Expansion-Augmentation of the Breast

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Background: Since the invention of the silicone gel-filled breast implant by Cronin and Gerow in 1963, breast augmentation has been a generally safe and reliable procedure. Expansion-augmentation was first introduced in 1984 with the gel-saline Becker expander. The implant controversy that began in 1991, however, caused plastic surgeons in the United States to switch to the saline-filled devices.

Objective: The purpose of this study was to compare saline expanders and standard saline implants with respect to deflation, infection, and reservoir extrusion—complications generally believed to differentiate the 2 devices. Various applications of the expanders are explored.

Methods: This study examines expansion-augmentation with the Mentor Spectrum postoperatively adjustable breast implant on 480 sequential patients beginning in 1993. The results were retrospectively reviewed and evaluated.

Results: No major complications or disadvantages were noted with the Spectrum expanders in comparison with standard saline implants. Several unique features of the expansion technique make this an exceptionally useful procedure for plastic surgeons performing breast augmentation.

Conclusions: Expansion-augmentation is an effective technique for the improvement of implant malposition, fibrous capsular contracture, and asymmetry of breast size and shape.

The breast has been synonymous with femininity in many cultures around the world from the beginning of recorded history. Examining images from antiquity, one can see that the breast has been either accentuated or diminished depending on what was considered fashionable at a particular period. Although the images of breast size appear to vary with the times, only in recent history has it been possible to increase or decrease breast size.

The first recorded surgical attempt to enlarge the breast was made in 1895, when Czerny tried to transplant a lipoma from an actress’s back to her breasts.1 Gersuny tried paraffin injections in 1889; the results were disastrous.1 In recent history, various creams and medicaments have been used in attempts to increase bust size. Berson (in 1945) and Maliniac (in 1950) performed dermafat flaps.2 Pangman introduced the Ivalon sponge in 1950,3 and various synthetics, including silicone injections, were used throughout the 1950s and 1960s. All of these attempts resulted in short- and long-term disasters.

In 1963, Cronin and Gerow4 developed the first silicone gel-filled breast implant with the Dow Corning Corporation (Midland, MI), and the era of more predictable breast...
augmentation began. Various implants were subsequently developed—some inflatable with saline and others inflatable with a combination of gel and saline. In 1982, Radovan5 developed the first generation of temporary tissue expanders for reconstructive use, and the concept of tissue expansion was born. In 1984, Becker,6,7 in conjunction with the Mentor Corporation (Santa Barbara, CA), developed the first permanent tissue expander designed specifically for breast reconstruction after mastectomy. The Becker expander soon found its place in breast augmentation.8-10 The concept of expansion-augmentation began in the late 1980s. The use of this implant was curtailed after the implant crisis of 1991, however, and the device was eventually supplanted by the Spectrum implant (Mentor), a permanent saline expander with a Becker valve, fill tube, and reservoir. Although the gel-saline Becker is still available for use with US Food and Drug Administration (FDA) restrictions, the prohibitive cost makes it unsuitable for expansion-augmentation, and it has essentially been replaced by the Spectrum saline implant, an effective permanent breast implant and expander in one.

The Procedure

Indications

Although breast augmentation is a fairly straightforward procedure, there are many variables involving size, shape, symmetry, and scarring that can lead to unpredictable and undesirable results. In these cases, expansion-augmentation offers a viable and more predictable alternative.

Size

Saline augmentation of the breast has increased in popularity in the United States since the time of the FDA ban on silicone gel-filled implants in 1991. Surgeons first began treating saline augmentations in the same way as procedures involving gel-filled implants, but time and experience revealed that saline-filled implants behave differently from gel-filled implants. Although in some ways the saline-filled implant is superior to the gel-filled implant, the issues of “feel,” palpability, and rippling generally mandate that these implants be placed beneath the pectoralis muscle rather than above it. A textured surface may be helpful in lowering the incidence of capsular contraction when gel-filled implants are placed in the subglandular position. A textured surface, however, has been shown to provide no advantage for saline-filled implants and may even contribute to implant rupture through fold failure.

When any implant is placed in the submuscular position, augmentation size is affected by the relatively noncompliant nature of the muscle cover. Depending on the width of the patient’s chest, the bulk and strength of the muscle, and the tightness of the overlying tissue and skin, the maximum augmentation may vary from 250 to 450 cc. Once the maximum fill is obtained in a submuscular augmentation, the breast assumes a spherical shape and becomes firmer than a natural breast; this limits the aesthetic result. This problem may be compounded when a secondary augmentation is being performed and a change from a subglandular pocket to a submuscular pocket is made because of the presence of fibrous capsule scar tissue overlying the pectoralis muscle.

The basic premise of tissue expansion is that as the tissue is gradually stretched, it becomes more accommodating. If the tissue is stretched beyond a certain endpoint for a period of time and the stretching force is then reduced, redundancy results. It is this concept that is applied in the expansion-augmentation technique. The implants are placed during surgery in the same fashion as any other saline implants, except that the micro-reservoir is attached to the fill tube and implanted under the skin. When it is decided preoperatively that a particular volume is required to achieve the desired result, the expansion is performed—first to the desired size, and then beyond that size for approximately 6 weeks.

