Characteristics of and Basic Technique for Cohesive Gel Implants

Claudio De Lorenzi, BA, MD

Cohesive gel anatomic implants offer decided advantages over traditional gel or saline implants for aesthetic and reconstructive breast surgery, producing stable, long-lasting breasts that are natural seeming and well contoured. However, these implants also require special care to ensure the best result. Basic decisions about implant shape, consistency, pocket size, and incision length are key to individualizing care and providing optimal results. Careful patient examination and effective patient education are also essential so that each patient understands the benefits and limitations of surgery and the special considerations necessary when these implants are used.

The technology exists to advance the art of augmentation mammaplasty to a new level with implants that are virtually undetectable. With careful patient selection and appropriate implant choice, we can in many cases get close to an ideal result that may be undetectable even by the patient's family physician. The goal is to predictably enlarge the breast while ensuring that it behaves like a natural, unaltered breast.

Different types of silicone implants are available outside the United States. Third-generation devices are still made with polydimethylsiloxane, but there is more cross-linking in them that gives them more characteristics of a solid by making the gel more cohesive. This gel may be deformed with compression and may be fractured if deformed beyond its limits. This is important, because if the surgeon tries to manipulate the device through an insufficient incision, it is possible to break the internal gel structure even though the external shell is intact, and the fractured gel may show through the skin as a deformity. This is a fundamental difference from previous generations of silicone devices, which had a fluid consistency. In addition, the shells of these devices have an intermediary barrier layer that prevents egress of short-chain molecules through the shell. I have used these devices since 2000 in more than 400 patients; patient satisfaction and breast appearance have been excellent.

PATIENT EVALUATION AND SELECTION

As with all breast surgery, a full medical history should be obtained, including any history of breast disease, breast cancer, and previous breast operations.

The physical examination provides important information to guide the surgeon in planning the procedure and selecting the appropriate implant. This examination should also be used as an opportunity to educate the patient about her appearance, to identify asymmetries, and to make certain that her expectations are realistic. It is helpful to show the patient what she looks like to others by taking an instant photograph of her

chest/breast area while she is standing upright, arms at her side (Fig. 1). It is also helpful to draw directly on the photograph to point out any asymmetries of the inframammary fold, nipple height, or breast volume. During postoperative visits the marked photo will serve as a reminder to the patient of preexisting asymmetry. Asymmetries should be noted in the medical record.

The patient is examined while standing upright in front of the seated examiner. This is the most important part of the examination, because it allows the surgeon to assess the degree of breast ptosis and asymmetry. The patient should be examined with her arms in a number of positions: at her side, on her hips, and straight up. This last position will accentuate any asymmetry. These findings should be pointed out to the patient while she looks in a mirror. The patient is also examined in a bending position with her hands touching her knees to check her back for scoliosis, absent musculature, or other deformities that can sometimes relate to breast asymmetry.

The surgeon should assess the degree of skin laxity and the quality and quantity of soft tissue present to cover a proposed implant. Skin laxity can be assessed easily by asking the patient to assume the diver's position (Fig. 2) to demonstrate any lack of skin and soft tissue support. Patients with significant hanging skin should be advised that skin reduction (mastopexy) will also be necessary to achieve a good result. The patient's height and weight are recorded and specific measurements are made of the chest

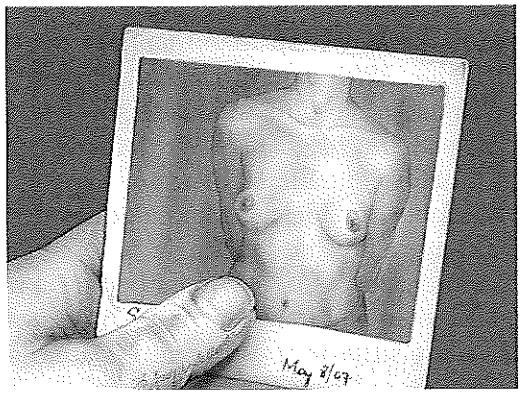

FIG. 1 Taking an instant photograph at the initial consultation helps patients identify issues more objectively than looking at themselves in a mirror. It also provides a record of the examination.

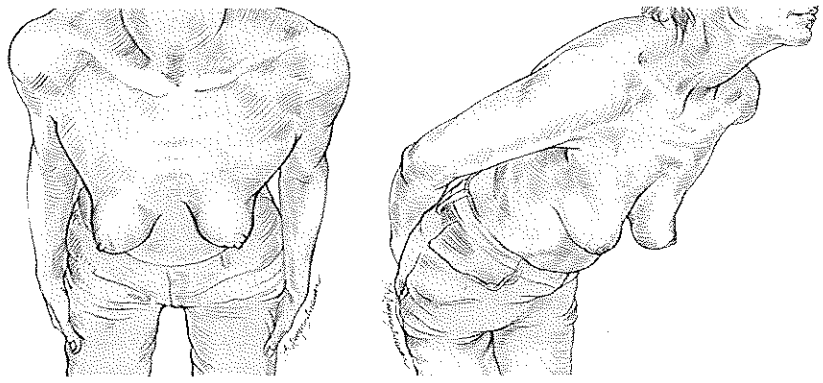

FIG. 2 The diver's position helps identify the degree of tissue laxity. Photographs of this position also help record the presence of preoperative loose skin.

