Breast Augmentation

Scott L. Spear, M.D., Erwin J. Bulan, M.D., and Mark L. Venturi, M.D.

Washington, D.C.

Learning Objectives: After studying this article, the participant should be able to: 1. Understand the different variables that are inherent to breast augmentation. 2. Identify certain breast shape characteristics that make one approach more advantageous than others. 3. Take into account certain patient characteristics to develop a logical surgical plan for breast augmentation.

The optimal technique for breast augmentation has always been debated, and numerous variables fit the needs of the variously shaped patients in our population. The purpose of this article is to present the advantages and disadvantages of the various techniques available in breast augmentation so that, in conjunction with the patient’s physical examination, a sound surgical plan can be developed for aesthetic augmentation of the breast. (Plast. Reconstr. Surg. 114: 73e, 2004.)

According to the American Society of Plastic Surgeons, more than 206,000 breast augmentations were performed in the United States in 2001, a 533 percent increase over 10 years ago and a 56 percent increase when compared with 1998 statistics.1 Breast augmentation has sparked considerable debate in the political realm with regard to the safety of breast implants, as well as collegial disagreement over the technical aspects used to create an aesthetic breast. When broken down into its parts, the procedure of breast augmentation confronts the surgeon with three distinct variables requiring decisions in the preoperative process: (1) implant selection, (2) incision location, and (3) pocket plane.

The purpose of this article is to provide the surgeon with the advantages and disadvantages of the various techniques available to make a sound clinical plan. The beauty in plastic surgery is that there is no one implant, incision, or pocket plane that is appropriate to treat every patient. It is this notion that makes breast augmentation both an art and a science.

IMPLANT SELECTION

Silicone versus Saline

The decision made by the U.S. Food and Drug Administration more than 10 years ago that resulted in the moratorium on silicone implants has narrowed the implant choices. At present, there has been no evidence to show a link between silicone gel–filled implants and any systemic medical illnesses including autoimmune disease, connective tissue disorder, or cancer.2-7 Nevertheless, for cosmetic augmentation, saline implants remain the only choice available to plastic surgeons in the United States. Silicone gel–filled devices are reserved only for specific secondary and reconstructive augmentation applications in Food and Drug Administration–sponsored adjunct studies. Like a pendulum that has reached its terminal apex, we expect that silicone implants will once again return to favor and be approved by the Food and Drug Administration by the time this article appears in print, some time in the year 2004. During the last 10 years, there have been improvements in manufacturing standards and quality and improvements in implant design, notably low-bleed silicone elastomer shells, more cohesive silicone gels, and implant shell surface texturing. As a result of intense scrutiny, the net effect during the last 10 years has been an improvement in the quality and safety of these devices.

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Although at this writing saline remains the only option available in the United States, the next generation of silicone implants merits discussion. In the absence of capsular contracture, saline implants exhibit several problems, such as palpability and firmer consistency, compared with silicone implants. Much of the earlier literature involving silicone implants dealt with their potential for capsular contracture and silicone bleed leading to granulomas. Although we have noted that there is no credible evidence linking silicone gel implants to any systemic illness, the fear of “escaping” silicone gel is present. The next generation of silicone implants, already in use outside the United States, contains a soft cohesive gel that is slightly firmer than earlier silicone gel implants. This cohesive gel implant is a formable device that retains its anatomic shape even with some degree of capsular contracture or loss of integrity of the shell envelope. When cut or ruptured, the shape of the implant remains intact and the silicone does not run out. One aspect of these devices is that their use requires a careful evaluation of the patient’s chest dimensions to determine the appropriate style of implant. The devices are available in a wide variety of dimensions that vary in height and projection. There has been a large experience with these implants in Europe, where they have proven to be very popular.

