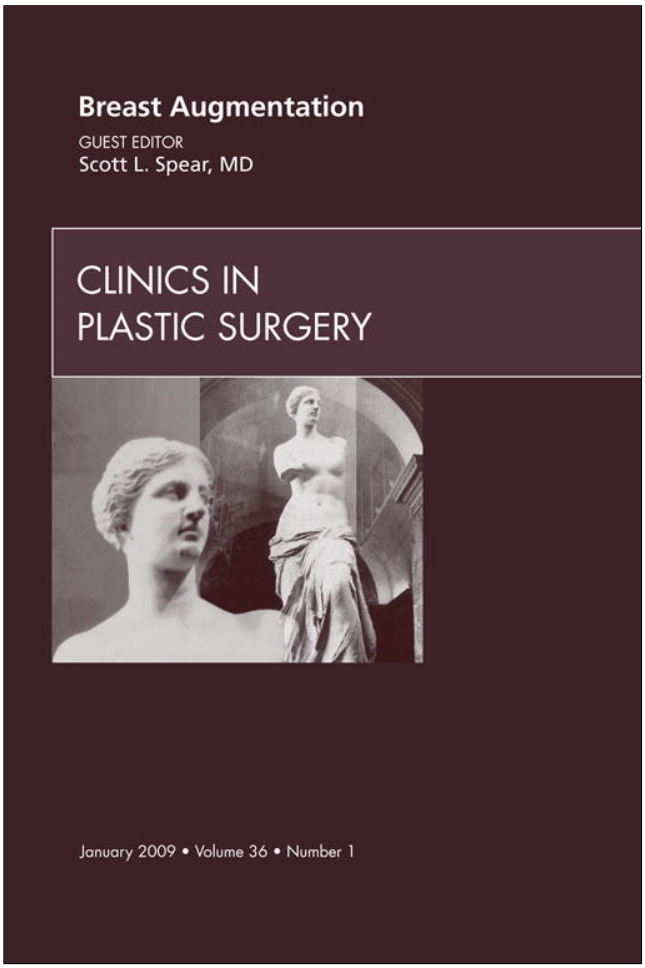

The Inframammary Approach to Breast Augmentation

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KEYWORDS

• Breast • Augmentation • Enlargement • Cosmetic
• Surgery • Inframammary • Incision • Complications

The inframammary approach to breast augmentation is the standard to which all others must be compared.

Patients and surgeons frequently reduce the discussion of incisions to a debate over the best location of the scar. Yet the final scar is the least profound difference between the various incisions. Each scar location requires exposure of and risk to very different anatomy, provides the surgeon with different levels of visualization of the critical portions of the operation, causes differing degrees of swelling and recovery, and has effects on the final outcome that will often be more significant to the patient than her scar.

As an example, the McBurney and Rockey-Davis incisions for appendectomy vary in the position of the incision; however, the operations are otherwise the same, encountering identical anatomy, risks, and benefits once beneath the skin. In contrast, breast augmentations through different incisions are quite different operations in very important ways.

Dwelling on the scar is understandable because the other issues are not immediately visualized or even understood by the patient. A paucity of well-controlled studies documenting these differences allows surgeons the freedom to suggest to patients the incision with which they most feel comfortable or to perform any incision the patient requests without pause for thoughtful discussion.

For a patient considering a breast augmentation who has no previous scar on her breasts and is reluctant or ignorant about the totality of breast augmentation risks, focusing on the scar is understandable. But to do so ultimately is puerile, and the surgeon educating the patient should inform her of other issues that need to be considered.

For the plastic surgeon, it is often easier to agree to a patient's request for a particular incision than to educate her to consider another. Experience and familiarity with an accepted technique creates little impetus for change. For many surgeons, the choice of incision occupies an important marketing niche for their practice, allowing them to offer incisions they can tout as "hidden around the areola," "no scar on the breast," or "hidden in the crease underneath the breast."

I must emphasize that all three incisions—transaxillary, inframammary, and periareolar—are all obviously fully acceptable. But patients should be aware and surgeons should remind themselves that there are many characteristics that distinguish the approaches other than the scar, and the selection of the incision should include consideration of those issues in addition to the location of the scar.

THE SCAR

I believe that scar location should be a low-priority issue when selecting an incision. But because it remains the focal point for most patients and surgeons, it warrants discussion first. Patients obviously want the most inconspicuous incision, and plastic surgeons want to deliver it to them.

But no matter which approach a surgeon prefers, that surgeon is capable of "selling" that incision to most patients. The transaxillary surgeon would tell patients that the armpit incision is off of the breast and heals so well that it is almost

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Clin Plastic Surg 36 (2009) 33–43
doi:10.1016/j.cps.2008.08.008
0094-1298/08/$ – see front matter

impossible to find. The periareolar surgeon would argue that placing the skin around a natural anatomic border renders it the most inconspicuous and that the thin skin of that area consistently yields thin and nearly invisible scars. The inframammary surgeon would argue that an inframammary fold scar is hidden within the crease under the breast, less noticeable than a mark from an underwire bra, and cannot be seen unless the arm is raised over the head with an observer beneath the breast. And the periumbilical surgeon would argue that a scar within the belly button is the epitome of scarless breast surgery because many women have had laparoscopic procedures through the belly button and those scars are barely noticeable.