(just under the axilla, over the bust), the breasts at maximum projection, the circumference of the chest at the height of the inframammary fold, the waist at the narrowest part, and the hips at the widest part. Measuring the interareolar distance, the distance to the nipple from the sternal notch, and the base width of each breast is also important. Careful records are kept of these measurements, and comparisons are made during follow-up visits.

An ideal patient will have a firm layer of subcutaneous fat, a sufficient amount of breast parenchyma, and excellent, thick skin with no striae cutis distensae (stretch marks). A less than ideal candidate will have very little subcutaneous fat, little natural breast parenchyma to hide the implant, and thin skin with innumerable striae cutis distensae.

CHOOSING AN IMPLANT

The choice of implant should be based on logical principles. For augmentation the goal is to enlarge the breasts without visible evidence of the underlying implants so that the breasts appear as natural as possible. All implants will be detectable to some degree. However, it is essential that the patient have sufficient soft tissue coverage so that the implant will not show through thin skin. Patients typically want full, natural-looking breasts, even if their physical attributes are not conducive to a good result. In any individual, larger implants will stretch the existing soft tissue envelope more than smaller implants. Consequently, larger implants tend to be more detectable.

As of this writing, all manufacturers are making implants so that the gel within each family of devices has the same degree of consistency, regardless of device size. This means that large implants are made with the same kind of gel used in small implants. Consequently, small devices appear somewhat stiff, and large devices tend to collapse under their own weight. In the future some manufacturers may alter the stiffness of their devices according to their size so that different sizes will behave in a similar fashion. In an ideal world, the gel at the base of each device would be stiffer to support the weight of the upper portion. In other words, the "degree of cohesion" of the silicone would vary not only between sizes (with larger sizes having more crosslinked material), but also within a single device so that the base could support the apex in an upright position.

Size

Implant size is an important consideration when selecting implants. Size is determined by the dimensions of the implant: the height, width, and projection. For most patients of average build, average-size implants with an average projection should be used. Good results can be obtained when these implants are used exclusively. Most experienced surgeons who have used implants over the years recall when only one size of implant was available. Good results were obtained with these devices, although more finesse is possible with tailored devices. Today, measurements play a far greater role in helping surgeons decide the volume and style of implant that is appropriate for each patient. Although a patient's wishes must be taken into consideration, the final implant volume selected will be determined primarily by what is appropriate for that patient's anatomy.

When selecting the appropriate implant size, several patient measurements need to be factored in. These include the patient's height, weight, chest diameter, base width of the natural breast, the degree of soft tissue laxity, and quantity of natural soft tissue (skin, fat, and parenchyma) that is available to hide the implant. How the patient is measured is important. The surgeon should choose a method and stick to it for consis-

tently for all patients. In my practice I use a soft tape to measure the patient while she is standing in front of me. The width and thickness of the breast are important determinants of success. Calipers are positioned to measure the medial and lateral maximum extents of the breasts. If a breast is not well defined, then the nondominant hand compresses the breast to look for a line of demarcation showing its medial and lateral extent while the other hand holds the calipers.

If the breast shape is normal and the patient has an average body build, the breast width is used to determine implant size. A patient should have an implant selected based on the shape of her natural breast. For example, if the patient's natural breast width is approximately 9.5 cm in the upright position, it may not be a good idea to choose an implant wider than this (with some important exceptions for breast abnormalities). She would have to be counseled that "large implants" (which for her may include any implant wider than 9.5 cm) may cause undesirable outcomes. Because each manufacturer produces implants of different sizes, charts are provided to assist surgeons in the selection process. The charts are used during the consultation, and the measurement process is discussed in detail with the patient. The surgeon should caution the patient against making an inappropriate selection and inform her of potential undesirable consequences. Choosing an implant that is 15 cm at the base for the patient in the earlier example would result in inappropriate implant placement (too close together at the midline, or the meridian too far away from the natural midline, or the lateral aspects of the implant extending too far toward the midaxillary vertical, or a combination of all of these problems). Furthermore, this overlarge implant would stretch the patient's natural tissues, thinning them so that rippling of the implant shows through her skin. Sometimes these deformities will not occur for months or years after the surgery, appearing in conjunction with life events such as pregnancy, involution, and weight changes.

I find it helpful in my practice to keep some general numbers committed to memory to help calculate the anticipated increase in bra cup size related to the patient's weight (Table 1).

This table approximates the implant volume needed to obtain an approximate increase of one bra cup size. Total accuracy is not possible, because all bra manufacturers have different standard cup sizes. U.S. brands typically underestimate actual cup size, whereas European bras overestimate bra size, so that a woman can be an A cup and a C cup at the same time. Therefore these figures must be used only as a general guide.

An average patient in my practice is 5 feet, 6 inches tall, weighs 125 pounds, and has a single cup size of about 200 cc. In a smaller patient (e.g., 100 pounds), one cup size is approximately 150 cc. Similarly, a woman weighing more than 150 pounds may need approximately 250 cc to produce an increase of approximately one cup size (see Table 1). It is important for the physician to recognize that most patients want a bra size increase of about 1 or 1½ cups, and that the desired volume increase will vary with a patient's actual size. Returning to the example, if a petite 100-pound woman wants about one cup size of enlargement and she has good soft tissues with no ptosis and good skin, using a manufacturer's chart to look up her breast base diameter of 9.5 cm shows that a medium-height, 9.5 cm wide implant is 135 cc.