Smooth versus Textured

Surface texturing is one option available today for breast implants. Historically, textured implants have been found to lower the capsular contracture rate. A review of several different studies suggests that subglandular breast augmentation with smooth, saline-filled implants may yield a capsular contracture incidence per implant as high as 23 percent to 40 percent compared with textured surfacing, which has the potential to reduce that contracture incidence to between 2 percent and 29 percent. This is at the cost of more visible rippling and greater palpability, as well as greater cost for the implant. The differences between textured and nontextured implants seem to decrease when both are placed in the subpectoral position. The incidence of capsular contracture with saline-filled implants may decrease to nearly 1 percent when the implant is placed in the subpectoral position. Therefore, surface texturing does not appear to offer a clear advantage in avoiding capsular contracture when the implants are placed submuscularly. Textured implants are recommended in patients with adequate soft tissue for whom subglandular positioning of the implant is desired.

Round versus Anatomic

The terms anatomic, shaped, or “teardrop” are all used to describe devices with a vertical axis that is different in dimension than the horizontal axis. Tall teardrop shapes are best suited for patients with a long chest or low breast position. A “reduced-height”-shaped device creates a relatively exaggerated width with abbreviated height to decrease upper-pole fullness. Overall, with an anatomically shaped implant, there is a diminished tendency toward upper-pole bulges, roundness, or distortion and greater volume support for the lower breast. Lately, there has been controversy about whether anatomic implants are really anatomic and whether round implants behave anatomically in vivo. From our experience, anatomic implants retain their basic shape, whether recumbent or upright, because of the shape built into the device. Round implants can appear somewhat anatomic given a loose periprosthetic space in the setting of an underfilled device. This situation, however, carries an increased risk of shell folds, visible rippling, and possibly early device failure. A caveat unique to using these shaped devices is implant rotation. Meticulous attention must be made not to overdissect the implant pocket, which would make rotation more likely. We recommend postoperative use of a support brassiere with a binder strip placed across the superior pole of the breasts for 10 to 14 days to minimize the risk of rotation.

Round implants can be considered to be more “forgiving,” enabling the creation of an aesthetically pleasing breast with a variety of patient shapes. In general, if there is an aesthetically shaped breast as well as relative volume to the existing breast, a round or shaped implant device is an appropriate choice. Certain body types, when augmented with round implants, have a greater risk of excessive upper-pole fullness and distortion. These body types include thin patients, patients with a high inframammary crease, patients with a vertically or horizontally deficient chest, and ptotic patients. In these instances, the anatomic implant provides valuable additional options to alter the shape of the breast.
INCISION SITE

Because of the ever-present patient concerns with scars, various techniques have been devised to minimize or hide the incision. Current choices include periareolar, inframammary, transaxillary, and periumbilical incisions. Patients present with certain anatomic variables, constraints, and desires that may make one approach more advantageous than another. Therefore, surgeons should be adept at several of these techniques. Figure 1 presents an algorithm to guide the selection of the incision site based on the characteristics of the breast. It is meant to serve as a relative guide, and the examples given below demonstrate how nipple size, fold position, and the need for additional procedures can be used to select an appropriate incision site.

Periareolar

The periareolar incision in many ways is the most versatile approach. It gives central access to all quadrants of the breast and is compatible with all the various breast implants and planes of dissection (Fig. 2). It is the most versatile incision when the inframammary fold is being lowered significantly, as well as the logical choice when considering or planning a simultaneous mastopexy. In addition, it is in the most appropriate location when breast parenchyma alteration is needed, as is the case with tuberous breast deformity. Although the diameter of the areola is a limiting factor when contemplating this approach, areolas as small as 25 mm in diameter (approximately the size of a quarter) will allow for the creation of a 4-cm incision along one half of the areolar circumference.17 Caution must be used in areolas that are lightly colored with indistinct margins, because the scars will not hide as well in those circumstances. Also, there have been preliminary reports suggesting an increased risk of changes to nipple sensation and lactation ability with the periareolar approach. Although these studies are small, retrospective, and not definitive, these issues warrant closer inspection.18,19

Inframammary

The inframammary incision represents the simplest and most straightforward approach to breast augmentation. Direct access to both the subglandular and subpectoral planes can be achieved without violating the breast parenchyma, and visualization of the breast pocket is unsurpassed by the other incision options. The scar is frequently inconspicuously hidden in

