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> Page 14

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> Page 16
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A question of combination

Surgeons discuss simultaneous augmentation mastopexy versus a staged approach

Do you perform mastopexy and augmentation in a single combined procedure, or do you opt for a staged approach? Why?

Philadelphia

“I always perform a simultaneous augmentation mastopexy, regardless of the degree of ptosis. In my experience, the complication rate is low enough to warrant this approach; plus, patients are subjected to less anesthesia. Women prefer a single-stage surgery because it is less expensive and reduces the amount of recuperation time. I have found simultaneous augmentation mastopexy to be safe and efficient, and I am able to achieve an excellent aesthetic result.

“I have always placed breast implants first (in a subpectoral, dual-plane position) before beginning the mastopexy. Earlier in my career, I relied on the common inverted T, anchor, or Wise patterns for women with moderate-to-severe ptosis. I would draw a pattern, remove skin within the pattern, and then tailor tack tissues together with skin staples. This approach involved my having to do multiple trimmings of skin — back and forth from one side to the other — to achieve maximum tightness and symmetry.

“In 2003, I decided to reverse this process after implant placement. I maximally invaginated and tailor tacked the tissues first without tension; I marked the perimeter of the skin staples used for tacking with a skin scribe prior to removing them. The newly marked area within the staples, indicating a new pattern of tissue to be safely resected, was much greater than any pattern I had ever drawn. I was able to perform a single en bloc resection of the excess skin.

“This has become my standard approach to simultaneous augmentation mastopexy for moderately to severely ptotic breasts. It reveals the maximum degree of skin tightening, giving the surgeon reassurance that the tissues will come together and that the vascular supply of the skin edges will not be compromised. It also allows for previsualization of symmetry before a one-piece skin resection. Plus, by eliminating the need for multiple skin trimmings, the procedure may be quicker. The final closure resembles that of the inverted T, but the traditional scar may be shortened.

“I have had no incidences of nipple areolar malposition, which is reported to be a common complication of simultaneous augmentation mastopexy. Because the staple-first approach allows for previsualization, it helps me create symmetry. Only two patients had recurrent ptosis (bottoming out). I believe my complication rate is lower than average because the staple-first technique permits maximum resection of tissues.

“Patients have reported great satisfaction with their results. This versatile stapling technique permits me to create symmetry regardless of the amount of droopiness, asymmetry, or the size of the implant desired by the patient. By removing the guesswork from the procedure, the technique has allowed me to achieve consistent, reproducible symmetry with confidence. “I’ve taught this technique to surgeons in a workshop that’s approved for 20 AMA PRA Category 1 credits. They consistently report that the staple-first approach makes simultaneous augmentation mastopexy simpler and safer.”
“Combining mastopexy and augmentation in a single procedure is one of my most common surgeries. It is routinely performed for many reasons.”

— Angelo Cuzalina, M.D., D.D.S.
Tulsa, Okla.

“Combining mastopexy and augmentation in a single procedure is one of my most common surgeries. It is routinely performed for many reasons. First and foremost, patients who have breast ptosis and hypoplasia demand the convenience of a single surgery to give them the final result they desire.

“In my own experience, greater than 90 percent of women seeking a breastlift and ‘possible’ implant placement prefer the appearance of breast following mastopexy with implants versus mastopexy alone. In addition, I feel that the simultaneous procedure can be performed with excellent results, a very low major complication rate and a relatively low revision rate.

“Choosing to stage the operation, in my opinion, is always an option that must be offered to the patient; however, I do not believe it means a better result or necessarily a lower complication rate in the majority of patients. In a review of my years (2008 to 2010) and 320 simultaneous breast augmentation and lifts, there was a 9.3 percent revision rate. The vast majority of revisions were very minor implant position adjustments and minor scar revisions. No major necrosis was seen in the past 320 cases.

“Patients are informed that a simultaneous procedure may increase risk of major complication such as nipple necrosis, yet almost all still select the simultaneous option if given the choice.

“An isolated mastopexy or basic augmentation can be relatively straightforward in select patients; however, combining mastopexy with breast implants during the same surgery can be a menacing and risky task for even the most experienced surgeon in certain patients, such as post-massive weight loss patients (Fig. 1). Yet, these patients will choose simultaneous procedure versus a staged one even when informed of the added risk.

“As a prudent surgeon, one must always weigh the risk versus benefit of performing a simultaneous augmentation and lift compared to staging the procedure. For instance, smoking increases the risk to a point I feel is unacceptable. I routinely require complete cessation for a minimum of three weeks before and after surgery and use a urinary cotinine test to verify compliance. Anything to help avoid problems and increase consistent good results for this procedure is a must.”

A patient after losing 125 pounds and with severe ptosis before (top images; left, third from left) and three months after inverted T mastopexy with medial-central pedicle. Angelo Cuzalina, M.D., says that 550 cc implants were placed in a total submuscular position. A female patient before (bottom images; left, third from left) and three months after vertical mastopexy and superomedial pedicle. Dr. Cuzalina says that 450 cc implants were placed in a total submuscular position. (Photos credit: Angelo Cuzalina, M.D., D.D.S.)

A slight difference is demonstrated between a classic superomedial versus medial pedicle mastopexy. The use of full inferior pole muscular coverage of a breast implant shown helps provide lower exposure risk and less risk for bottoming out. (Photos credit: Angelo Cuzalina, M.D., D.D.S.)
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"A nice technique for the simultaneous mastopaxy-augmentation I use is ‘total’ submuscular placement of the implant (Fig. 2). This is easier to do with a simultaneous procedure while the chest wall is easily visualized through the larger mastopxy incisions. The coverage of the lower pole of the implant helps prevent implant exposure if a minor dehiscence occurs along the incision. In my own hands, a superomedial-central pedicle works best if the sternal notch to nipple distance is less than 30 cm, while a medial-central pedicle is used with more severe ptosis.

"With all cases, much of the lower and lateral pole of the breast parenchyma is excised to improve aesthetics and prevent glandular ptosis relapse. Regardless of techniques, surgery of the ptotic breast is challenging and requires artistry since no easy or perfectly dogmatic method for simultaneous mastopaxy and augmentation exists."

Efrain Gonzalez M.D., F.A.C.O.G., F.A.C.S.
Sacramento, Calif.

"I perform augmentation mastopaxy as a single procedure. Many patients have both breast hypoplasia and ptosis. This is especially common in the postpartum patient. After the increase in breast size during pregnancy, the involution that occurs postpartum can leave the skin envelope underfilled and ptotic, with the nipple areola complex in a low position. In these patients, simply performing a breast augmentation will result in a superior malpositioned implant and a nipple areola complex that remains too low. On the other hand, if only a lift is performed, the patient will have an underfilled breast. For these reasons, I believe that to achieve the best results, it is better to combine both procedures.

"The level of difficulty of the combined procedure is greater than either operation alone. One of the reasons this is such a difficult operation is that while the augmentation increases volume and expands the surface area, the mastopaxy reduces the skin to accomplish the lift. The surgeon must plan for this carefully, leaving enough skin to accommodate the implant and to lift the areola, without placing too much tension that can result in an unsightly scar or compromised blood supply. The result should also be long-lasting.

"Although some physicians may still advocate for a staged approach, most patients are reluctant to have a staged procedure when they compare the cost and convenience of just having one procedure. Of the many advantages to combined augmentation mastopaxy — such as safety and convenience of having one operation rather than two — most patients understand that there is a higher revision rate and complication rate than when performing the operations in stages.

"There is no doubt that this is probably the most difficult procedure that we perform to the breast, and also the most litigious one. At the same time, the reward for the combined operation is extremely gratifying for both the patient and physician."

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**Doctors’ Bios:**
Efrain Gonzalez, M.D., F.A.C.O.G., F.A.C.S., is the founder and medical director of Advanced Medical Spa in Sacramento, Calif. Dr. Gonzalez is a fellow of the American Academy of Cosmetic Surgery as well as a fellow of the American College of Surgery. Angelo Cuzalina, M.D., D.D.S., is the immediate past-president of the American Academy of Cosmetic Surgery and a dual board-certified cosmetic surgeon practicing in Tulsa, Okla. Dr. Cuzalina has performed more than 3,000 breast augmentation procedures, and has developed a particular interest in simultaneous breast lifting and augmentation. He has lectured extensively across the country on this subject. Ted S. Eisenberg, D.O., F.A.C.O.S., F.A.A.C.S., is a Philadelphia-based plastic and reconstructive surgeon who focuses his practice entirely on cosmetic breast surgery. His surgical approach to simultaneous augmentation mastopaxy has been published in Aesthetic Plastic Surgery and the American Journal of Cosmetic Surgery. He is an associate professor of surgery in the division of plastic surgery at the Philadelphia College of Osteopathic Medicine.

**Disclaimers:**
Drs. Gonzalez, Cuzalina and Eisenberg report no relevant financial interests.
AUGMENTAT
MASTOPEXY

To stage, or not to stage? Algorithm drives decision, surgeon says

John Jesitus
Senior Staff Correspondent

A Texas plastic surgeon recommends using an objective algorithm to decide whether to perform breast augmentation mastopexy in one or two stages.