The implant is initially filled at surgery to a comfortable size, and weekly expansions of 60 to 120 cc are performed beginning after the first postoperative week. The reservoir is placed near the incision for later ease of removal with no additional scar. The excessive fluid is then drawn out of the implant; this creates the redundancy and results in the final shape and softness of the breast. The reservoirs are typically removed (with the patient under local anesthesia) shortly after completion of the expansion process—no more than 6 months, as recommended by Mentor. However, Berrino11 has reported leaving the reservoirs in for up to 4 years for later adjustments to the volume of fluid. When this slow stretching of the breast is carried out, there are virtually no size limitations to submuscular breast augmentation. The technique also allows the patient to become an active participant in her own breast augmentation, which results in a higher rate of satisfaction.

Shape

The shape of the breast during an expansion-augmentation can be affected by the amount of redundancy created. The softer the resulting breast, the more natural its
shape. The firmer the breast, the rounder it appears. This titration occurs at the end of the procedure, when the excess fluid is removed. If the final volume is larger than the manufacturer’s recommended final fill, the implant will naturally appear more spherical in shape. The final volume obtained versus the amount of fluid removed, even within the manufacturer’s recommendations, can also affect the end result. I prefer to remove no less than 100 and no more than 200 cc of fluid; it is within this span that the titration of shape occurs.12,13

Symmetry
The expansion technique is effective in overcoming breast asymmetries ranging from simple volumetric imbalances to much more complex problems involving volume, nipple position, base width, and ptosis or pseudoptosis. The use of an expandable implant, even in difficult cases, can result in greater breast symmetry than can be achieved with a unilateral mastopexy or nipple lift procedure, which in and of itself can destroy symmetry. If a breast with a higher nipple position is overexpanded for a longer period of time than a breast with a lower nipple position—after release of the fluid—the higher nipple will fall farther; often, the result is greater symmetry. This nipple descent is striking when the expansion occurs in the subglandular space on the affected side, but some descent is also possible in the submuscular position. Other asymmetries, including differences in roundness, inframammary crease position, size, and shape, can be stretched out as well.

Scarring
Breast shape can be adversely affected by the presence of scar tissue from any number of causes; fibrous encapsulation is the most common. It is well known that persistent stretching will overcome the effects of scar tissue and change tissue shape. Scar tissue can limit the attractive roundness of contour in the breast, whereas expansion can restore proper shape. If repeated fibrous encapsulation is the cause of poorly shaped breasts, overexpansion for a longer period of time—sufficient to obtain mature scar tissue—can overcome a recalcitrant fibrous capsule. The tuberous breast and pseudoptotic breast both have abnormally high inframammary creases that can result in a “double-bubble” effect if a submuscular implant is placed below the natural inframammary crease. Expansion can solve this problem without resorting to scoring of the breast tissue.

Another useful feature of the expander is for the treatment of capsular asymmetries created by prior breast implant surgery. When an internal capsulodesis with a running or interrupted suture technique is being performed, the expander can be placed into the pocket greatly underinflated in a way that does not place tension on the repair. The implant should remain underinflated

Figure 1. A, C, Preoperative views of a 32-year-old nulliparous woman with 34AA cups (approximately 100 g of breast tissue). She wished to have full C cups. The estimate for fill was 550 to 600 cc. 425+ Spectrum implants were chosen to allow for further increases. B, D, Postoperative views are after overexpansion for 6 weeks from the last fill with a volume of 780 cc. The final volume was 660 cc. The patient’s final increase was to full C cups with both breasts Baker 1 and minimal skin thinning inferiorly.

Figure 2. A, C, Preoperative views of a 28-year-old nulliparous woman with 34AA cups and breast asymmetry, with the right breast slightly larger than the left. She wished to have full C/D cups. The estimate for fill was 650 cc, with more required on the left side. 575cc+ Spectrum implants were chosen. B, D, Postoperative views show a final volume of 600 cc on the right and 660 cc on the left after expansion to 780 cc for 6 weeks. Her final bra size was a full C cup. Both breasts were Baker 2 with minimal skin thinning.
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for 3 weeks to allow for wound healing. Overfilling the implant will then overcome slight irregularities in the contour that may have been created by the internal capsulodesis itself.

Results

Figures 1-4 illustrate the results of the expansion-augmentation technique.

Complications

From 1993 to 1999, I performed breast augmentations on a total of 480 patients with 960 implants. Of these patients, 349 underwent the insertion of 698 standard implants and the other 131 underwent expansion-augmentation with 262 implants. The complications of deflation, infection, capsular contracture, and reservoir extrusion were then studied. The results were as follows:

Deflation. For implants overall, 21 (2.19%) of 960; for standard implants, 13 (1.86%) of 960; for expanders, 8 (3.05%) of 960.

Infection. For implants overall, 6 (0.63%) of 960; for standard implants, 5 (0.72%) of 960; for expanders, 1 (0.38%) of 262.

Capsular contracture. For implants overall, 25 (2.60%) of 960; for standard implants, 15 (2.15%) of 698; for expanders, 10 (3.82%) of 262.

Reservoir extrusion. For expanders, 2 (0.76%) of 262.

The slightly higher rate of capsular contracture for the expanders can be partially explained by the patient's desire to sacrifice softness for size.

Conclusions

The expansion-augmentation technique is a useful adjunct to breast augmentation in selected cases. In difficult cases involving implant malposition, recurring fibrous capsular contracture, or asymmetry of volume or breast shape, adjustable breast implants can make treatment much easier. Patients readily accept this technique, are consistently pleased with the results, and are especially happy to be a part of the decision-making process when size is an issue.

References


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