I usually choose implants from the medium height category unless special circumstances are present. If a patient is unusually tall (nearer to 6 feet), taller implants may be appropriate. On the other hand, shorter patients (less than 5 feet tall) may consider low height implants. In general, moderate height, moderate projection implants should be used. However, as the surgeon gains experience, finesse may be attained with other available sizes (Tables 2 through 11).

TABLE 1 Relationship of Patient's Weight to Implant Volume

Approximate Weight of Patient (lb)	Approximate Volume of Implant Needed to Increase by One Bra Cup Size (cc)
100	150
125	200
150	250

TABLE 2 Mentor Contour Profile Gel™ 312 and Mentor Cohesive III™, Low Height/Moderate Plus Profile

Volume (cc)	Width (cm)	Height (cm)	Projection (cm)
125	9.0	8.0	3.8
145	9.5	8.4	4.0
170	10.0	8.8	4.2
195	10.5	9.3	4.4
225	11.0	9.7	4.7
255	11.5	10.2	4.9
290	12.0	10.6	5.1
330	12.5	11.1	5.3
370	13.0	11.5	5.5
415	13.5	12.0	5.7
465	14.0	12.4	5.9
515	14.5	12.8	6.1
570	15.0	13.3	6.3
690	16.0	14.2	6.8

TABLE 3 INAMED Style 410LF Anatomic Cohesive Gel and Soft Touch Gel, Low Height/Full Projection

BioDIMENSIONAL™ Cohesive Gel-Filled Breast Implant With BIOCELL™ Surface Texture			
Implant Weight (g)	Width (cm)	Height (cm)	Projection (cm)
125	9.5	7.6	3.7
150	10.0	8.1	4.0
175	10.5	8.6	4.2
205	11.0	9.1	4.4
240	11.5	9.6	4.6
270	12.0	10.1	4.8
310	12.5	10.5	5.1
390	13.5	11.4	5.3
440	14.0	11.8	5.6
490	14.5	12.2	5.8
540	15.0	12.6	6.1
595	15.5	13.0	6.2

TABLE 4 Mentor Contour Profile Gel™ 321 and Mentor Cohesive III™, Medium Height/Moderate Profile

Volume (cc)	Width (cm)	Height (cm)	Projection (cm)
120	9.0	8.5	3.3
135	9.5	8.9	3.5
155	10.0	9.4	3.7
180	10.5	9.9	3.8
215	11.0	10.3	3.9
245	11.5	10.8	4.0
280	12.0	11.3	4.2
315	12.5	11.8	4.4
355	13.0	12.2	4.6
395	13.5	12.7	4.7
440	14.0	13.2	4.9
480	14.5	13.6	5.0
530	15.0	14.1	5.2
640	16.0	15.0	5.6
775	17.0	16.0	5.9

TABLE 5 INAMED Style 410MM Anatomic Cohesive Gel and Soft Touch Gel, Moderate Height/Moderate Projection

BioDIMENSIONAL Cohesive Gel-Filled Breast Implant BIOCELL Textured INTRASHIEL Barrier Shell Anatomic Shape			
Implant Weight (g)	Width (cm)	Height (cm)	Projection (cm)
160	10.0	9.1	3.6
185	10.5	9.6	3.8
215	11.0	10.1	4.0
245	11.5	10.6	4.2
280	12.0	11.1	4.4
320	12.5	11.6	4.6
360	13.0	12.1	4.8
400	13.5	12.5	5.0
450	14.0	12.9	5.2

If a patient desires a larger-volume device, then the surgeon may choose the same width implant with a higher projection. Thus the patient may satisfy her desire for a larger implant while the surgeon stays within the width restriction of her natural breast. For example, if we search for a 12 cm width device using Table 4, we find the volume of the device is 280 cc, and looking for the 12 cm width device using the medium height/moderate profile in Table 6, we see the volume of the device is 330 cc.

What does one do if a patient has an abnormal breast? I generally avoid damaging the inframammary fold unless it is abnormal because, as those who have tried to create a new inframammary fold know, it is difficult. However, if a patient has a congenital anomaly that makes the inframammary fold abnormal, then it must be altered. In this case the rule of not using implants wider than the natural breast may not hold. These patients require measurements of their chest and an estimate of the breast base appropriate for their chest circumference. If the skin is of good quality, then I recommend placing the implant above the muscle so that the implant may exert force on the contracted skin to allow it to expand.

TABLE 6 Mentor Contour Profile Gel™ 322 and Mentor Cohesive III™, Medium Height/Moderate Plus Profile

Volume (cc)	Width (cm)	Height (cm)	Projection (cm)
140	9.0	8.5	3.8
165	9.5	8.9	4.0
195	10.0	9.4	4.2
225	10.5	9.9	4.4
255	11.0	10.3	4.7
295	11.5	10.8	4.9
330	12.0	11.3	5.1
375	12.5	11.8	5.3
420	13.0	12.2	5.5
475	13.5	12.7	5.7
525	14.0	13.2	5.9
585	14.5	13.6	6.1
650	15.0	14.1	6.3

TABLE 7 INAMED Style 410MF, Moderate Height/Full Projection

Volume (cc)	Width (cm)	Height (cm)	Projection (cm)
140	9.5	8.6	3.7
165	10.0	9.1	4.0
195	10.5	9.6	4.2
225	11.0	10.1	4.4
255	11.5	10.6	4.6
295	12.0	11.1	4.8
335	12.5	11.6	5.1
375	13.0	12.1	5.2
420	13.5	12.5	5.3
470	14.0	12.9	5.6
525	14.5	13.2	5.8
580	15.0	13.6	6.1
640	15.5	13.9	6.2