“Breast augmentation mastopexy is one of the most difficult procedures we perform in plastic surgery,” says William P. Adams Jr., M.D., a University Park, Texas, plastic surgeon in private practice. To decide whether to perform this procedure in one stage or two, he says he employs a specific algorithm that incorporates key measurements of the breast envelope.

Overall, “This is not an easy procedure,” he says. Augmentation seeks to expand the envelope and parenchyma and increase breast mass, while mastopexy seeks to reduce the envelope, compress the parenchyma and decrease the breast mass. “It’s basically two procedures with opposite forces. That’s why fundamentally it’s very difficult, with a higher rate of complications.”

In one study, combining breast augmentation and mastopexy into a single procedure resulted in a fivefold reoperation rate and a 10-fold complication rate versus breast augmentation alone (Spear SL, Boehmker JH 4th, Clemens MW. Plast Reconstr Surg. 2006;118(7 Suppl):136S-147S; discussion 148S-149S, 150S-151S).

“If you look at the Regnault classification of ptosis,” Dr. Adams says, “it’s very nonspecific. When I think about breast augmentation or augmentation mastopexy, it is all about accurately assessing the tissues of the breast in a predictable way. That allows me to make more sound decisions about these procedures. Characterizing the envelope of the breast is the most critical factor in deciding between one- and two-stage augmentation mastopexy.”

Dr. Adams says that when he began practicing 15 years ago, “I never staged augmentation mastopexy. Then I evolved to the point where I was staging every patient. Now, I’m trying to develop objective criteria to help me determine whether I’ll do one stage versus two.”

MEASUREMENTS TAKEN Dr. Adams says he checks the nipple-to-fold measurement, the skin stretch measurement and the vertical excess. For the skin stretch measurement, he recommends pulling medial to the areola and measuring the anterior-posterior distance with a caliper.

“The nipple-to-fold measurement is taken on stretch, from the nipple to the fold. For a one-stage procedure, I’d like to see a skin stretch less than 4 cm, or a nipple-to-fold measurement of less than 10 cm,” he says.

To measure the vertical excess, “Just mark the nipple position for your mastopexy. Then measure down to wherever you intraoperatively set the nipple-to-fold distance. For me, if it’s a 12 cm breast, I set the nipple fold at 8 cm,” Dr. Adams says. The difference between these two figures is the vertical excess. “For a one-stage procedure, we want the vertical excess to be less than 6 cm.”

Furthermore, Dr. Adams says he always uses the dual plane II or III implantation approach to optimize the soft tissue interface at the lower pole of the breast.

STUDY RESULTS In a series of 10 consecutive patients that Dr. Adams treated between November 2010 and April 2011, 80 percent underwent single-stage procedures; 20 percent had two-stage procedures. “In my 10 cases and in the literature, you can expect a five to 10 times higher complication rate than we see in primary augmentation,” he says.
Complications among Dr. Adams’ 10 patients included delayed healing at the T incision area and lower pole soft tissue stretch (two patients each). Dr. Adams says he defines the latter as a postoperative nipple fold stretch greater than 25 percent of its original measurement. Additionally, one patient experienced immature scarring at one year.

One patient he treated looked at first glance like a candidate for breast augmentation only, Dr. Adams says. The nipple fold measurement on her left breast was 10 cm, with a skin stretch of 4 cm. “She had much more skin laxity in the envelope of her breast than it appeared on her clinical photos,” he says. Therefore, he performed an augmentation on the right breast and augmentation mastopexy on the left, using differential fill volumes so that the breasts looked evenly sized postoperatively.

The only patient in the series who required reoperation underwent a two-stage procedure and experienced delayed wound healing that required debridement and operative closure after the first-stage mastopexy, Dr. Adams says. Preoperatively, “She had nipple fold measurements of 12 and 11.5 cm, and skin stretch of 5 cm.” However, Dr. Adams says that nine months after her central mound mastopexy, she underwent breast augmentation with a Natrelle 15-304 style implant (Allergan).

That’s true — you probably will have some patients who walk out of your office and don’t return for the next procedure. But for patients with significant skin laxity of the breast, that’s something you’ll have to be willing to accept.”

Dr. Adams says it would be appropriate to perform augmentation first in patients who are unwilling to accept mastopexy scars. “The more ptosis they have, the more bizarre they may look after getting augmentation.” Additionally, he says that these patients must understand they will need a mastopexy eventually. “Usually, I let the patient decide when she is ready for that second stage.”

Plastic surgeons can do fundamentally much better frank bulk mastopexy with a staged procedure than safety permits with a one-stage procedure, Dr. Adams says. “It’s like building a house — you’re setting the foundation of that breast up to be a good candidate for augmentation, whereas initially the patient is a poor candidate for an implant. Because you’re able to set the foundation of that breast with good fundamental aspects, these patients tend to fare better long-term regarding soft-tissue stretch, bulk shape of the breast and predictability of the result over time,” he says.

Some surgeons have expressed concern that they could lose patients in between the stages of a two-stage procedure. “That’s true — you probably will have some patients who walk out of your office and don’t return for the next procedure,” Dr. Adams says. “But for patients with significant skin laxity of the breast, that’s something you’ll have to be willing to accept. For people who need a two-stage procedure, that attrition rate is certainly worth it” when one considers the patient outcomes that can be achieved by those who stay the course, he says.

Disclosures:
Dr. Adams is an investigator for Mentor and Allergan, a consultant to Allergan and the founder of theplasticsurgerychannel.com.
Getty Images/Vetta/David Falk

WHICH COMES FIRST? In a staged procedure, “My preference is to do the mastopexy first — I try to set the envelope to the desired dimensions for the implant,” Dr. Adams says. “Then I have the patient return at a minimum of three months postoperatively for the augmentation. You certainly could do the augmentation first. The problem is that some patients don’t look very good when you do that.”
MASTOPEXY

Mastopexy inevitably results in a visible scar, and the scar is particularly lengthy after parenchymal reshaping and dermal suspension mastopexy, acknowledges J. Peter Rubin, M.D. Nevertheless, satisfaction is high among its target population—massive weight loss patients—because it successfully addresses their extensive deformities and with long-lasting results, he says.

Currently, the possibility of “scarless mastopexy” is being evaluated using a prototype of an internal suspensory system. Determination of its place in surgical practice is pending further investigation, but even if it becomes a viable option, the scarless mastopexy procedure will probably only find utility in a very limited patient population, says Dennis C. Hammond, M.D.

THE DEFLATED BREAST

According to Dr. Rubin, parenchymal reshaping with dermal suspension is designed to address the multiple breast deformities present after massive weight loss, which include excessive volume loss, flattening of breast shape, medialization of nipple-areola complex position, extensive lateral skin rolls, and dropout of the lateral inframammary fold.

It is based on a modification of the Wise pattern in which the lateral markings are extended to encompass the lateral chest roll. The excess lateral tissue is used for auto-augmentation, being moved as a cutaneous flap into the breast to add volume while simultaneously restoring the lateral curvature, he says.

“With this technique, we can precisely shape the breast and obtain a result that resembles the shape of an implant, but using only the patient’s tissue,” says Dr. Rubin, chief, plastic and reconstructive surgery, University of Pittsburgh.

Versatility is another feature of the technique. Using this approach, the surgeon can tailor the amount of lateral chest tissue that is moved into the breast for reshaping. For this reason, it can be used to correct asymmetry by taking more tissue from the lateral side of the smaller breast, Dr. Rubin says.

In addition, it can be combined safely with other contouring procedures that may be needed in the massive weight loss patient, including fleur-de-lis abdominoplasty and circumferential torsoplasty. The procedure can also be done in patients with small breasts who do not want augmentation with implants, although it is more challenging in these patients because of the need to rely on the available lateral tissue for the shaping, he says.

THE TECHNIQUE

Key steps of the procedure include de-epithelialization of the entire area within the Wise pattern to provide a broad dermal surface area that can be used for suspension and reshaping. Breast parenchyma is degloved by elevating a flap 1 cm to 1.5 cm thick down to pectoralis fascia, and the dissection is continued up to the level of the clavicle. “The result is a generously sized subcutaneous pocket into which the breast tissue will be mobilized,” Dr. Rubin says.

The dermis is suspended to rib peristomeum, starting first centrally along the breast meridian. Fixation of the central mound of dermis, which creates an

Scarless mastopexy may some day become an option for select patients

Cheryl Guttman Krader
Senior Staff Correspondent

Scar wars

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“internal brassiere,” is done with permanent suture material and usually into the second rib. “At this point, it is important to check the nipple height, and if it is being pulled up too far, the attachment should be moved down to the third rib,” Dr. Rubin says.

Next, the lateral portions of the Wise pattern that are normally discarded in a breast reduction are elevated as fasciocutaneous flaps and suspended to rib periosteum, usually one rib down. “This is the step that rebuilds the lateral curvature of the breast, and so it is a key shaping step,” Dr. Rubin says.

While there are no set rules for dermal plication, Dr. Rubin says he prefers 2-0 braided absorbable suture material used in both a running and interrupted fashion. The skin envelope is closed with half buried mattress sutures and stapling. Any nipple tethering is released by scoring the dermis just adjacent to the areolae with electrocautery.