Which of these arguments is the most correct? If any one of the scars were commonly unacceptable, then that technique would have long since been abandoned. If any one of them had invisible scars without other trade-offs, then everyone would have switched to it by now.

What can we say about the scars? No study has compared patient satisfaction with scars in randomized trials. I have seen very poor scars from all three methods. These problematic scars have been a result of poor execution, patient biology, or both.

Transaxillary incisions must be made at the apex of the axilla, within or parallel to a skin crease. It should not be diagonal, nor should it cross the latissimus or the pectoralis major muscles. When these errors are made, the incision can be unsightly, but the technique should not be condemned due to misexecution.

Periareolar incisions can be excessively visible if they are within the areola, which sometimes yields a hypopigmented scar within a sea of dark areola (though this is easily repairable with cosmetic tattooing). A periareolar incision that is made out beyond the border of the areola can be conspicuous.

An inframammary incision must be made precisely at the inframammary fold. If the location of the fold is going to be preserved, then the incision should be made exactly within the pre-existing inframammary fold. But if the fold is going to be lowered, its precise location should be determined and the incision made exactly at that location. For years, surgeons were improperly taught to make the incision above the inframammary fold so that the scar would not be visible if a woman were wearing a small bikini or bra and raised her hands above her head. But an incision within the crease typically heals so well, that even when the hands are raised and the bra rides up, it is scarcely visible. When the incision is made above the fold, however, the pressure of the implant on the lower pole of the breast frequently causes the scar to widen and hypertrophy. It is probably because of the errant advice to place the scar above the fold that this approach developed a reputation among some for giving a suboptimal scar. Placement of the scar above the fold should similarly be viewed as a suboptimal execution of the approach, and the incision should not be condemned as a result of it.

Whichever incision is used, surgeons must remind themselves that a scar can be no better than the condition of the skin edges that are approximated. Beveling, scratching through the dermis with multiple knife passes, cauterizing too close to the skin edges, not trimming the skin edges if they were abraded with retractors, putting too much dissolvable suture superficially, closing with uneven sutures, applying too much tension in the sutures, and leaving sutures in too long are all avoidable causes of unsightly scars.

More common and profound than suboptimal execution of the surgery are poorly understood issues of patient biology and wound healing. These issues can yield scars that are thick, raised, painful, and pigmented. Why a surgeon who performs a procedure the same way with excellent scars suddenly gets a patient who has a bad scar is a vexing problem.

Although uncommon in the axilla, when such scars occur, the patient is stuck with a scar that is visible in a bathing suit and in any shirt or dress that is sleeveless. Instead of what could likely have been a bad scar around the areola or in the inframammary fold that could have been covered by clothing and only exposed to intimate friends, she now has a problematic scar that cannot be hidden. Again, although such scars can occur in the axilla, it appears to be a relatively privileged place in terms of scars, and it is fortunate that such scars are uncommon. But the unfortunate few with bad axillary scars are subjected to embarrassment and difficulty in finding clothing to cover up this telltale sign of a breast augmentation.

Hypertrophic, hyperpigmented, and widened scars are much more common with the periareolar than either the transaxillary or inframmary approaches. The reasons are unclear, but I have seen many such patients who had their surgery performed by surgeons known for their expertise with the periareolar approach and personally known by me to perform technically excellent surgery (**Fig. 1**). Although the axilla is a favored area in darker, oilier, and more pigmented patients, the same is undoubtedly not the case with the areola. I have seen only a handful of unacceptable axilla and inframammary scars, but I have seen countless bad areola scars in which the issue was

Fig. 1. There are many photos showing inconspicuous and problematic scars from all three incisions. A truly bad transaxillary scar is very rare, and a bad inframammary scar is at least relatively hidden beneath the breast, so long as it is at the inframammary fold. But a bad periareolar scar is unconcealable, visible to all, and more common than is acknowledged. This particular incision was made by an excellent surgeon who is a proponent of the periareolar approach. This photo is just one of literally scores of bad periareolar scar photos I have collected. During the same collection period, I gathered just a handful of photos showing bad transaxillary and inframammary scars.

Fig. 2. The first procedure this patient ever had was a mole excision in the lower outer quadrant, leaving an erythematous and hypertrophic scar. For that reason, she selected a transaxillary approach for her augmentation. The transaxillary scar is shown here over five years after surgery, and is frequently visible in sleeveless clothing. When she later required a complete capsulectomy, a periareolar incision was used, which is shown here two years after surgery and laser treatments. Imagine if she had the same poor quality scar in the inframammary fold: she would have had only one scar and it would only have be visible when undressed and supine.

patient biology and not the technical prowess with which the surgery was performed.

So long as the inframammary scar is made to lie within the inframammary crease, it too is a relatively biologically privileged position. Even if all is executed properly, some inframammary scars do get hypertrophic and hyperpigmented. When the breast is small and the crease ill defined, such scars can be quite visible; however, when the breast is large or there is any ptosis, even the thick or red inframammary incision can be difficult to see.