TABLE 8 Mentor Contour Profile Gel™ 322 and Mentor Cohesive III™, Medium Height/Moderate Plus Profile

Volume (cc)	Width (cm)	Height (cm)	Projection (cm)
165	9.0	8.5	4.6
195	9.5	8.9	4.8
225	10.0	9.4	5.1
260	10.5	9.9	5.3
300	11.0	10.3	5.6
345	11.5	10.8	5.8
390	12.0	11.3	6.0
440	12.5	11.8	6.2
495	13.0	12.2	6.5
555	13.5	12.7	6.7
620	14.0	13.2	6.9
685	14.5	13.6	7.1

TABLE 9 INAMED Style 410MX, Moderate Height/Extra-Full Projection

Volume (cc)	Width (cm)	Height (cm)	Projection (cm)
165	9.5	8.6	4.6
195	10.0	9.1	4.9
225	10.5	9.6	5.1
255	11.0	10.1	5.3
290	11.5	10.6	5.5
325	12.0	11.1	5.7
370	12.5	11.6	6.0
410	13.0	12.1	6.1
445	13.5	12.5	6.2
520	14.0	12.9	6.5
550	14.5	13.2	6.7
620	15.0	13.6	7.0
685	15.5	13.9	7.1

TABLE 10 Mentor Contour Profile Gel™ 322 and Mentor Cohesive III™, Tall Height/Moderate Plus Profile

Volume (cc)	Width (cm)	Height (cm)	Projection (cm)
145	9.0	9.4	3.8
175	9.5	9.9	4.0
205	10.0	10.4	4.2
235	10.5	10.9	4.4
270	11.0	11.5	4.7
305	11.5	12.0	4.9
350	12.0	12.5	5.1
395	12.5	13.0	5.3
445	13.0	13.5	5.5
495	13.5	14.1	5.7
555	14.0	14.6	5.9
615	14.5	15.1	6.1
680	15.0	15.6	6.3

TABLE 11 INAMED Style 410FF Anatomic Cohesive Gel and Soft Touch Gel, Full Height/Full Projection

BioDIMENSIONAL Cohesive Gel-Filled Breast Implant BIOCELL Textured INTRASHIEL Barrier Shell Anatomic Shape			
Implant Weight (g)	**Width (cm)**	**Height (cm)**	**Projection (cm)**
160	9.5	10.0	3.7
185	10.0	10.5	4.0
220	10.5	11.0	4.2
255	11.0	11.5	4.4
290	11.5	12.0	4.6
335	12.0	12.5	4.8
425	13.0	13.5	5.2
475	13.5	14.0	5.3
535	14.0	14.5	5.6
595	14.5	15.0	5.8
655	15.0	15.5	6.1
740	15.5	16.0	6.2

Consistency and Rippling

Different manufacturers use different cohesive gel consistencies in their breast implants. For example, Mentor's Contour Profile Gel (CPG) implant is similar in consistency to Inamed's Soft Touch devices. The Inamed 410 implant is firmer than the CPG. In my practice, there is a role for each type of implant; I try to match the texture of the patients' natural tissues with the texture of the implant. Most of my patients are postpartum, and if they have sufficient natural breast tissue then I typically choose either a Mentor CPG or an Inamed Soft Touch product for them because they are softer and "bouncier" in situ than the Inamed 410 device. If a patient has firmer breasts, I may recommend the regular Inamed 410 implant. Both the Mentor and the Inamed implants have desirable properties. The regular Inamed 410 is firmer, but it is also less likely to show rippling. Neither product has totally solved the rippling problem because it is mainly a patient selection issue. I have seen rippling with each of these devices. Most of the time rippling is position dependant, and the diver's position is excellent for demonstrating problems when they occur (see Fig. 2). If the physician opts for more firmness, the breasts will look less realistic when the patient is moving, walking, or lying down. However, if the physician opts for a softer, more natural feel, then slightly more rippling may occur. All of the devices are very well made, and patients should have a role in the decision process. I typically show patients samples of each device, discuss the benefits of each, and ask them to help choose the ideal device for them.

Patients with a thinner skin covering will have a greater tendency to show undesirable implant characteristics. This can be partly controlled by the surgeon who recommends the implant size. Larger sizes will distribute the same amount of tissue over a larger geographic volume, thereby resulting in a relative thinning of tissues—the larger the implant, the greater the problem. It is important to remember that living tissues respond to stresses, and that tissue expansion occurs with any implant. Both recruitment and new skin growth are to be expected with tissue expanders, so there will always be some extra skin over time in patients with implants.