“A robust central pedicle blood supply maintains nipple viability, so that in over 150 cases, we have seen no episodes of nipple loss,” Dr. Rubin says.

He adds that wound healing-related problems in the lower pole of the breast accounts for most of the complication of the procedure. However, the rate is low (less than 5 percent), and the complications minor.

**INTERNAL THREAD SUSPENSION** According to Dr. Hammond, although the internal breast suspensory system was developed originally to allow scarless mastopexy, its use as a standalone procedure in this indication would probably be limited to women with mild ptosis who also have a reasonable amount of breast volume available.

He says that based on the initial experience he and others have had evaluating the system, it might have a greater role as an adjunct to mastopexy where it would offer a conservative approach to avoid a hollow upper pole. Even then, its primary benefit may be for its ability to keep tissues stented in place during the healing period in women undergoing a circumvertical mastopexy, says Dr. Hammond, a plastic and reconstructive surgeon in private practice, Grand Rapids, Mich. It might also be used to internally splint flaps in breast reconstruction, he adds.

Dr. Hammond describes the platform as a “catheter and pulley system.” It is based on percutaneous placement of anchors that are seated by large hooks into the parenchyma and suspended by threads from a superior mesh.

“The anchors are sturdier than the ones that have been used in facelift procedures so that they solidly engage the tissue, and after the threads are passed on either side, the breast can be lifted to achieve significant translocation of the parenchyma into the upper pole,” Dr. Hammond says.

“The question that remains to be answered is how long the benefit persists.”

Follow-up of some initial cases show it is effective in achieving repositioning of the breast superiorly immediately after surgery, and although there is some soft tissue relapse, some benefit appears to be retained over the medium term, based on follow-up to seven to 12 months.

Dr. Hammond acknowledges that evaluation of the benefit is confounded by the lack of a control, and it remains to be determined whether the effect will persist for five to 10 years. Currently, 3-D technology is being used to document any upper pole effect.

**Disclosures:**
Dr. Hammond and Rubin report no relevant financial interests.
In patients who have undergone massive weight loss (MWL), a circumvertical approach to breast augmentation mastopexy allows surgeons to perform these procedures together, says Dennis Hammond, M.D.

According to Dr. Hammond, a Grand Rapids, Mich., plastic surgeon in private practice, the goals of augmentation mastopexy include elevating and adding volume to the breasts. “We also need to reconstruct the upper pole in most patients, particularly MWL patients. Additionally, we must lift the position of the nipple and areola and reduce the areolar diameter and the excessive skin envelope.”

In patients of normal weight, “You’re taking an excessive skin envelope and making it smaller. Then you’re adding volume and making the breast bigger,” Dr. Hammond says. “These seem to be competing goals. But in the MWL situation, you’re taking a deficient volume and bringing it to the optimal level. You’re taking an excessive skin envelope and reducing it to the optimal skin envelope. These two maneuvers can be complementary.”

When addressing the breast envelope after MWL, “There’s only so far you can go with periareolar approaches,” he says. In one patient who had refused any vertical incisions, the periareolar approach provided “a fairly reasonable result regarding overall shape. But the compromise was in the periareolar scarring,” which was irregular and stippled.

“That’s why the circumvertical approach is so advantageous — you can avoid complications related to that large purse-string cinching down to just a small areolar opening,” Dr. Hammond says, adding that he started developing the circumvertical approach while working on the short scar periareolar inferior pedicle (SPAIR) mammoplasty.

“It’s basically a combination of a periareolar flap with a vertical...
extension (Hammond DC. Plast Reconstr Surg: 1999;103(3):890-901),” he says. “That operation taught me how to utilize those maneuvers. Whether it be augmentation mastopexy, mastopexy alone, revisional breast surgery or any large skin envelopes in breast reconstruction, the circumvertical pattern is the most powerful tool that you’ll have to manage these excessive skin envelopes.”

In MWL patients, “You’re far better off adding a vertical component to the periareolar pattern, because that vertical component reduces the stress on your periareolar closure,” Dr. Hammond adds. “By taking out the bottom part of the circle, your circular opening gets smaller. Additionally, running that vertical component out laterally along the lateral aspect of the breast narrows the base diameter of the breast skin envelope and increases projection.”

Whereas the periareolar approach tends to flatten breast projection, “The addition of that vertical component tends to counteract that. These two maneuvers work very well in concert with each other,” he says.

After MWL, the breast typically hangs very low on the chest wall. “The nipple position is low, and the areola is widened,” Dr. Hammond says. “We want to lift all that back up (and) then supplement it by placing an implant. I further believe that the placement of the upper pole sutures can have a definite, long-lasting effect on the shape of the breast. It’s certainly better than doing nothing.”

It’s difficult to create a breast that has a bulging upper pole, he says. “Without using an implant, about the best you can hope for is a straight-line contour.” With an implant, “That’s what we’re trying to accomplish with reshaping sutures.”

**HOW IT’S DONE** In one recent MWL case, the patient had achieved a stable weight and was in fact rather muscular as a result of working out. However, Dr. Hammond says, “She had a low-hanging breast with a ptotic nipple-areolar complex.” To correct these conditions with the addition of an implant, “I wanted to undermine the breast and take the underside of the breast and suture it north in order to reshape that upper pole.” To do this, he chose to undermine in the subglandular plane.

To make the initial areola dissection, Dr. Hammond says he typically uses a 40 mm to 44 mm areolar mark. “I do that with the areola under maximal stretch, because we don’t want to have a flaccid areola stretch out postoperatively” in a lateral direction.

Next, he de-epithelializes the involved skin segment. “As I make my incision,” he says, “I’m very careful to leave a small dermal shelf all the way around the defect because that is ultimately going to hold the suture that I’m going to place.”

To ease the closure of the periareolar opening, “I undermine just at the level of the dermis all the way around. Don’t go down into the breast, because you want to preserve those perforators coming up to the nipple and areola.”

The middle aspect of the vertical surgical segment is a “free zone,” Dr. Hammond says. “We can make an incision there with no concern whatsoever. We can then use that to gain access to the underside of the breast. The key in all of this dissection is that you do not want to lower the pole. Keep all of the attachments of the pole intact.”

To create the subglandular pocket, Dr. Hammond says he recommends dissecting right to the margins of one’s preoperative markings. This requires caution because it’s easy to over-dissect.

Using the premarked pole position as a guide, he gradually approaches the desired contour. “Ticking that pocket open millimeter by millimeter, being careful not to go under Scarp’s fascia,” he says. One of the challenges here is the limited amount of tissue available after patients have achieved MWL.

If performed correctly, the above maneuvers will set the subglandular pocket laterally and medially without lowering the upper breast pole, Dr. Hammond says. “If you did lower it, you could easily put a couple stitches in it to suture it back.”

Dr. Hammond says he then over-dissects the pocket superiorly, extending past the area to which he plans to suture the reshaped breast, basically connecting the underside of the breast to the pectoralis major, typically using three sutures.

“That’s essentially the same maneuver used with the SPAIR breast reduction, except that we are taking that upper flap and suturing it up under itself to create some fullness in that upper pole,” he says, adding that this maneuver actually requires slight overcorrection to auto-augment the upper pole. “Then it’s a simple matter to place an implant in. And the implant, along with that suture reshaping, should nicely fill in that upper pole.”

Overall, Dr. Hammond says, “This is a very controlled and artistic maneuver, done with the patient upright on the table. It requires a good stapler, because you’re going to grab the tissues with your forceps and bring them together exactly where you think they need to be. Then your assistant has to staple that together.” To create a pleasing breast shape, “Do not hesitate to curve that incision upward. There’s no need to go right down the inframammary fold as we’re taught in classic vertical mammoplasty. That incision wants to curve up laterally in most patients, so let it.”

The addition of a vertical incision segment takes the stress out of the periareolar closure so that the dimensions of the areolar opening are smaller, Dr. Hammond says. “That’s what I mean when I say that in MWL patients, breast augmentation and mastopexy complement each other.”

The procedure concludes with careful marking and excision of excess skin before closing the nipple-areolar area. In this regard, Dr. Hammond says he uses an interlocking Teflon suture (Surgiform). To map out this suture, he places eight evenly spaced cardinal marks along the periareolar and areolar incisions.

“It then takes a Keith needle and enter at the 3 o’clock position from deep to superficial,” he says. “Next, I’ll come over and incorporate a small bite of the areola and go back over to the dermal shelf we created at the beginning of the case, up to the next cardinal point. Then I go to the corresponding point on the areola and incorporate a small bit of the dermis before going back over to the dermal shelf to the next cardinal point, and back to the areola — back and forth all the way around.”

Whereas he started the suture from deep to superficial, Dr. Hammond says that when finishing the suture, “We’ll turn superficial to deep. This is how you keep the knot from eroding through. When I’m done, I’m able to take that knot and bury it underneath the medial flap. No other suture materials will slide through the tissue that way — that’s why I like the Teflon.” However, he adds, “You need to put eight to 10 knots in it because it tends to slip.”