The question that we need to answer is how good or bad is each incision likely to end up. There are no data available to resoundingly answer this issue. One thought experiment, which can be done with a patient, is the following: ask the patient where they would want the scar if they knew the scar would be totally invisible. All will tell you they would want it where there would be the least pain, the easiest recovery, and the best chance to not encounter problems; it would be every issue other than the scar. Then ask the patient where they would want the scar it if they knew it would be terrible (**Fig 2**). Draw on them with a black felt-tip marker in their axilla, around the areola, and in the inframammary fold. If that would be their scar, which would they prefer? I have done this on patients for years, and over 90% choose the inframammary scar because the axillary scar would be visible in all sleeveless clothing and the periareolar would be visible to anyone looking straight at the breast. The inframammary incision is usually largely hidden beneath the breast, particularly after an augmentation.

REOPERATION

The most objectively quantifiable end point of breast augmentation is the need for revision surgery. Tests are being developed to assess patient satisfaction and other important indicators of success, but as of this date, there are no large series comparing patient satisfaction between the various incisions.

Reoperations remain a significant problem, with nearly one in five women requiring one in the first 3 years following breast augmentation. Unpublished data from the Inamed (now Allergan) Corporation's 3-year pre-market approval data showed a statistically significant, 5.5 times higher reoperation rate through the axilla than through the inframammary fold, and a 2.5 times higher reoperation rate through the areola than through the inframammary fold (Scott Spear, personal communication, 2008). These patients were not randomized, nor were the surgeons. Unless it turns out that patients who wanted the axilla or areola approaches were

somehow more predisposed to want revisions than patients who wanted the inframammary approach, or that the transaxillary surgeons in the study were somehow less skilled than the inframammary surgeons in the study, these findings point to a substantial advantage of the inframammary approach over the others.

CAPSULAR CONTRACTURE

Although there are no randomized prospective data that have analyzed the differences in capsular contracture rates between different incisions, the best data to date on capsular contracture rates were based on series of patients who overwhelmingly had the inframammary approach. Even though these patients were not randomized or compared with women having other incisions, until equivalent data are generated with other incisional approaches, the literature supports the use of the inframammary incision.

An abundance of information suggests that bacterial contamination on the implant surface contributes to inflammation of the breast implant capsule. The statistically significant reduction in capsular contracture rates when specific antibiotic or povidone-iodine (Betadine) irrigation is used demonstrates the role of bacteria in capsular contracture. Cultures of periprosthetic tissue and fluid in cases of capsular contracture frequently produce growth of a number of organisms that occur within the breast tissue.

Contact of the implant with breast tissue and the organisms known to reside therein is minimized with the transaxillary and inframammary approaches and occurs to the greatest extent with the periareolar approach. Avoidance of such contact is so important that many surgeons describe putting a sterile drape over the nipple so as to not have any microscopic nipple discharge contaminate the field when performing an inframammary or transaxillary augmentation.

Given how common mastitis is during lactation, women understand that their nipples are open to the outside and that it is normal for potentially harmful bacteria to live within their ducts. When they learn about possible contamination, they are often wary about selecting the periareolar approach.

PRESERVATION OF TISSUE COVERAGE

Maximizing tissue coverage is the single greatest priority in breast augmentation. Inadequate coverage leads to implant visibility and palpability, to pressure atrophy of the parenchyma, and to skin stretch. Correcting such tissue coverage problems are the most daunting issues in secondary breast surgery.

Although there should not necessarily be a difference in tissue coverage between the various approaches, the periareolar approach is the most prone to inadvertent and often unavoidable sacrifice of tissue coverage (**Fig. 3**). No matter how the dissection is done, there is inevitably some disruption of the fibers that connect the pectoralis muscle to the overlying gland. After the muscle is divided along the inframammary fold, these fibers serve a critical role in holding the muscle down toward the inframammary fold and maintaining muscle coverage over the lower pole of the breast. But when these fibers are divided even a little, the caudal cut edge of the muscle retracts strongly superiorly, inadvertently converting what should have been a dual-plane type I to a type II (caudal cut edge of pectoralis laying at approximately the lower border of the areola), a type III (muscle to about the upper border of the areola), or even far superior to that, such that little or no muscle is available to cover the implant.

This issue of coverage is not a problem with the transaxillary approach because it would take an intentional effort—(**Fig. 4**) and a difficult one at

Fig. 3. The patient is shown just after removal of subpectoral implants placed through a periareolar approach. The dotted line indicates the caudal border of the pectoralis. Though she had "retromuscular" pockets, the implant itself had negligible if any coverage because the muscle was so high it could cover only a bit of the implant, and the pressure of it probably pushed the implant away. Although her muscle was still attached to the sternum, the muscle had been inadvertently detached from the overlying parenchyma, thereby allowing it to window-shade up far higher than would be ideal, even for a dual-plan type III. It is almost impossible to create this deformity with the transaxillary approach, possible with the inframammary, but endemic with the periareolar approach.