The normal human breast is not static. Most women undergo biologic changes from puberty through adulthood, including maternity, lactation, and involution. The breast shape is not stable during these stages, and therefore an implant will have different appearances during the different stages. As they age, most women experience a natural loss of volume, especially in the upper part of the breast, in association with some de-

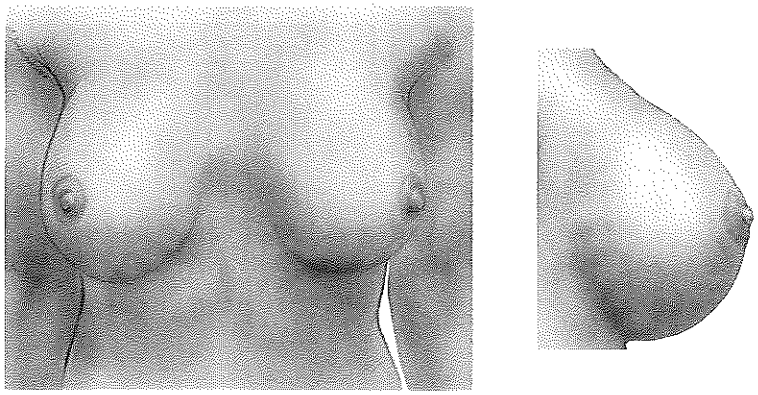

FIG. 3 With time, saline implants may show abnormalities along the periphery of the implant that are fill-volume and position dependent. These defects are rarely seen with cohesive gel implants.

gree of glandular ptosis. It is essential that women understand that if an implant is placed deep to the pectoralis muscle, then a waterfall or Snoopy deformity may eventually develop, because the parenchyma eventually drops below the implant that is supported by the muscle. Remember that breasts will eventually descend if there is significant parenchyma, whereas the chest muscles will not descend.

Surface Texture/Tissue Adherence

There is a common misconception that textured implants of a particular type always result in tissue ingrowth. Clinically, this has not been found to be the case. Typically, textured silicone gel-filled implants do not induce tissue ingrowth, regardless of the nature of the texture. Malrotation may occur with any type of shaped implant. The only exception to this is when great internal pressure is applied, such as with tissue expansion or tight submuscular pockets. Tissue expansion with textured devices can produce Velcro-like tissue adherence. I have had the opportunity to remove capsules of both moderately and aggressively textured implants during submammary augmentations, and in no case of normal breast augmentation was tissue ingrowth attained (in contrast with tissue expanders, in which the more-aggressive Inamed Biocell [salt loss] texture usually causes ingrowth, but the Mentor Siltex texture does not).

Most of the implants I place are in the subfascial space, not the subpectoral space. Therefore I prefer textured devices because they seem to have a lower rate of encapsulation when used in this area. There does not seem to be a clinical benefit to placing textured implants underneath the pectoralis, so in the event that submuscular placement is desired, smooth-walled implants would likely be successful. However, there is no hard and fast rule, and some surgeons use one type of implant exclusively.

BASIC TECHNIQUE

Markings

Planned incisions are marked with the patient standing. Because of the underlying Scarpa's fascia that extends onto the chest, the patient's arm position directly affects breast position. Therefore, markings on the patient's chest should be made with her arms in the same position that will be used on the operating table. If the patient were to be marked in the resting position (with her arms at her side), and then positioned on the operating table with arms abducted, the marks would be too high (Fig. 4).

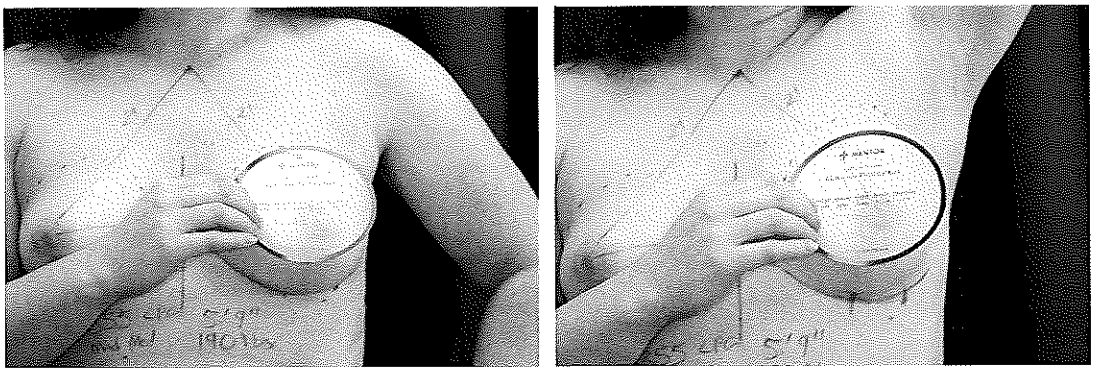

FIG. 4 The position of the upper line shows the pocket plan if the patient is marked in the anatomic position and then switched to the 90-degree, arm-abducted position on the operating room table.

Surgical Approach

The most common approaches used for cohesive gel implants are the periareolar and inframammary approaches because they afford the greatest flexibility and visibility for proper implant positioning (see p. 75 and p. 91 for these approaches). I personally prefer incisions on the breast. The scars are typically very good in the periareolar or inframammary regions, the incisions may be used again, and they do not require abnormal stresses to be applied to the gel implants during insertion. It is important to remember that cohesive gel implants may fracture, and that the firmer gels are more fragile. Colleagues who have used the axillary approach do not advise using it for the larger implant sizes that are typically used in North America.

Length of Incision

Unlike saline implants, which may be inserted empty and filled in situ, gel implants are fully formed. Therefore they require a larger incision for insertion. For typical 250 cc sizes, a 5 cm incision is sufficient, but larger incisions may be necessary for larger devices to avoid possible damage to the implant. Stiffer devices also need larger openings.