Additionally, “I don’t hesitate to perform revision as needed to get the result I’m looking for,” Dr. Hammond says. “I tell my patients that about one year post-surgery, there’s a 20 percent chance that we’ll find something we don’t like that I can fix.”

**Disclosure:**
Dr. Hammond is a consultant with Allergan and Mentor/Ethicon (both owned by Johnson & Johnson).
There were 17,195 breastlifts after massive weight loss (MWL) in 2010, according to the most recent statistics reported by the American Society of Plastic Surgeons (ASPS) — up 6 percent from 2009. And with the continued success of bariatric surgery-related weight loss, experts predict that demand for contour deformity correction of the breast will continue to rise.

While a breastlift in this patient population is basic mastopexy technique, says Jane A. Petro, M.D., there are unique differences for the surgeon — differences she described in her presentation “Treating the Massive Weight Loss Patient” at the 28th annual meeting of the American Academy of Cosmetic Surgery (AACS).

According to Dr. Petro, a board-certified plastic and reconstructive surgeon and retired chief of plastic surgery at Northern Westchester Hospital, Mount Kisco, N.Y., when preparing to treat the MWL patient, there are several key issues with which the cosmetic surgeon must be familiar.

“Formerly obese patients have significant comorbidities. They have health hazards that are not obvious, such as malnutrition (and) trace mineral deficiencies that affect healing,” she says. And depending on the category in which they lost their weight — intentional, restrictive or malabsorptive — some may have more deficiencies than others (see “How they lose,” page 15).

“The patient who has had a malabsorptive gastric weight loss program is going to have a lot of very significant deficiencies which may not ‘autocorrect’ once their weight is stabilized and their diet is stabilized,” Dr. Petro says.

According to Dr. Petro, these patients are going to have deficiencies related to gastric digestion of amino acids, enzymatic actions of the pancreas, absorption of fat soluble vitamins and changes in their absorption and ability to maintain all of the important trace minerals.

When it comes to wound healing, she says, it becomes impaired not just in any nutritional state of deficiency, but also because these patients have abnormal skin.

Regardless of how they lost their weight, “The skin in massively obese patients is quite abnormal and after the weight has been lost, the skin problems remain significant: changes in collagen, changes in collagen density, changes in inflammatory cytokine content of the skin,” Dr. Petro says, all of which she describes as invisible precursors of normal healing.
Complications are also different, she says, including seroma and infection rates. With five-, six-, even eight-foot incisions, in the MWL patient population, there is an added potential for wound-healing problems. And wound healing, she adds, contributes significantly to patient satisfaction.

“When you look at the complication rate for any of the incisional operations that are done on post-bariatric weight loss patients you almost universally see extraordinarily high problems related to wound dehiscence, incisional issues, (such as) wound infections, unsatisfactory healing, unsatisfactory scars,” Dr. Petro says.

PATIENT GUIDELINES In order to minimize risk and maximize outcomes and patient satisfaction, first and foremost, determine what the patient actually needs, Dr. Petro says. A physical exam will allow you to analyze the breast and the breast surgery process, she says, adding that she advises using the Pittsburgh Rating Scale with MWL patients.

“One once you establish a rating scale, this forces you into a paradigm way of thinking that will also shape your surgical approach. By forcing yourself to put patients into categories, you enter a more rational thought process in terms of determining your surgical course,” she says.

Another reason to use a scale is working towards having evidence-based medical analyses of cosmetic surgery procedures. “We’ve got to start standardizing our analysis of the patient in some ways that make sense,” says Dr. Petro, who explains that she picked the Pittsburgh Scale because it’s been well published, well used, and applied to hundreds of cases.

“If a patient has no breast volume and long empty breasts, which is a Pittsburgh 1, then a simple lift may give them a better shaped breast, but it’s going to be quite tiny. If they come in with a hanging breast but lots of volume, they may also want a reduction. If their goal is a petite body size, they may not be happy with a lifted C cup breast,” Dr. Petro says.

Dr. Petro emphasizes that analysis of the breast tissue and the breast process is very important in terms of determining surgery specifics. “Whether it’s going to be a big incision, a small incision, whether you can do it with a lollypop or whether you need to do one of those extended wings that goes way around the sides and gets rid of the lateral flank rolls,” she says.

“How they lose

According to Dr. Petro, there are three ways MWL patients lose weight. They are:

1. INTENTIONAL
These patients do it the old fashioned way: They cut calories and exercise themselves into weight loss. While they have caloric malnutrition, they don’t necessarily have more significant deficiencies that lead to impaired wound healing.

2. RESTRICTIVE
Restrictive weight loss (vertical banded gastroplasty, lap band surgery, gastric sleeve, transoral gastric volume reduction) patients are similar to those in the intentional category, with some changes in gastrointestinal function. “We don’t understand all of those yet,” Dr. Petro says.

3. MALABSORPTIVE
Surgery such as gastric bypass and duodenal switch, rearrange or remove part of the digestive system, thereby limiting the calories and nutrients the body can absorb. While these procedures result in the most weight loss, they also tend to have the highest complication rates, Dr. Petro says.

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While the prospect of being “awake” during surgery has created a recent stir in public media, surgeons have been using local, tumescent anesthesia safely and effectively for years. Initially pioneered by Jeffrey Klein, M.D., the tumescent approach for liposuction today is used for virtually every kind of cosmetic surgery. And one of the first doctors to master and describe this approach specific to breast augmentation surgery was Barry Kaplan, D.O., a cosmetic surgeon in Orlando and Melbourne, Fla.

“In 2001, I started doing breast augmentation, and my intention when I started was to do it under local anesthesia from the beginning, so I’ve never done it any other way,” Dr. Kaplan says. “If it’s elective, it should be under tumescent.” His reason: safety.

“There was a plastic (surgeon) in Boca (Raton, Fla.) about two years ago who had an 18-year-old die on the table as a reaction from anesthesia. My philosophy is that if it’s elective cosmetic surgery, it should absolutely be under local anesthesia. It should not be any deeper than that,” Dr. Kaplan says.

As for outside demand, that’s a result of television, he says. “People are very much aware of the dangers of anesthesia, from shows on TV where people come out of surgery and are shaking and throwing up and in a lot of pain. We don’t have any of that.”

One physician’s approach makes going local with breast surgery safe, effective

Eliza Drewa
Staff Correspondent
Fifteen minutes after surgery, his patients walk out with no pain, Dr. Kaplan says.

Dr. Kaplan admits that there is the odd patient who walks away because she's not comfortable with the idea of being awake during surgery, but “overwhelmingly, people come to me precisely because I do it that way,” he says.

**SURGICAL SCHEDULE** Because Dr. Kaplan performs his breast augmentation surgeries exclusively using the tumescent approach, he has developed a routine schedule and process for his patients. “On the day of the surgery they eat breakfast (and) take their antibiotic. When they come in we give them 2 mg lorazepam and 0.1 mg Catapres (clonidine hydrochloride, Boehringer Ingelheim),” he says. Then the patient sits for about an hour before she goes to the operating room.

“We give them 25 mg hydroxyzine with 2.5 mg Versed (midazolam, formerly manufactured by Hoffmann-La Roche) IM. Then we inject lidocaine in the inframammary fold where we’re going to make our incision. We put a little stab where we’re going to put the incision anyway, and that allows us to insert our spraying (2 mm) cannula under the pectoralis major muscle, (making sure we’re going parallel to the plane of the chest and not perpendicular, so it slips underneath the muscle). Then we use a pump and a button-controlled (Hunstad, Mentor) handle, for hand control. We start infiltrating underneath the muscle, which starts the pocket and it numbs the area,” Dr. Kaplan says.

In the IV bag is what Dr. Kaplan describes as “essentially Klein’s formula.” But, he points out, “We double it.”

He says his mixture is 100 cc lidocaine at 2 percent, 2 cc epinephrine and 10 cc bicarbonate.

“We’ll infiltrate anywhere from 250 to 500 cc per side, depending on the amount of tissue or the size of the breast we’re starting with,” Dr. Kaplan says.

The tumescent solution sits for 20 or 30 minutes to numb the patient, and then it’s time for surgery.

Dr. Kaplan says he always uses inframammary incision. This is “technically the easiest,” he says, and from his perspective, the safest.

“If you go in through the armpit and you go down to make the inframammary crease, what if there’s a little bleed there? First of all, you can’t see it. Second of all you can’t possibly get to it, so I think it’s safer to go in through the inframammary fold.”

He concedes that it’s also personal skill and preference. “For someone who has done thousands of axillaries, it’s no problem. But (the inframammary) is technically the safest place to put it.”

Twenty minutes later, the patient is cleaned up, put in a sports bra and walks out pain-free, he says.

Dr. Kaplan says that because he has his patients begin taking pain pills before the anesthetic wears off, they have continuous relief.

“When they (patients) get home, we have them take their Phenergan suppository (promethazine, Pfizer). We have them eat, take their Percocet (acetaminophen, oxycodone; Endo) or Demerol (meperidine, Sanofi-Aventis), and they’ve already started taking pain pills before our anesthetic wears off. So they’ve got continual pain relief. They’re not going home in agony and nausea and trying to take their pain medication,” he says. “So we’re ahead of the pain curve instead of trying to catch up to it, which is almost impossible to do.” As a result, Dr. Kaplan argues, recovery is easier.