Fig. 4. Revision being done through original periareolar incision. First operation was ostensibly retromuscular, but note that there is capsule in front of the muscle as well as behind it. This is because excessive release of attachments between muscle and gland allowed the muscle to slide so far cephalad that the muscle slipped beneath and in front of it. The dotted diagonal line indicates the caudal free edge of the muscle, which is higher than even a Dual Plane III in a patient who needed either a Dual Plane I or a partial retropectoral pocket. This thin patient has permanently lost significant muscle coverage.

that—because it would involve retrograde endoscopic dissection to disrupt those fibers between the muscle and the gland. Although it is easy to inadvertently overdissect superficial to the muscle with the inframammary approach, it is also easy to control the premuscular dissection from the inframammary pocket, and it therefore gives the most control over the type and accuracy of dual-plane dissection performed.

It is not just compromise of muscle coverage that is at risk with the periareolar approach. Subcutaneous dissection down to the inframammary fold to avoid dissecting through the parenchyma inevitably results in some degree of detachment of parenchyma from the over lying skin (because of the subcutaneous tunnel) and detachment of the deep surface (because of creation of the pocket for the implant.) the parenchyma from the skin on its superficial surface (because of the subcutaneous tunnelling) and muscle on its deep surface (from creation of the pocket.) With nothing holding the breast mound down, placement of the implant can result in a superior migration of large portions of the breast, resulting in an implant whose lower pole can be located in essentially a subcutaneous position. This is an extremely difficult problem to correct, and results in significant deformity (**Figs. 5** and **6**).

USE OF INCISION FOR REVISIONAL SURGERY

With nearly one in five women requiring a reoperation on her breast augmentation within 3 years, it is important to consider the surgeries a woman may have in her future. Some have described

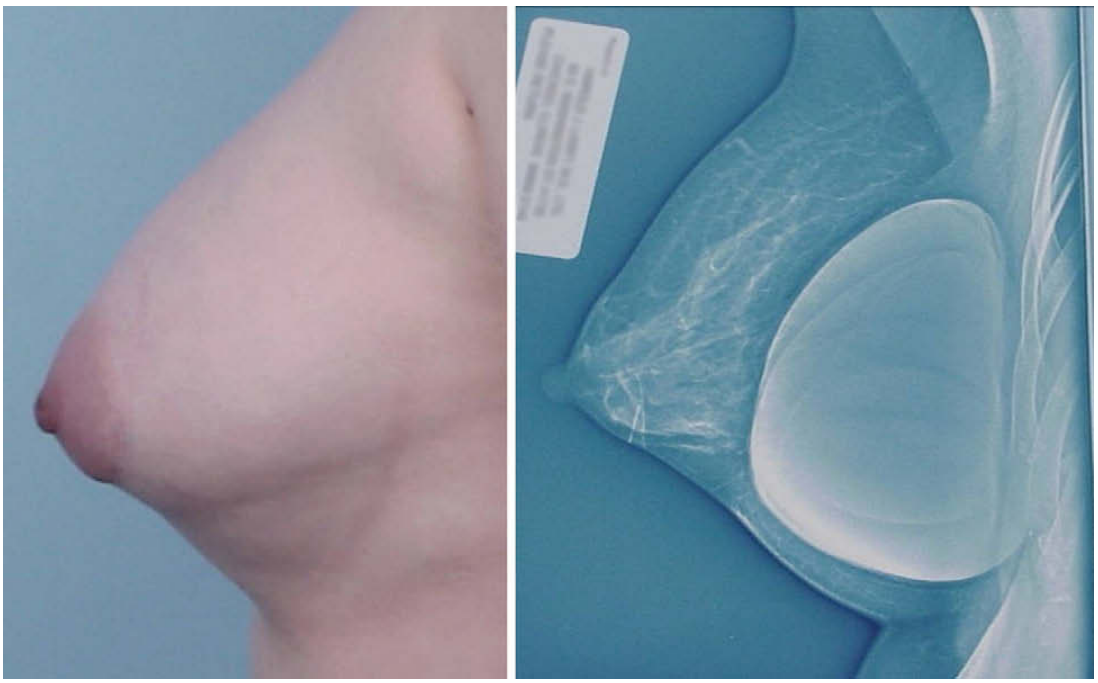

Fig. 5. This patient complains of a deformity following a periareolar augmentation. There is a visible step-off and the implant is easily palpable. The Xeromammogram explains why: there is no parenchyma over the lower pole of the implant. The original operative note described dissection from the periareolar incision to the inframammary fold through the subcutaneous plane.

Fig. 6. A preop photograph shows that she did not have tuberous breasts; parenchyma was normally distributed and extended down to the inframammary fold; the superior shift of her parenchymal mass was due to the subcutaneous dissection from the inframammary incision. While this is an extreme case, some degree of vertical tissue shift frequently occurs with the periareolar incision when a subcutaneous dissection technique is utilized.

performing a capsulotomy or lowering the inframammary fold through the transaxillary approach. But a periareolar or inframammary incision is necessary in order to conduct a complete capsulectomy, conversion to a dual-plane, capsulorraphy, conversion from saline to a large silicone implant or a cohesive implant, or to create a neoretropectoral pocket. There are many patients who started with a transaxillary incision because they did not want an incision on their breast who subsequently required an additional scar in the inframammary or periareolar location in order to perform a revision operation. This occurs so commonly that the eventuality of having a second scar should be explained to all patients considering a transaxillary incision, and those unwilling to ever have a scar on their breast should probably not have a breast augmentation at all.