Implant Position

The submammary location, in which the implant is placed above the muscles, is less likely to show dynamic deformity with muscular activity, but it is also less likely to support a heavy breast implant and is therefore more prone to breast ptosis than the subpectoral or fully submuscular positions. The submuscular location is chosen for patients with very poor tissues who have little breast parenchyma and no excess skin. For submuscular placement, the pectoralis major muscle and portions of the serratus anterior muscle are elevated, and the implant is placed deep to the muscles, creating a complete submuscular and subfascial pocket. This is a moderately fast dissection, staying close to the rib periosteum. Extreme care must be exercised to avoid lowering the inframammary fold, using the rib subjacent to the inframammary fold as a handy reference point. If the patient has any degree of glandular ptosis, then maneuvers beyond the scope of this discussion are required to achieve success.

If the upper part of the breast at the proposed height of the implant is thin, much less than 2 cm, then a subpectoral position is appropriate. This is an effective method for reducing upper pole implant visibility, but it has a trade-off with a potential for abnormal breast dynamics. If the tissues are thin, the implant is positioned under the pectoralis where it will be far less likely to be visible. This is the easiest and fastest plane of dissection of the three presented. Dissection of the lower border of the pectoralis from the chest wall as well as from the breast may be required to allow the device to sit at the appropriate level on the chest wall. A firmer implant may be a better choice if this position is chosen because it will better resist deformation from muscular contraction. If the patient has 2.5 cm or more of firm parenchymal tissue across the superior (cephalad) region of her breast, then the Mentor CPG produces excellent results, especially in the subfascial position, effectively achieving a nondetectable result.

Plane of Dissection in a Submammary Procedure

The plane of dissection is critical when an implant is placed in the submammary position.[1-4] The plane of dissection should be subfascial, especially at the periphery of the pocket (Fig. 5). There are vertical and vascularized extensions of fascia that extend into the substance of the pectoralis muscle from the overlying fascia. This vascular plane cannot be dissected bluntly; good lighting and careful hemostasis through fulguration of bleeding vessels is important. Dividing these fibers allows elevation of the fascia. At the end of the subfascial dissection the muscle edge is tented up at the border of the implant pocket so that implant edge visibility is minimized[1] (see Fig. 5). The fascia itself may be quite thin and friable in some patients, particularly in the inferior pole, but it is usually thicker in the upper pocket area over the pectoralis major muscle and laterally over the serratus anterior muscle. The surgeon should dissect under the fascia at least 1 to 2 inches proximal to the edge of the implant pocket. I typically dissect a complete subfascial pocket, but it is often necessary to split the fascia under the central area to allow the implant to fill the central portion of the empty breast to create projection. I sometimes elevate the fascia at the periphery of the implant, leaving some of the central fascia intact on the pectoralis. This technique permits better camouflage of the implant edge and also reduces operating time because the central portion of the pocket can be developed more quickly above the fascial plane.

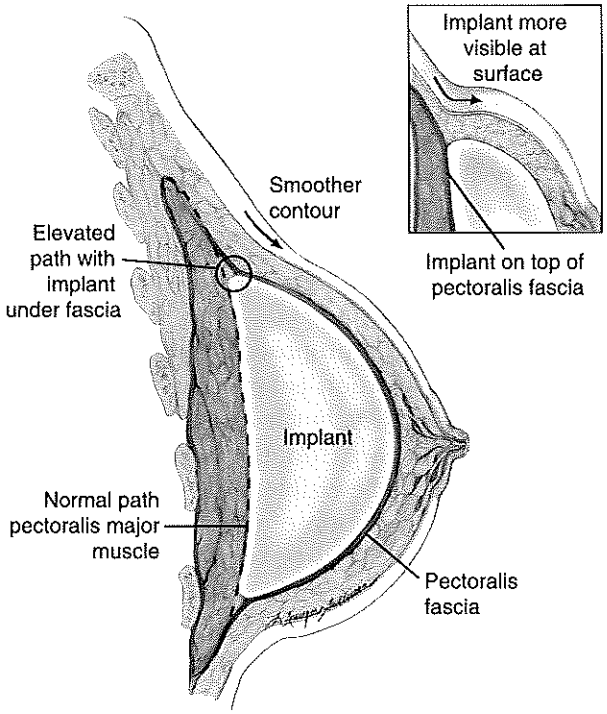

FIG. 5 Subfascial (submammary) dissection elevates the peripheral muscle tissue at the implant edge, resulting in better camouflage of the implant edge. It may also provide mild compression of the implant, which may better help to hold its shape.

Implant Pocket Size and Shape

When working with saline implants the pocket must be larger than the implant to promote softness by allowing the implant to move around in an oversized pocket. This is not true for cohesive gel implants. The pocket need only be large enough for the implant when the implant is compressed. Creating an oversized pocket for shaped implants introduces a greater risk of malposition.

The pocket shape must conform to the overall dimensions of the selected implant. For example, if the implant is wider than it is tall, then the pocket should also be wider than it is tall, otherwise the forces applied to the implant will cause it to turn sideways. Abnormally shaped implant pockets encourage implant malrotation and should be avoided.[2,5-8]

Drains may be required in some patients. I typically only use them when I have performed extensive dissections using electrosurgery because this could reasonably be expected to cause more serous effusions. For example, after capsulectomy, or if there are a very large number of bleeding vessels that required electrocautery, then I use a small suction drain brought out through a small axillary puncture wound. These should always be placed before implant insertion. I do not believe that drains prevent hematomas, but they may help prevent malrotation in some cases.