**GOING LOCAL** Dr. Kaplan says he has performed more than 7,000 surgeries with the tumescent approach, and they extend beyond the breast borders. He also does tummy tucks, facelifts, mastopexy, liposuction — pretty much everything — under local. It’s safe, he says, and it’s rare that anything goes wrong in his hands.

Vigilance in the presurgical evaluation and workup will help to avoid the potential for an unwanted pharmacologic reaction, he says. He advises surgeons to make sure patients aren’t taking a medication that uses the same enzyme system that the lidocaine uses to be metabolized.

“It’s the same kinds of precautions using when doing liposculpture. If you’re using fairly large amounts of lidocaine, you have to make sure that they’re able to metabolize it,” he says.

“The worst problem is that somebody says, ‘Oh, I can feel that in that spot,’” Dr. Kaplan says.

His solution? To put a little bit more local in, but “usually, even that doesn’t happen,” he says.

**Disclosures:**
Dr. Kaplan reports no relevant financial interests.

**References:**
Kaplan, B. Breast augmentation by tumescent anesthesia is a safer, more affordable alternative to general anesthesia. *Am J Cosmet Surg.* 2004;21(2).
As much as a prescriptive approach to mastopexy would simplify the surgical decision-making process, a variety of issues influence the surgeon’s diagnosis and treatment plan to lift the breasts.

That’s according to David Hendrick, M.D., a cosmetic surgeon in Salina, Kan., who appeared onstage at the 28th annual meeting of the American Academy of Cosmetic Surgeons in Las Vegas to discuss his method for determining which patients need which mastopexy procedures.

Of all the techniques currently in use, how do you know which is right for individual patients? According to Dr. Hendrick, it comes down to judgment.

“The spectrum of ptosis is a continuum, and where you change on the continuum from one type of mastopexy to another really becomes a matter of judgment and experience,” he says.

THE SURGICAL SPECTRUM “If your patient has grade 1 or borderline grade 2 ptosis, an implant alone may do the trick, but it may be time to consider one of the periareolar incisions,” Dr. Hendrick says.

The crescent and doughnut periareolar techniques are
typically used at the time of implants if a minimal lift is deemed necessary, he says.

“You don’t usually use those techniques in a woman who wants a lift but no implants. It’s almost always done at the same time as an augmentation,” Dr. Hendrick explains.

If a patient has true grade 2 ptosis, however, it may be time to step up to the lollipop mastopexy, which removes more skin and allows the surgeon to move the nipple a longer distance while leaving the breast tissue intact.

It’s also going to lessen the chance that the patient experiences widening of the areola or widening of the scars around the areola, Dr. Hendrick says.

“When you do a lollipop, there’s less cinching of the skin down around the areola than there is with the doughnut,” he says.

But this is also where surgical technique gets more complicated. The potential problem, Dr. Hendrick says, “is that there’s an ideal length between the nipple and the breast fold. When you lift the nipple, you may also be creating an unfavorable distance between the nipple and the fold.”

When you increase the length so much that you have to consider additional skin excision, “That’s when you have to think about departing from a vertical and going to an inverted T incision in the fold of the breast,” he says, emphasizing that whether it’s the fish-tail excision, the Wise pattern excision, or something else that removes skin from above the breast fold, the goal is to create an appropriate distance between the nipple and the fold.

**EXCISING BY NUMBERS** The purpose of the breast ptosis grade, Dr. Hendrick says, is to orient the surgeon. It’s the measurements that will tell you precisely how much — and what kind of — skin excision is required.

“In cosmetic surgery, we’re all about diagnosis. You’ve got to make the right diagnosis before you can use the right technique,” he says, adding that that’s why it’s so important to understand the so-called “norms.”

The norms, Dr. Hendrick says, depend on frame size and height. The distance from the nipple to the sternal notch generally ranges between 18 cm and 21 cm; from the nipple to the fold is from 5 cm to 9 cm, with the lower end more typical of a tiny, petite woman and the higher end a taller, larger woman.

“Normally, we’re targeting something in the range of 7.5 to 8 cm,” from the nipple to the fold, Dr. Hendrick says.

To get a final distance between 7 cm and 8 cm with an inverted T excision,
A superior pedicle is good for short lifts, where the nipple doesn’t have far to go. The further the nipple has to go, the more kinking of that pedicle there is so a medial-based pedicle tends to rotate up into the higher position without kinking.”

Dr. Hendrick admits, however, that that’s not always the case. “Some of it’s a matter of preference; some of it’s just a matter of judgment,” he says.

There’s also the issue of shape. While some breast glands may still be fairly compact with some projection, others may be completely stretched and flattened out. Therefore, a surgeon may need to shape the breast by removing tissue or folding it within itself, he says.

“Am I going to divide the inferior pole breast tissue into thirds (medial, lateral, central pillars); or fold (imbrication); or am I going to spiral it on itself (what we do in the case of massive weight loss patients)? Their breast tissue is always such a flat sheet that you can’t get a good breast mound without some sort of spiraling and fixing that with suture material,” Dr. Hendrick says.

“IT’s about safety,” Dr. Hendrick says. “The pedicle determines what part of the tissue will keep an uninterrupted blood supply, so blood flows to and from the nipple.”

Importantly, he points out, the pedicle is a separate consideration to the skin and breast shaping technique.

While the inferior pedicle is used in the classic Wise breast reduction, “When we’re not removing a lot of breast tissue, it’s going to involve preserving a superior or medial pedicle,” Dr. Hendrick says.

So, who needs what?

“A superior pedicle is good for short lifts, where the nipple doesn’t have far to go. The further the nipple has to go, the more kinking of that pedicle there is so a medial-based pedicle tends to rotate up into the higher position without kinking,” he says.

At the end of the day, whether it’s the pedicle or excision pattern, Dr. Hendrick’s advice is this: “Make an accurate diagnosis. That determines the treatment plan.”

<table>
<thead>
<tr>
<th>Grade</th>
<th>Ptosis Level</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Mild</td>
<td>Nipple just below inframammary fold but still above lower pole of breast</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
<td>Nipple further below inframammary fold but still with some lower pole tissue below nipple</td>
</tr>
<tr>
<td>3</td>
<td>Severe</td>
<td>Nipple well below inframammary fold and no lower pole tissue below nipple</td>
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Transaxillary tips

Technique for balloon-assisted augmentation mammoplasty creates scarless breast, but pitfalls are possible

According to the latest statistics reported by the American Society of Plastic Surgery (ASPS), breast augmentation surgery holds the number one spot for cosmetic surgical procedures performed in 2011. While breast implants have held a position in the top five throughout the history of cosmetic surgery in the United States, one thing that has changed in more recent years is the rise in use of silicone breast implants.

Silicone, one expert says, is up nearly 50 percent since they were reintroduced to the market in November 2006. That’s according to Michael S. Kluska, D.O., F.A.A.C.S., F.A.C.O.S., who presented at the 28th annual meeting of the American Academy of Cosmetic Surgery earlier this year in Las Vegas.

An established expert with the transaxillary approach to cosmetic breast surgery, Dr. Kluska says that the popularity of silicone gel-filled implants also come with challenges, including restrictions in implant size and minimum required incision length for placement.

“When you insert a saline implant, it’s empty, and you can use a 1 1/2 to 2 cm incision,” he says. Silicone implants, on the other hand, come prefilled and are much larger at the time they’re placed in the body, he explains.

“The FDA (Food and Drug Administration) found that silicone implants forced through a smaller incision were more likely to rupture. As a result, the minimum incision for a silicone implant is 5.5 cm,” Dr. Kluska says. To make the incision even more accommodating of the prefilled gel implants, he uses a z-plasty or lazy “S” incision. Despite the longer incision, there is a limit in size—less than 600 cc, says Dr. Kluska, who practices in Greensburg, Pa.

While the inframammary and periareolar breast implant options effectively hide incisional scars, it’s the transaxillary that’s arguably the most optimal, as it leaves no scar on the breast itself, Dr. Kluska says. The key to success with this approach, however, is avoiding the pitfalls, which range from surgeon and patient selection to the actual surgical process and the aforementioned silicone-implant specific techniques.

SURGEON SELECTION
Knowing who the appropriate candidate is isn’t limited to just patient selection — it extends to surgeon selection as well, Dr. Kluska says. “The right surgeon has experience with minimally invasive surgery and can handle intraoperative and postop complications, such as bleeding, asymmetry — both preoperative and postoperative — capsular contracture, and malposition,” he says.

Surgeons must also know how to select the right patients for this particular technique, he says, adding that such candidates have mild to moderate asymmetry or pseudoptosis, and less than grade 2.

However, “If a patient has previous implants by another surgeon and experienced complications — even if the first augmentation was transaxillary,” or if she wants to exchange silicone implants, the transaxillary incision is not an option, he says.

POSITION PERFECT
The biggest pitfall with the transaxillary approach, whether it’s saline or silicone implants, is maintaining the lateral position, Dr. Kluska says. Lateral migration of the implant is a classic result for the inexperienced surgeon.