The utility of the periareolar incision for revision depends on the size of the areola and the amount of tissue. A small areola with an abundance of parenchyma can result in a long tunnel with poor visualization and access with which to perform a revision, but a large areola with little parenchyma can give the largest possible exposure. If there is a hard and spherical contracture, by virtue of essentially being at the equator of the implant, then the periareolar approach can offer excellent visualization. When operating on capsular contracture, however, avoiding contamination of the new implant by going through the periareolar incision is an issue that must be considered.

Overall, there is scarcely any revisional breast surgery that cannot be done through the inframammary approach, although there are select examples in which the periareolar approach has exposure advantages. But it is irrefutable that the inframammary approach is most likely to work for the widest variety of possible augmentation revision procedures.

ABILITY TO PERFORM DUAL-PLANE POCKETS

One of the most important debates in breast augmentation is between advocates of submammary pockets and those of submuscular pockets. Most of the advantages of each are retained and most of the disadvantages of each are eliminated with the dual-plane approach. With the inframammary incision, a dual-plane approach can be thoroughly and precisely executed. It allows for direct digital assessment of the lower pole for restriction by unreleased muscle, and direct visualization of the muscle to allow for symmetric, accurate, and bloodless division of the origins of the pectoralis along the inframammary fold and of the attachments between the pectoralis muscle and the overlying parenchyma. Dual-plane is a very important and powerful tool, and sacrificing the ability to take full advantage of it is a tremendous loss to the patient.

The transaxillary incision works to create a partial retropectoral pocket (origins of the pectoralis are not divided along the inframammary fold). A dual-plane type I, which divides the origins along the inframammary fold, can frequently be done, but it is exceedingly common to see transaxillary patients who have asymmetric division of the pectoralis, have inconsistent pectoralis division in which there are areas of skipped release, or even have division onto the sternum. Furthermore, it is not technically feasible given the instruments of today to perform a dual-plane type II or type III through the axilla, because to do so would require retrograde dissection and visualization at the farthest reaches of the pocket. The patients who require type II and type III for optimal coverage and aesthetics are numerous, and failing to achieve the proper degree of release and dual-plane type is illogical just to have an incision in the axilla.

While the transaxillary approach results in ''down-staging'' the dual-plane type II or III pocket to a type I or partial retropectoral pocket, the periareolar approach does the opposite: it converts most intended type I's to an unintentional type II or a type III—or beyond. The inadvertently ''window-shaded'' pectoralis muscle is commonly seen with the periareolar approach and often leads to an uncorrectable deformity. Even in skilled

hands, restricted visualization and unavoidable disruption of at least some of the attachments between the muscle and parenchyma invariably results in some shift of a type I to a type II, or a type II to a type III. A great many patients suffer irreparable tissue damage from well-executed periareolar incisions due to these factors.

PAIN, SWELLING, AND RECOVERY

Although Tebbetts reported 24-hour recoveries with all three incisions, most of his patients had the inframammary approach. There is little doubt that cutting through the breast tissue with the periareolar incision invariably results in an element of pain and swelling not seen when the parenchyma is left undisturbed with the inframammary approach. Although a bloodless and accurate transaxillary approach is possible, few surgeons possess the skill to conduct it in such a manner. Most use a blunt dissection approach, which not only often results in inaccurate releases at the inframammary fold but also frequently results in more pain and bruising than observed when dissection is done under visualization with bloodless techniques.

EFFECTIVE FOR WIDEST VARIETY OF IMPLANTS

The incision length for saline implants is limited by the visualization required to form the pocket, whereas the incision length for silicone implants is dictated by the size of the implant. Although a small silicone implant does not frequently require an incision any larger than required to dissect the pocket, progressively larger implants require larger incisions. The inframammary approach can be widened to accommodate implants of any size. There are limitations to the size of a silicone implant that can be introduced through the periareolar and transaxillary incisions that vary with the profiling of the implant (higher profile implants are more difficult to insert) and with the texturing on the surface.

The use of shaped implants requires accurate pocket dissection in which the pocket fits the shape of the implant to reduce the likelihood of rotation. Shaped implants can be placed through all three incisions; however, it takes a higher level of skill and experience to place these implants through the periareolar and transaxillary incisions. What is not known is whether, even at equivalent levels of expertise, there is a lower malposition rate through the inframammary approach. Logic would suggest that the enhanced visibility through this approach would increase the likelihood of dissecting a pocket that best fits the implant.

In addition to requiring precise pockets, form-stable breast implants are stiffer and less deformable, requiring a longer incision for atraumatic insertion. While excellent results have been reported through all incisions, the greatest number of results in published series of shaped form-stable implants has been with the inframammary approach. It is therefore the standard to which others must be compared.

REDUCES TRAUMA TO IMPLANTS

Manufacturer analysis of ruptured implants retrieved and returned for analysis overwhelmingly demonstrates by electron micrography that the most common cause for device failure is trauma at the time of surgery. This trauma can be due to excessive manipulation and pressure that causes weakness of the shell or due to damage from a fingernail or a sharp instrument. Implant trauma has been recognized as an important factor contributing to shell failure that can be nearly eliminated as a future cause for device rupture. The practice of forcing large implants through small incisions that was de rigueur in the past is no longer considered acceptable.