Implant Insertion

An assistant retracts the incision open while the surgeon places the implant in position. Anatomically shaped implants must be placed appropriately into the pocket. Using a clock reference, with 12 o'clock at the cephalic end of the implant and 6 o'clock at the caudal end, then typically the edge of the implant at 9 o'clock is placed against the left side of the incision. Then using the right index finger, the surgeon gently pushes the implant through the opening and stabilizes it with the nondominant hand. External compression of the implant gradually shifts most of the gel material from outside the pocket to inside the pocket until the implant has totally passed through the opening. Care must be taken not to deform these implants beyond their limits because the gel within the implant may fracture, even when the implant is intact externally. Implants that have been damaged when inserted often reveal surface irregularities through the breast tissue. It takes some practice to learn how much force is too much. Sample implants are useful to inexperienced surgeons for learning the limits of the forces that may be applied. Clinically the potential for fracture is greater with the firmer, more cohesive implants. There is no remedy for a fractured implant; it must be replaced.

Postoperative Management

Postoperatively it is prudent to apply a light dressing and support with a mildly adhesive porous tape. This will help hold the tissues in place. Patients should be advised to curtail their activities for the first few days and gradually increase activity as tolerated. Patients may shower on the day after surgery. Patients return for follow-up visits at 1 week, 4 weeks, 4 months, 12 months, and then annually thereafter. In addition, patients are encouraged to call the office to speak to the head nurse if they have any concerns. We record all measurements on standardized data sheets that are entered into a computer spreadsheet.

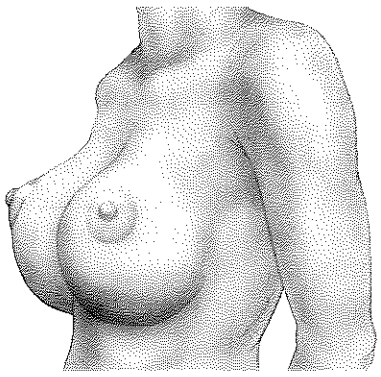

FIG. 6 Excessive release of the inframammary fold often results in a bottoming-out deformity.

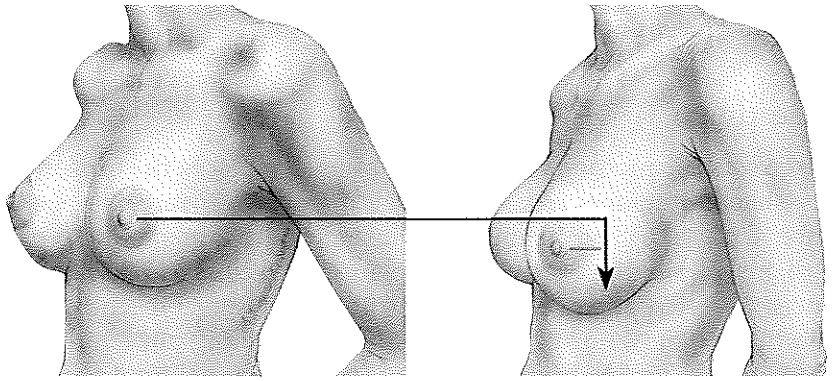

FIG. 7 Gravity pulls more on larger breasts, eventually resulting in ptosis. Larger implants will cause more skin stretch and more descent with time, especially in the submammary position.

PREVENTABLE PROBLEMS

If the inframammary fold is not respected during the procedure, several problems may occur. If the inframammary fold is released completely during the submammary dissection, the breast implant may descend precipitously, resulting in an abnormally high nipple position on the resulting breast mound. This has sometimes been called *bottoming out* (Fig. 6). In my opinion this problem is iatrogenic because it can be prevented by not altering the inframammary fold unless it is affected by pathology, as in the case of a constricted breast. Because of their weight, all implants exert a downward force that will alter tissue characteristics over time. Thus the breast will descend on the chest wall, mimicking the natural process of breast ptosis (Fig. 7). The patient should be informed that breast ptosis is a natural consequence of large breasts, and this should be a consideration when choosing breast implant size. Other preventable problems include the Snoopy or waterfall deformity and the double-bubble deformity (Fig. 8).