He says that his success with this particular technique is an outcome of a three-step balloon-assisted augmentation mammoplasty (BAAM) approach.

STEP 1. First is blunt dissection of the pocket, which should be carried out the new inframammary crease. “I perform the initial dissection of the plane beneath the pectoralis using a finger sweep technique,” he says. To refine the pocket, he uses a hockey stick dissector on the inferior portion of the muscle.

“If you’re going to perform a transaxillary breast augmentation, keep it completely submuscular to maintain lateral position,” he says.

Once the pocket is created, it’s time to irrigate. “Be sure you irrigate the pocket with tumescent solution until the fluids run clear and hemostasis is achieved,” Dr. Kluska says.

STEP 2. Dr. Kluska’s second step is to use the Snowden Pencer Spacemaker Surgical Balloon Dissector to complete the dissection.

“The balloon does a great job keeping lateral intact,” he says. The balloon is contoured and the resulting pocket mimics the shape of the pectoral muscle. The result? A very natural implant position, he says.

Dr. Kluska advises obliquely inserting the balloon from the superolateral to the inferomedial. In essence, the balloon acts as a sizer. After inflating the balloon to 900 cc or 1,000 cc and allowing it to expand the pocket, Dr. Kluska deflates it and pumps it back up to the size of the implant to be placed.

“Each pump of the balloon is equivalent to about 30 cc. If I plan to use a 300 cc implant, I can pump the balloon 10 times to check the size,” he says.

STEP 3. The final step to the BAAM approach is an endoscopic assessment, if needed. After the balloons are removed, an endoscope is inserted to evaluate and complete dissection, Dr. Kluska says. “Look for retained attachments of pectoralis and signs of bleeding. Control bleeding with your endocautery handpiece.”

To wrap up the procedure and minimize postoperative complications, Dr. Kluska advises the following: Sit the patient up and check for breast symmetry; take an intraoperative photo to show implant position. If the patient doesn’t follow postop massage instructions, this will show that your work was appropriate; instruct the patient to wear a sports bra or no bra for a minimum of six weeks; have the patient begin implant massage and stretching three to five days postop and for the next three months; and encourage “bouncing” activities after two weeks.

Disclosures: Dr. Kluska reports no relevant financial interests.

Eliza Drewa  
Staff Correspondent

Dr. Kluska
Surgeons find lipotransfer a versatile, reliable tool for breast shaping

Cheryl Guttman Krader
Senior Staff Correspondent

Grafting of autologous fat into the breast remains controversial, and even surgeons who have embraced it acknowledge there is a need for more data to help define the indications and refine the technique. However, based on their experience, speakers who discussed fat grafting to the breast at the 2011 meeting of The Cutting Edge Aesthetic Surgery Symposium concur that with proper technique, it is a safe and effective modality for breast enhancement and correcting deformities that provides durable results.
“I found the grafted fat was sitting where I placed it and bled when I cut into it. My use of fat grafting took off after that, and now there is hardly a reconstruction case where I don’t inject fat to improve contour defects.”

Dennis C. Hammond, M.D.
Grand Rapids, Mich.

Sydney R. Coleman, M.D., says he began using fat grafting for breast shaping 17 years ago, and because of his available patient follow-up, he can speak to the longevity of improvements achieved. In addition to the persistence of its effect, the technique has the benefit of producing very natural results, and it offers great versatility as it can be used alone or as an adjunct in aesthetic and reconstructive cases, allowing for contouring to meet the individual’s specific goals, he says.

“Fat injection offers controlled reshaping of the breast,” says Dr. Coleman, assistant professor of surgery, New York University Medical Center, New York.

Dr. Coleman notes that even in his early cases, he was careful to thoroughly document the site of fat placement with respect to both level and quadrant of delivery. Considering this information in conjunction with the outcomes achieved supports the use of a three-dimensional structural fat grafting approach, in which small aliquots of fat are placed diffusely, largely into the pectoral-retromammary space (the pectoralis major muscle and the retropectoral and prepectoral spaces) for augmentation, as well as more superficially into the subcutaneous space for shaping.

In most cases, fat is not grafted into the parenchyma, but placement deep to the areola has been used in select cases to increase projection, Dr. Coleman says.

The fat transfer is usually done through only four incision sites, although an additional site in the axilla may be used in reconstruction cases. Dr. Coleman says he uses cannulas that are 9 cm or 15 cm long, beginning with and usually focusing on the inferior pole.

“Occasionally, I will use longer cannulas, but I prefer the smaller lengths especially after hearing reports of pneumothorax,” he says.

**DISASTER AVERTED**

Dennis C. Hammond, M.D., says he was converted from a skeptic about autologous fat augmentation for the breast based on positive results in a few early patients.

“I must admit that I initially thought fat grafting would be the biggest disaster to ever befall plastic surgery, and I have certainly seen problems when the procedure is performed by untrained individuals, which speaks to the need to have technical expertise. Medicolegal concerns persist, but I believe the issue of microcalcifications interfering with breast cancer detection has been successful resolved,” says Dr. Hammond, a plastic and reconstructive surgeon in private practice, Grand Rapids, Mich.

“There are still questions in need of answers, including determination of the best fatty substrate to graft, the role of stem cells, the best technique for transferring the fat, and if there is any adjunctive technology that can increase graft survival, he says. “However, I am convinced the grafted fat survives, and I consider fat transfer a useful, safe, simple and versatile option. Moreover, patients love it because of the added benefit of contouring the body elsewhere.”

Dr. Hammond says he came to appreciate the longevity of the result based on maintenance of improvement after 18 months of follow-up in his first patient. Subsequently, he obtained proof that the grafted fat survives when another early patient, who also had an implant, had to be taken to the OR for treatment of capsular contracture.

“I found the grafted fat was sitting where I placed it and bled when I cut into it. My use of fat grafting took off after that, and now there is hardly a reconstruction case where I don’t inject fat to improve contour defects,” he says.

Regarding technique, Dr. Hammond emphasizes the importance of minimizing cell damage and concentrating the fat, which he does by straining rather than centrifugation. He cautions that when doing reconstruction cases with an implant and fat grafting, surgeons need to be careful to stay between the muscle and skin, avoiding puncturing into the implant space as that can lead to infection with loss of the implant.

He says that through his experience, he’s also learned that it is possible to inject large volumes, up to 500 cc at a time, but that a multiple stage procedure is probably more effective than a single stage.

**WATER-JET ASSISTANCE**

Cladio De Lorenzi, M.D., who is in private practice in Kitchener-Waterloo, Ontario, says he learned the technique of autologous lipotransfer to the breast from Klaus Uebberreiter, M.D., (BEAULI Technique), and he highlights his use of water-jet assisted liposuction (Bodyjet, Human Med) for fat harvesting.

“It’s critically important to consider how you do the procedure to understand problems that can occur,” Dr. De Lorenzi says.

Although he always works with a board-certified anesthesiologist, he uses the platform first to disperse local anesthetic, and he says it results in rapid onset of anesthesia and vasoconstriction. This increases patient safety since less general anesthetic is needed to complete the procedure, he explains.

Using small-aperture cannulas and 0.5 atm pressure, the water-jet assisted harvesting collects the fat atraumatically in a sterile fashion and essentially washes the material. The infranatant fluid is automatically removed and the portion for transfer consists of small clumps of fat cells without the presence of long collagenous fibers, he says.

“This technology provides unparalleled speed for preparing large quantities
“In most cases, I do not transfer more than 200 cc of fat into a single breast, resulting in about 100 cc of permanent enhancement, and although I know others do, I have not done repeat treatments in my patients.”

Claudio DeLorenzi, M.D.
Kitchener-Waterloo, Ontario

A patient before (left) and approximately one year after bilateral fat graft procedure to breasts using the BEAULI technique. Note the correction of the mild preoperative breast asymmetry possible with this technique. The right breast, smaller and slightly lower preoperatively, has been filled and elevated to better match the left postoperatively, Dr. DeLorenzi says. (Photo credit: Claudio DeLorenzi, M.D.)

Fat continued

of high quality fat for grafting and is very useful for increasing efficiency. However, the single-use disposables are expensive, and it means having yet another machine to maintain and recertify,” Dr. DeLorenzi says.

Candidates for breast enhancement with autologous fat grafting in Dr. DeLorenzi’s practice are women who do not want implants and who have only a modest to moderate requirement for size increase. “This procedure is not meant to replace standard breast augmentation with breast implants, because the volumes that can be safely used only result in about a half-cup size enhancement per breast, whereas women who desire breast augmentation frequently ask for about two or three times that amount” Dr. DeLorenzi says.

“In most cases, I do not transfer more than 200 cc of fat into a single breast, resulting in about 100 cc of permanent enhancement, and although I know others do, I have not done repeat treatments in my patients,” he says.

Dr. DeLorenzi says he also uses fat transfer to correct localized deficits, such as upper pole mammary deflation, and frequently this type of enhancement is done while a patient is undergoing abdominoplasty.