There are no data that specifically demonstrate a difference in device failure rates using the various incisions, but the stresses are different through each of the approaches. The inframammary and periareolar approaches appear to place the greatest risk to the implant from the needle at the time of closure because the implant is very close to the layer that needs to be closed; the transaxillary closure is more remote from the implant. Careful retraction and use of instruments to protect the implant should minimize this risk.

When implants are large relative to the incision size, as can occur with the periareolar and transaxillary approaches, excessive trauma to the implant can occur. One option in these situations is to consider the use of saline implants; another is to consider the inframammary incision if it would allow for less implant trauma in these patients.

SURGICAL TECHNIQUE OF THE INFRAMAMMARY APPROACH

The first step is to determine the ideal position of the inframammary fold. It is calculated from the nipple with the tissue placed on maximum stretch. In general, the standard of 7 cm for a base width of 11 cm, 8 cm for a base width of 12 cm, and 9 cm for a base width of 13 cm produces an ideal aesthetic outcome. If the inframammary fold is already at that height, it does not need to be altered.

An incision is made at the proposed inframammary fold (**Fig. 7**). Dissection is carried straight down to the muscle fascia with the electrocautery, taking care not to skive inferiorly. There is a natural tendency of the cut edge of the tissue to pull inferiorly, so the dissection may angle superiorly—but only for the purpose of not undercutting the skin edge and inadvertently lowering the fold more than intended, if at all.

The fascia is scored carefully with the cautery so that the muscle is visible. Place in a double-ended or army-navy retractor with the tip pointed toward the medial border of the areola (**Fig. 8**). With no horizontal dissection yet made, there will be little to hold the tissue up onto the blade of the retractor, so use the ulnar fingers of the retractor-holding hand to pull the tissue onto the blade. Lift up toward the ceiling. Only the pectoralis will tent up. If the muscle does not tent at this point, it may be that the muscle is tight or that it is not the pectoralis. To ensure that it is the pectoralis and not the serratus, rectus, or intercostals, touching it with the cautery will make the pectoralis in the upper chest contract. If still not clear, only then dissect just a couple of millimeters along the muscle surface in a cephalad direction. These are the important fibers that you want to preserve to hold the muscle down after you divide pectoralis origins along the inframammary fold, so sacrifice no more than necessary for the anatomy to be clear. This step will allow you to see the fibers of the muscle and allow some tissue to lie over the blade of the retractor, thereby allowing the pectoralis to tent up.

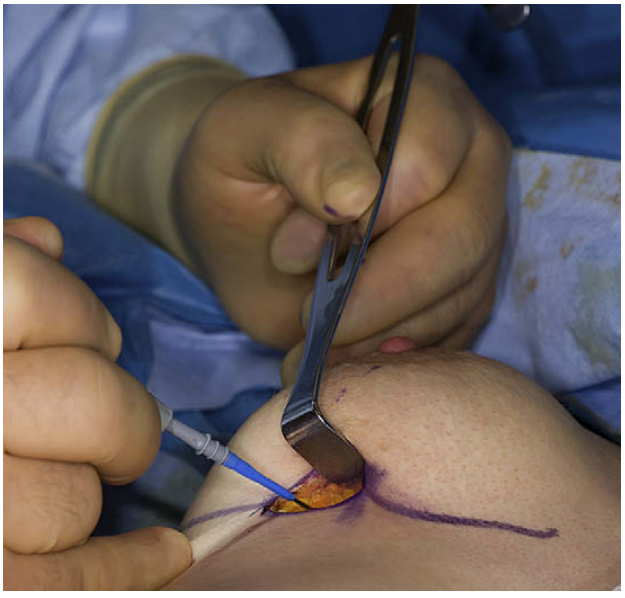

Fig. 7. An incision is made cleanly through the dermis with a single pass of the knife. The cautery is used to dissect down through the subcutaneous tissue to the muscle, taking extraordinary care not to inadvertently skive inferiorly. Do not allow an assistant to place a retractor on the inferior cut edge because this risks overlowering the inframammary fold. The goal is to go straight down to the muscle, and aiming slightly cephalad helps to achieve this.

Fig. 8. After you see muscle fascia, aim a retractor at the medial border of the areola and lift up. This process will tent the pectoralis major fibers. Lower your hand so that you can Bovie into the tented fibers, with the angle of cut parallel to the floor.

Again, advance the retractor blade to the edge of the muscle, pointing the blade towards the medial border of the areola, pulling the breast tissue onto the retractor and lifting up toward the ceiling. Because it is loose on its deep surface, the pectoralis will tent upward. Holding your hand down so that the cautery is horizontal, sweep gently the taut pectoralis fibers that appear vertical in front of you. Use hand-switching monopolar forceps because it allows precise control of blood vessels by squeezing and can be held together and used as a Bovie pencil.

So long as it tents, it is pectoralis. So long as your cautery is horizontal and parallel to the chest wall, the chest should be safe. Keep advancing the retractor forward and lifting up after every stroke of the cautery. With each motion of the cautery and repositioning of the retractor, the muscle will tent higher and the plane through the muscle will be more obvious.