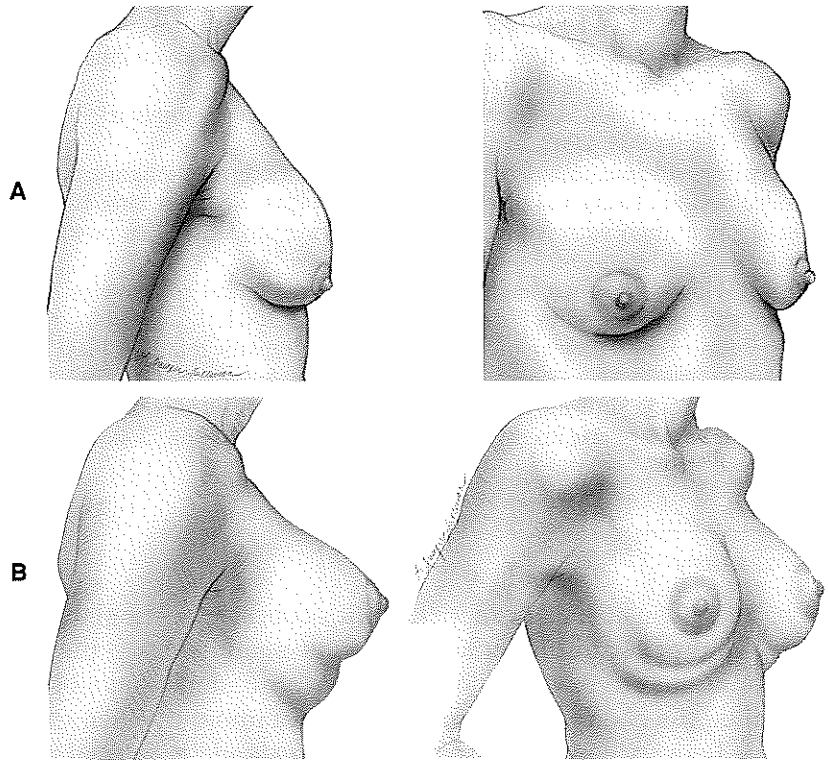

FIG. 8 **A,** A *Snoopy* or *waterfall* deformity results from submuscular augmentation in patients with glandular ptosis because the implant location prevents redistribution of glandular tissue. Correction requires either an aggressive mastopexy or, if glandular tissue conditions permit, a device exchange to a cohesive gel product and a site exchange to a subglandular position. **B,** A *double-bubble* deformity occurs when an implant has been placed subpectorally and the inframammary fold has been released but the glandular attachments to the pectoralis have not been released. Correction is performed by releasing the fascial connections between the lower border of the pectoralis major muscle and the breast and by separating the gland from the skin. Sometimes radial glandular incisions are also required to redistribute the glandular tissue. This deformity typically occurs in constricted breasts.

CONCLUSION

Each surgeon must maximize the chances of success with cohesive gel implants by carefully following the correct paradigm. For surgeons who have not had experience using these devices, it would be helpful for them to educate themselves about the properties of and special considerations for using cohesive gel implants. Measurements are the key to success with these devices. We should always measure each patient and record these measurements, if only to elevate the science of the work we do. Counseling patients is time-consuming but rewarding, and it helps avoid postoperative misunderstandings. The surgeon who spends time educating the patient should have better outcomes and better patient follow-up. Long-term follow-up is essential because if we only saw 6-week results, we would think that nothing ever went wrong with augmentation surgery. However, the early result is never really the final result. Following patients carefully over many years will teach us more than could ever be taught during residency, and it helps us become better surgeons.

REFERENCES

1. Góes JC, Landecker A. Optimizing outcomes in breast augmentation: Seven years of experience with the subfascial plane. Aesthetic Plast Surg 27:178-184, 2003.
2. Graf RM, Bernardes A, Rippel R, et al. Subfascial endoscopic transaxillary augmentation mammaplasty. Aesthetic Plast Surg 24:216-220, 2000.
3. Graf RM, Bernardes A, Auersvald A, Damasio RC. Subfascial breast implant: A new procedure. Plast Reconstr Surg 111:904-908, 2003.
4. Barnett A. Transaxillary subpectoral augmentation in the ptotic breast: Augmentation by disruption of the extended pectoral fascia and parenchymal sweep. Plast Reconstr Surg 86:76-83, 1990.
5. Spear SL. Breast augmentation with reduced-height anatomic implants: The pros and cons. Clin Plast Surg 28:561-565, 2001.
6. Heden P, Jernbeck J, Hober M. Breast augmentation with anatomical cohesive gel implants: The world's largest current experience. Clin Plast Surg 28:531-552, 2001.
7. Baeke JL. Breast deformity caused by anatomical or teardrop implant rotation. Plast Reconstr Surg 109:2555-2564, 2002.
8. Chantal M, Melis P, Marco R. Suturing of a textured breast implant filled with cohesive silicone gel to prevent dislocation. Scand J Plast Reconstr Surg Hand Surg 37:236-238, 2003.

Editorial Commentary

Dr. De Lorenzi has very considerable experience with cohesive gel implants, and when he says that they give the best results in augmentation mammaplasty, then one has to pay careful attention to his words of wisdom. There is absolutely no doubt that, in the case of these implants, the choice of size and shape is paramount. When the procedure is being contemplated, a very comprehensive discussion should be carried out with the patient regarding the implant, how it is inserted, and what is expected of it. In this article the approach to insertion of the implant, the size of the incision, and the position of the implant are spelled out very carefully. Further advice is given on the pocket, particularly about the extent of undermining.

These implants are very different from those used in the past, albeit the very recent past. It is no longer a case of making a pocket and putting the implant into it with virtually no attention being paid to the position of the implant within the pocket. In our experience with previous implants, the size of the pocket was paramount, but the position of the implant, whether saline-filled or silicone-filled, was not a matter of great concern. Retaining the philosophy associated with previously used implants may lead to a virtual disaster if correct technique is not used. With care, gentle technique, and correct placement, a very natural end result can be achieved. With rough technique there can be fracture of the internal gel structure, and, as a result of this, an underlying deformity can occur.

Another factor that has been stressed is that very accurate preoperative assessment should be made, because, when using these implants as Dr. De Lorenzi advocates, the four important factors to be remembered are:

- Choice of implant
- Size of incision
- Size of pocket
- Required shape of the breast

Paying attention to these basic tenets will improve results and help prevent problems.

Ian T. Jackson, MD