Based on having centrifuged samples from the lipoaspirate in the first dozen patients, Dr. DeLorenzi says that about half of the original volume is viable material. MRI follow-up from Dr. Ueberreiter’s patients indicate that any significant loss of volume occurring after the procedure happens mostly within the first four weeks, while images from eight to 12 weeks and six months show stable results (Herold C, Knobloch K, Rennekampff HO, et al. Plast Reconstr Surg. 2010;126(5):260e-261e).

“We have not seen oil cysts, nodules and calcifications, although those problems, which have been cited in previous reports, may not appear until later on,” Dr. DeLorenzi says. “Furthermore, this technique harvests small clumps of cells rather than individual cells.”

Cancer Concerns Based on findings from in vitro experiments and animal studies investigating effects of leptin and adiponectin, concern has been raised that stem cell-enriched fat grafting can stimulate cancer growth in rats.

However, it remains unclear how these laboratory findings relate to an increased risk of breast cancer after fat grafting in patients without a history of breast cancer, says Dr. DeLorenzi, adding that he uses strict patient selection criteria for autologous fat grafting and treats only healthy women who are nonsmokers with no personal or family history of breast cancer.

He does note, however, that Rigotti and colleagues reported no evidence for an increased risk of locoregional recurrence following fat grafting in breast cancer patients undergoing reconstruction after mastectomy (Rigotti G, Marchi A, Stringhini P, et al. Aesthetic Plast Surg. 2010;34(4):475-480).

Disclosures: Dr. Coleman receives royalties for cannulas distributed by Mentor. Drs. Hammond and DeLorenzi report no relevant financial interests.
Hyaluronic acid filler adds value as minimally invasive option for breast enhancement

Cheryl Guttman Krader
Senior Staff Correspondent

Hyaluronic acid gel for breast augmentation (Macrolane VRF20/VRF30, Q-Med) is a new tool with a clear indication because of its simplicity, safety and high patient acceptance, says Per Hedén, M.D., Ph.D.

“If we consider the population of patients interested in breast enhancement, those willing to undergo implant surgery are only the tip of the iceberg. This leaves a huge population of women looking for alternatives,” says Dr. Hedén, associate professor of plastic surgery, Karolinska Institute, and chairman of the private Akademikliniken hospital, Stockholm.

“Hyaluronic acid gel injection helps to meet this need. It provides immediate results with minimal discomfort, and in clinical trials, it was associated with high ratings of breast general appearance, shape and firmness. In addition, satisfaction with hyaluronic acid gel breast augmentation can open the door to implants. In my practice, the conversion rate is more than 30 percent,” Dr. Hedén says.

**PROS AND CONS** Just like implants and fat injection, hyaluronic acid gel has both advantages and disadvantages that need to be discussed with patients so they can make an informed decision, Dr. Hedén says. There have been no early or late serious adverse events noted in studies with the product to date. However, patients must also be told that even though more than 15 million injections of the non-animal stabilized hyaluronic acid gel has been given in the face in the last 15 years, because hyaluronic acid gel for breast augmentation is still relatively new, data from long-term experience and large series are lacking, he explains.

Other limitations include the fact that absorption of the material is unpredictable, but it may be rapid. The amount of gel remaining after one year varies from 5 to 85 percent, and patients should anticipate the need for a touch-up after nine to 12 months, he says.

Capsular contracture also can occur. In clinical trials, the rate of capsular contracture resulting in firmness, displacement, visibility, nodularity or asymmetry ranged from 4 to 22 percent during the first 12 months after injection. Left untreated, the problems disappeared spontaneously in most cases. By 24 months, the complication rate was 2 percent, Dr. Hedén says.

“With our experience, about 15 percent of patients request treatment for capsular contracture, but it usually can be done successfully by simple squeezing (closed capsulotomy) or percutaneous needle puncture. This is in contrast to the surgical intervention needed for managing capsular contracture with silicone implants,” Dr. Hedén says.

The injected material can interfere with breast imaging, but this concern is minimized with the recommended technique of subglandular injection. It’s almost eliminated with use of ultrasound for diagnostic imaging, he says.

**TECHNIQUE DETAILS** Findings from post-treatment MRI performed in patients enrolled in clinical trials demonstrated the material remained where it was intended when it was delivered in a subglandular technique. MRI also showed that absorption occurs much faster with submuscular placement. In patients with thin tissue cover in the upper pole, however, a dual-plane technique with submuscular placement of the material in the upper pole is preferred, Dr. Hedén says.

After investigating various injection techniques, Dr. Hedén says he determined that delivery of the material through a skin entry site above the breast in the upper lateral part of the chest was most desirable, because it minimized risk of gravitational migration of the hyaluronic acid gel and enabled access to the whole treatment area with ease of maneuvering the syringe.

Pre-injection, markings are made to guide gel placement. This includes drawing a line from the nipple to the sternum with arms elevated to simulate the nipple elevation achieved after the injection and elongation of the inframammary fold to the middle. Most of the material should be placed under the gland, on top of the pectoralis muscle, between these two lines, Dr. Hedén says.

Anesthesia is done using a tumescent cannula to infuse 40 cc of 0.5 percent lidocaine with epinephrine under the gland. Anesthetic is delivered to both breasts prior to starting the hyaluronic acid gel injection. In a pocket technique for hyaluronic acid gel injection, a space is created in the lower pole of the breast between the gland and the muscle, and the pocket is gradually filled with the material, Dr. Hedén says.

Breast palpation during the injection is recommended to minimize nodule formation. Pushing down on the breast so that the nipple-to-sternum line becomes horizontal provides a good simulation of the appearance of the breast when the patient is standing, Dr. Hedén says.

A modified pocket technique combines creation of a small pocket with tunneling of the cannula, paying careful attention to the track of the cannula in order to know in which direction the material has been injected. Dr. Hedén says it is also recommended to lift the cannula off the muscle surface and inject with the bevel deep, as this minimizes the risk for migration of the material into the gland and pectoralis major muscle during the injection.

**Disclosures:** Dr. Hedén is a consultant for Allergan and Q-Med.
Megavolume lipografting, enabled by pregrafting external tissue expansion that creates an enlarged, vascularized recipient space, is a safe and predictably effective approach for breast augmentation, says Roger K. Khouri, M.D.

"Current discussions about improving outcomes of fat transplantation are focusing on methods for atraumatic harvesting, processing and delivery, as well as on the role of stem cells or other adjuncts for optimizing graft survival. However, these discussions are ignoring the importance of optimizing the graft-recipient interface," says Dr. Khouri, in private practice at the Miami Breast Center, Key Biscayne, Fla.

"Successful fat transplantation requires attention to all of the involved elements because each by itself is a rate-limiting step, and if the goal is to deliver a large-volume graft, the recipient site must be proportionately sized. A farmer who plants a huge number of seeds into a small pot cannot expect to grow a big crop," he says.

Dr. Khouri says he pioneered this procedure for autologous fat breast augmentation, which uses an external, bra-like, vacuum-based expansion device that he invented (Brava Breast Enhancement and Shaping System, Brava LLC). Here, he discusses the procedure as well as intraoperative and postoperative techniques to optimize graft take and survival.

Dr. Khouri says he developed the concept of external expansion to create an enlarged, vascularized scaffold as the recipient site for fat transplantation in the breast in 2004, at a time...
when breast enhancement with autologous fat was considered was looked down upon. Patients are asked to wear the expansion device each night for at least 10 hours for a period of four weeks.

Early on, Dr. Khouri says he undertook a prospective study using 3-D volumetric analysis of serial MRI images to evaluate the effect of the expansion and its effect on the outcome of the fat graft procedure. The results provided proof of concept, he says, showing dose-response relationships between patient compliance with expander wear and increased size and vascularity of the recipient space and between recipient space size and achieved postgraft augmentation volume.

Data collected in a soon-to-be published prospective multicenter study enrolling 81 women (Khouri RK, Eisenmann-Klein M, Cardoso E, et al. Plast Reconstr Surg. 2012 Epub ahead of print) show a strong linear correlation between pregrafting recipient site expansion and the breast augmentation volume. Among 71 women who wore the expansion device preoperatively, the mean augmentation volume at 12 months follow-up was 233 mL/breast, representing 82 percent graft survival.

These outcomes are highly significantly different compared with historical controls from published series of women having breast augmentation without pregraft expansion, Dr. Khouri says. “In the women without pregraft expansion, mean augmentation volume at 12 months was only 134 mL/breast and graft survival only 55 percent,” he says.

Dr. Khouri adds that results from the prospective study of megavolume breast augmentation with pregraft expansion also refute the criticism that results of fat grafting for breast augmentation are unpredictable. “According to the linear dose-response curve we established, patients can be told that two-thirds to three-fourths of the volume they achieve with pregraft expansion will become permanent augmentation,” he says.

**THE WEakest LINK** Recognizing that the outcome of autologous fat transplantation depends on its weakest link, Dr. Khouri says he has refined his entire technique to maximize the quality of the fat graft, its delivery and postoperative survival. Together with Tom Baker, M.D., and Tom Biggs, M.D., Dr. Khouri has developed a farmer analogy that describes the success of planting as depending on the “four S’s” — seeds, soil, sowing and support. For harvesting, he uses a spring-loaded syringe that pulls a constant 300 mm Hg vacuum and special 12-hole cannulas that he says he developed.