With this maneuver, you will very quickly get through the muscle and will see the subpectoral space (**Fig. 9**). Free up areolar tissue that is immediately in front of the incision. Be alert for a perforator inferomedial to the areola and use the hand-switching monopolar forceps to coagulate it and other vessels that are seen.

Turn the retractor blade medially along the inframammary fold toward the sternum. Controlling the tension of the retractor blade on the muscles with fingers on the outside of the

Fig. 9. Keep advancing the retractor and bovie only elevated fibers; this will help assure you are dividing pectoralis and not intercostal muscle fibers. After a few swipes with the bovie, you will have divided the pectoralis and entered the retropectoral space.

breast, use the cautery to divide the muscle about 1 cm above the proposed inframammary fold (**Fig. 10**). This may serve as a shelf to help support the implant; it prevents overlowering of the fold and allows point coagulation of the blood vessels. Cut through the muscle and the overlying fascia. This should be bloodless and very easy to visualize.

In fact, this dissection is so anatomic that you should expect to be able to do this dissection without needing to place a single four-by-eight gauze

Fig. 10. After the retropectoral pocket is made, the pectoralis is divided 1 cm above the proposed inframammary fold. Note the use of the ulnar digits on the retractor hand pressing the muscle under tension so that it splits as it is divided. The superior and inferior cut edges are visible. When this is divided up to the sternum, a dual-plane type I will have been created, as shown in this photo. Depending on the tension of the tissues, the muscle will window-shade up 1 or 2 cm; in this case, the muscle is about half the width of the retractor blade above the inframammary fold.

into the pocket. Look beyond the tissue plane immediately in front of you, and anticipate and visualize the perforators ahead of time.

Continue all the way to the sternum but do not proceed up the sternum at all. If you are unclear where this point is, mark it with an "X" externally on both sides preoperatively.

Continue the dissection sweeping superolaterally, then sweeping inferiorly. This technique helps to define the plane between the pectoralis major and the pectoralis minor, which are more intertwined when the dissection in that area starts inferolaterally rather than superolaterally.

Irrigate with antibiotic solution and inspect the pocket. Take note of the long, narrow V-shaped trough where the muscle was released inferomedially and window-shaded a bit superiorly. Inspect where the cut edge of the pectoralis is relative to your incision; sometimes it is just a few millimeters beyond it and sometimes it is already window-shaded several centimeters. This distance will vary based on whether connections between the pectoralis and parenchyma were inadvertently divided when entering the retromuscular space and how tight the given patient's connections are between the pectoralis and breast tissue. The more directly one enters the retropectoral space without any premuscular dissection, the lower the caudal cut edge of the pectoralis will sit.

Place a finger in the incision and feel the lower border of the muscle and lift up, taking note of the position of the muscle through the skin as shown by the position of your finger. This inspection process is not only important to define what you need to do for that specific patient but, when done repeatedly, also provides the surgeon with a valuable experience about the dynamics of the muscle and the soft tissue.

If the intention is to do a dual-plane type I, by virtue of the muscle division along the inframamary fold, the dual-plane portion of the dissection is complete. The implant can be placed and the incision closed.

If the goal is to do a dual-plane type II or type III, then now is the time to do a release between pectoralis and overlying gland (**Fig. 11**). This release is gradual and incremental. It cannot be overstated that substantial differences in position of the caudal edge of the pectoralis are created by just several millimeters of dissection. Surgeons ask why they cannot dissect between the muscle and the gland before dissection the retromuscular pocket, and the reason is that such small amounts of dissection result in significant movement of the muscle that it is impossible to predict where the muscle will end up before dissecting the pocket and releasing the inframammary fold.

Fig. 11. To go from a dual-plane type I to a type II or type III, the fibrous connections between muscle and the overlying parenchyma must be taken down. Just a few sideways swipes with the cautery is enough to cause significant movement of the muscle.

With the curved end of a double-ended retractor placed in the incision, abutting the caudal edge of the muscle but with only breast tissue within it, use the other fingers of the retractor hand to push in on the breast so that together with the retractor, it is putting tension between the muscle and the overlying gland (**Fig. 12**).

Visualize the fascial connections between the muscle and gland and use the cautery to gradually cut these using sideways sweeping motions. You will see the muscle quickly pull away from the retractor and slide upward. After doing this for several millimeters, move the retractor medially and laterally and repeat this process wherever you feel it is necessary along the entire inferior edge of the muscle.

Rather than repeating this motion in the same area, keep moving around, taking down the attachments a little at a time, because this will give the most control over the final position of the muscle.

Although illustrations may suggest that dual-plane types I, II, and III are distinct entities, they are part of a continuum of options (**Fig. 13**). Their designations are designed as a guide to enable us to think about a clinical situation and compare notes. In any given patient, however, the muscle does not necessarily end exactly at the lower border of the areola (type II) or the upper border of the areola (type III.) Rather, the release is made to the extent that is necessary to achieve removal of muscle coverage where it is restricting expansion of the lower pole while retaining maximal coverage elsewhere (**Fig. 14**). The goal is always to maximize coverage; the release is customized to each breast in order to allow lower pole expansion only when and where necessary.