Fig. 1. Breast augmentation algorithm.
the well-developed inframammary fold and can often be seen only in the recumbent position (Fig. 3). In addition, the length of the incision can be of generous size to fit various implants. Certain circumstances, however, require thought as to where to make the incision. In patients with significant hypoplasia that causes an ill-defined inframammary fold or with a constricted breast and a breast fold too close to the areola, placement of the incision is less obvious. In these cases, once the implant is placed, the incision may lie above the new inframammary crease and be visible on the breast, or it may be too low and be visible beneath the breast. Special caution should be used in such instances, and the incision should therefore be at or just above the site of the anticipated new fold, as governed by the vertical diameter of the implant. Thus, the inframammary incision works best when the preoperative natural fold closely approximates the fold after augmentation.

Transaxillary

The transaxillary incision’s obvious appeal is that it avoids a scar on the breast. The scar is well concealed, and like the inframammary incision, it does not violate the breast parenchyma (Fig. 4). This incision is particularly advantageous in patients with small, minimally ptotic breasts with an ill-defined inframammary fold or small areola. An endoscope can be used in either the subpectoral or subglandular plane. It allows sharp dissection, accurate hemostasis, and precise release of muscular and soft-tissue attachments. Despite such advantages, there are definite trade-offs to such a remote approach. When compared with the other, more direct incision options, the transaxillary incision lacks the same degree of

Fig. 2. (Above) Preoperative views of a 26-year-old woman with hypoplastic asymmetric breasts with poorly defined inframammary fold and large nipples. (Below) Postoperative views approximately 12 months after periareolar dual plane augmentation with 390-cc (filled: right, 430 cc; left, 400 cc) McGhan style 68 saline-filled implants.
control and accuracy and theoretically has a higher risk of asymmetry and implant malposition. Because of this, it may have a higher revision rate. Furthermore, subsequent secondary procedures may be difficult or impossible with an axillary incision, and this may require a new incision that is located more directly on the breast. Because it would be difficult to adequately manipulate the breast parenchyma in complex cases such as the tuberous breast deformity, the transaxillary incision is also not recommended when substantial parenchymal rearrangement is required. Finally, the transaxillary approach is at a significant disadvantage when using shaped implants or large silicone gel implants, particularly those containing cohesive gel.

Transumbilical

The transumbilical incision is the newest approach to breast augmentation. Through an inconspicuous scar, a subcutaneous tunnel just above the rectus fascia is created to the breast whereby the implant pocket is created hydraulically with the use of expanders. Although it is described for use in the subglandular and subpectoral pockets, in our experience, the subpectoral plane is significantly more difficult. As with the transaxillary incision, the transumbilical incision is outside the aesthetic unit of the breast and thus poses less risk of implant extrusion. Unfortunately, both share the drawbacks of remote access. Its potential for inaccuracy increases the risk for implant malposition, particularly for textured or shaped implants. It would not seem possible to place a silicone gel implant of any significant size through the umbilicus. This method has not been approved by the Food and Drug Administration and is thus officially “off-label.” This does not prohibit its use, but it could place
the surgeon in a weakened position in defending an unsatisfactory result. Furthermore, problems with hemostasis and secondary procedures almost certainly would require a more direct incision. Because of the need for the upper abdominal tunnel, this technique should be used with caution in the very thin patient with minimal subcutaneous tissue or the obese patient where tunneling would be difficult. Overall, its advantages are greatest and most dramatic in selected patients who do not have a well-defined inframammary fold or an areola that would be suitable for a periareolar incision (Fig. 5).

**Implant Placement Sites**

**Subglandular**

In the history of breast augmentation, the development of various techniques for creating implant pocket planes is generally an evolution to better methods rather than a development of equally acceptable options, as is the case with various implant and incision choices. Early augmentation procedures involved placement of the implant in the subglandular plane. This was generally effective in patients with some amount of breast tissue and subcutaneous fat and the obvious place to start. It worked best when there was adequate soft-tissue coverage of the implant. In patients with less soft tissue, there is a higher risk of implant visibility, and a sharp transition can often be seen in the upper pole. In addition, there is substantial evidence that this position is associated with a higher incidence of capsular contracture. It is also clear that the subglandular plane is less satisfactory for mammography.

**Submuscular**

Total muscle coverage was developed as an option to reduce implant visibility and palpa-
bility and, ideally, to decrease the incidence of capsular contracture. This was, however, at the expense of adequate lower-pole shape and inframammary fold definition. In addition, late superior migration of the implants or pseudoptosis of the breast was seen in a significant number of women. This was a result of the gravitational effects on the breast against an implant still supported by the lower muscle panel. Since newer devices were developed that seemed to reduce the risk of capsular contracture, there became less need for total muscle coverage.

Subpectoral

Subpectoral placement generally refers to partial muscle coverage of the implant in its upper pole by the pectoralis major, with the lower portion of the implant being subglandular. This plane seems to achieve about as low a rate of capsular contracture as total submuscular positioning while also facilitating mammography. There is improved upper-pole breast contour because the muscle blunts the transition between the upper breast and the implant superiorly. The pocket dissection is easier overall in the subpectoral loose areolar plane, and the breast parenchyma is less devascularized, which is optimal for any planned breast shaping or mastopexy. Subpectoral implantation should be used with caution in patients with significant postpartum atrophy, glandular ptosis, and significant native tissue volume. These clinical situations are at a higher risk for developing a double-bubble deformity.

Dual Plane

The “dual plane” augmentation has developed as a variation of the subpectoral plane augmentation to minimize the risk of a double...
breast contour deformity. This variation, recently described by Tebbetts, helps to create a desirable breast shape utilizing the subpectoral plane in conjunction with the subglandular plane, which is adjustable for the less ptotic nulliparous breast to the more ptotic or loose breast. The key difference between dual plane and subpectoral implant sites is the use of a subglandular dissection that may extend above the level of the inferior border of the pectoralis major superiorly. For patients with minimal breast tissue, dissection only proceeds for a few centimeters. For patients with more breast soft tissue leading to ptosis, the subglandular dissection may continue up as far as the level of the superior border of the areola. The dual plane pocket should allow for implant placement and soft-tissue redraping, creating a more aesthetic lower-pole contour and avoiding a double-bubble deformity.

“Nonsurgical” Breast Augmentation

Recent technology has been developed using external negative pressure devices to create enlargement in breast mound volume. Similar to the distraction theories that are well defined in osteosynthesis and found in orthopedic and craniofacial surgery, this negative distraction force induces breast tissue growth. To obtain such results, a stringent regimen is required: a brassiere-like system applying 20 mmHg of vacuum pressure to each breast is worn for 10 to 12 hours per day over a 10-week period to obtain an average increase of 98 percent over starting size. The stable long-term increase in breast size, however, is 55 percent. In addition, temporarily halting treatment can cause a recoil effect to occur. This system is touted as a means for breast enlargement without the pain and risk of surgery. One must be aware that these are preliminary studies and that long-term studies are needed to prove the validity of this technique. In addition, the volume added to the breast in the typical surgically augmented patient is significantly more than the 100-cc to 110-cc gain found with this system. More importantly, the patient compliance that is needed to achieve the suggested results leaves a huge variable that cannot be controlled by the plastic surgeon.

Conclusions

There has been and always will be continued debate regarding the optimal technique for breast augmentation. Numerous variables currently fit the needs of the variously shaped patients in our population. Although there is no one single technique that is considered “the best,” one must take the options that are available in conjunction with the physical examination of the patient to create a sound surgical plan for achieving an aesthetic-looking augmented breast.

Scott L. Spear, M.D.
Division of Plastic Surgery
Georgetown University Medical Center
1st Floor, PHC Building
3800 Reservoir Road N.W.
Washington, D.C. 20007
spears@gunet.georgetown.edu

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