The most important point is to not overdo it. You can always release more, but after it is released, it is difficult if not impossible to pull the muscle back down. Put your finger back in as you did before and note the change in position of the muscle that resulted from the release. Feel all along its edge and go back and release more where you feel it is necessary.

If you feel bands within the breast that are restricting expansion, such as with a constricted lower pole or when the inframammary fold had to be lowered with a tight inframammary fold, then now would be the time to score the lower pole, much as you might have done with a submammary pocket.

Irrigate again with antibiotic solution (**Fig. 15**), recheck for bleeding, place the chosen implant, and close per the usual routine.

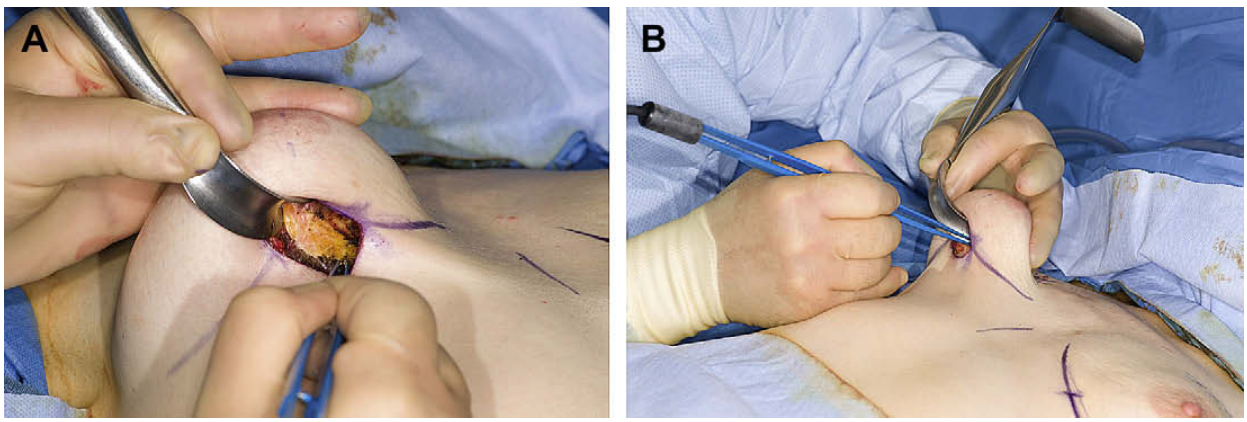

Fig. 12. (*A*) After just a few swipes of the cautery freeing up some attachments of the muscle to the gland, the muscle moves cephalad. The fresh yellow fat shows the significant motion of the muscle relative to Fig. 11. Again, note the use of the ulnar digits against the retractor to create tension at the muscle parenchyma border, thereby making the dissection more precise and facile. (*B*) When a dual-plane type I is converted to a type II or type III, note how the hand and the retractor are used as a unit to create tension at the muscle/parenchyma interface.

Fig. 13. In this case, the muscle is released to the lower border of the areola, which is a so-called dual-plane type II. When it is released to about the upper border of the areola, it is termed a dual-plane type III.

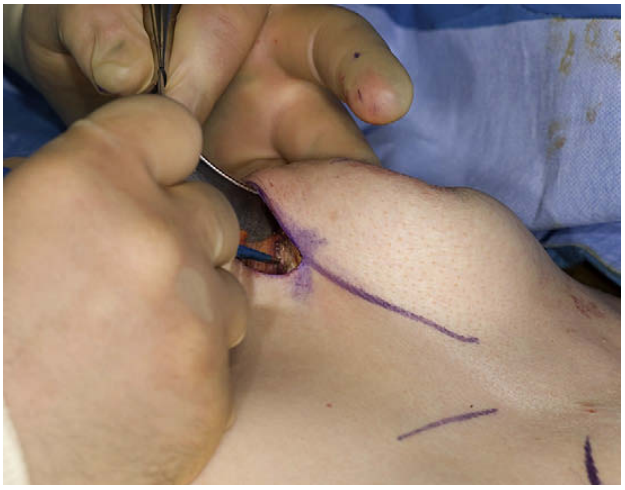

Fig. 14. Here the release is being done more laterally. It can be adjusted on each breast exactly as the conditions necessitate.

Fig. 15. Copious irrigations with Adams solution (50 mL povidone-iodine [Betadine], 80 mg gentamicin, 1 gram cefazolin sodium [Ancef] in 500 mL normal saline) is used throughout the operation. Note the yellow fat visible just beyond the retractor; the cut edge of muscle is just visible.

SUMMARY

A basic tenet of surgery understood by every intern is that a surgeon should select the most anatomically direct approach to the area of concern unless a different approach avoids critical anatomic structures. The defining aspect of the breast augmentation operation is the accuracy and symmetry of the pocket creation, and the most critical aspect of this dissection lies at the inframammary fold. The inframammary approach unquestionably offers the greatest visualization of this area and results in the least damage to normal tissue. The transaxillary and periareolar approaches create trauma to tissue that is undisturbed using the inframammary approach, and does so at the price of less visualization of the critical aspects of the surgery.

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