“It’s intuitive that more fat can be harvested faster using a cannula with a greater number of holes, although there was existing dogma that because of the viscosity of fat, harvesting efficiency reached a plateau using a cannula with three holes. We’ve proven in a study that the 12-hole cannula allows for increased harvesting efficiency,” he says.
"If the extracted fat contains little to no blood, it will separate very rapidly with minimal centrifugation. The result of this technique is a slurry-like material."

--Roger K. Khouri, M.D.
Key Biscayne, Fla.

Megavolume continued

with the added benefit of lower vacuum compared with a single-hole cannula," Dr. Khouri says.

Dr. Khouri says he has also devised a closed system (Lipografter, Lipocosm LLC) for atraumatically collecting, processing and grafting that minimizes manipulation of the fat and avoids its exposure to air. Fat withdrawn through the cannulas is transferred into a collection bag via a two-way valve, and once the harvesting is complete, the bag is centrifuged gently at 15 g.

"If the extracted fat contains little to no blood, it will separate very rapidly with minimal centrifugation," Dr. Khouri says. "The result of this technique is a slurry-like material. Going back to the farmer analogy, the farmer doesn’t plant seeds in clumps, but rather one at a time."

The sedimented fat is transferred directly to the 3 mL grafting syringes using the same two-way valves in reverse mode. It is delivered to the breast in a 3-D fanning pattern through multiple entry sites (10 to 14) and using a fine cannula attached to the small grafting syringe. These instruments enable precise and diffuse injection, he says.

The injections are periglandular only and particularly target the subcutaneous space. Dr. Khouri says that "gives the most bang for the buck," but fat is also deposited into and below the pectoralis muscle. The volume delivered is equivalent to the amount of space created by the expansion. Dr. Khouri says he cautions surgeons to be wary of the “last drop effect.”

"Overgrafting is a common cause of failure. If the potential volume of the graft recipient space and its tissue compliance are exceeded, there will be increased interstitial pressure and decreased perfusion that will compromise graft survival. It is all about the container: If it is filled beyond its capacity, it will bust," he says.

To support the graft after surgery, patients are instructed to wear the external expansion device for one week, beginning 24 hours after surgery. The device acts as a splint, holding open the space from the pregrafting expansion, and any spaces opened from intraoperative contracture release while also stabilizing the grafted fat against movement and subsequent trauma that could compromise its survival, Dr. Khouri says.

Disclosures:
Dr. Khouri is a stockholder of Brava LLC and Lipocosm LLC.

Brava vacuum pressure applies an orthogonal expansion force on the breast to generate the recipient scaffold required for the large volume fat graft. (Photos credit: Roger Khouri, M.D.)

Fat harvesting and grafting with the Lipografter closed system. Clockwise, starting from lower-left — A: A 12-hole, 12-gauge cannula connected to the spring-loaded syringe via the two-way tissue valve with tubing leading to the sterile collection bag; B: Ribbon springs connected to the syringe impart a 300 mm Hg vacuum aspiration force that is constant along the entire excursion of the plunger to gently liposuction the fat into the syringe. Once the syringe is full, pushing the plunger down re-cocks the spring and the valve sends the fat to the collection bag; C: After gentle centrifugation of the bag, the fluid is drained and the fat is concentrated in the collection bag that now becomes the delivery bag. The same valve in reverse mode now draws the fat from the bag to the 3 mL syringe and pushing the plunger down injects it into the tissues. The grafting cannula is a 14-gauge, single-hole, spatulated round tip with a gentle curve to better follow body contour. This system saves the loss of motion associated with switching cannulas and reloading syringes, Dr. Khouri says; D: Fat is grafted through multiple circummammary needle holes, fanning out multiple radial passes through each entry side, preferentially in the subcutaneous periglandular planes while retracting the cannula, to leave behind a thin ribbon wheal. (Photos credit: Roger Khouri, M.D.)
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Injectables, RF energy aid female genital rejuvenation

John Jesitus
Senior Staff Correspondent

DUXBURY, MASS. — From traditional labiaplasty to filler injections, patients interested in female genital rejuvenation have a growing array of options, says Christine A. Hamori, M.D.

Although prospective patients are generally familiar with labiaplasty, they may not know that various other surgical and nonsurgical procedures also are available for rejuvenation of female genitalia, says Dr. Hamori, a Duxbury, Mass., plastic surgeon in private practice and director of the Cosmetic Surgery and Skin Spa.

Evolving expectations With the growing popularity of waxing and shaving procedures, patients are demanding better aesthetics in the vulvar area, Dr. Hamori says. “They basically have a low tolerance for any kind of dangling of the labia minora beyond the labia majora. This isn’t exactly natural, but neither are large breasts on women that previously had small breasts.”

Whether women get such ideas from Victoria’s Secret catalogs, medically oriented reality TV programs or digitally altered pornographic images, Dr. Hamori says, “Having no labia minora show beyond the majora seems to be the new cosmetic ideal. The public is demanding a different look, even though it may not be natural. I hope to offer them a safe procedure for reaching their goals.

“I’m afraid if they don’t go to the right kind of provider — a plastic surgeon or someone trained in this area — they might seek out a primary care doctor or a cosmetic physician who is not trained in closing wounds and in the aesthetics of the vaginal region,” she adds.

Contrary to what one might assume, Dr. Hamori says her patients include “very few dancers or strippers.” With a small minority of her patients expressing interest in genital rejuvenation procedures, she says, “I don’t see any aesthetic issues, but they do.” If these patients choose an inexperienced cosmetic surgeon without proper training in this area, Dr. Hamori says she is concerned about function. “If too much of the labia minora is trimmed, patients can run into problems such as dyspareunia, dryness, irritation and unusual appearances. I’m trying to avoid that.”

More commonly, Dr. Hamori sees 15- to 19-year-old females who have congenital asymmetry of the labia minora. “Those patients want to achieve symmetry and look equal on both sides. Therefore, we perform a unilateral, one-sided labiaplasty.”

Dr. Hamori says the majority of her patients are ages 25 to 35. “They’re very concerned with the appearance of the vulvar area in a standing view,” she says.

Women worry about how they look standing in front of the mirror with their legs together, she explains.

Conversely, “Men are interested in a different view, with the legs spread.” Informal surveys of men reveal a surprising preference of labia minora dangling beyond the labia majora. “Few men desire labia minora trimming. It’s mostly a female phenomenon,” she adds.

Another group of Dr. Hamori’s patients fall roughly into the perimenopausal category. With ages between 38 and 68 years, “These women have seen the development of vulva disharmony such as wrinkling of the outer lips and increased length of the labia minora, perhaps because the outer lips are becoming more atrophied and shrunken,” she says. After childbirth, “Women feel their labia have changed; this becomes important in the age group of women re-entering the dating scene after divorce or loss of a partner.

“I discuss the importance of perimenopausal hormone replacement potentially to improve problems patients may be having with vaginal dryness and libido,” Dr. Hamori says. “I usually perform a labiaplasty on these perimenopausal patients. For the labia majora, I tend to volumize that area with fillers including Resylane (hyaluronic acid/HA, Medicis), Sculptra (poly-L-lactic acid, Sanofi-Aventis) and fat.”

Labia minora reduction The typical approach to wedge labiaplasty (labia minora reduction) involves removal of a wedge from the roughly semicircular labia minora (After
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“I realized that perimenopausal women, and some younger women, have wrinkling of the labia majora. It becomes deflated, similar to how the face deflates as we age.”

Christina A. Hamori, M.D.
Duxbury, Mass.

Labiaplasty continued

G.J. Ann Plast Surg. 1998;40(3):287-90, Dr. Hamori says. After anesthetizing the patient and marking the area to be resected, she uses a peak plasma blade to incise the labia minora first along its inferior surface, then externally.

Next she removes the mucosa of the wedge, leaving the submucosa intact. She uses the peak plasma blade to achieve hemostasis as well. After both sides have been resected, bupivacaine is injected, and the labial defects are closed with absorbable sutures.

Dr. Hamori says that for wedge labiaplasty, “I’ve made a modification where I take a little extended piece of the clitoral hood out laterally. When you reduce the labia minora, you must also reduce to some degree the protrusion of the clitoral hood. On a standing view, most women don’t like the width of their clitoral hood. To reduce that, when I remove the wedge, I take my incision north a bit between the clitoral hood and the labia majora, north of the labia minora. I remove a small wedge, which reduces the bulkiness of the clitoral hood, as well as allowing me to run a dog ear out and make the closure more aesthetic.”

Conversely, she says the traditional approach carries this dog ear on top of the clitoral hood. “I prefer to take it along the junction of the clitoral hood and the labia majora,” she says.

Postoperatively, Dr. Hamori says that patients require four days off their feet. “They can return to work usually on day five,” but they must avoid excessive sitting. Patients can return to sports at about three weeks, and sex, cycling or horseback riding at about six weeks postoperatively, she says.

For labia majora reduction, Dr. Hamori says it’s possible to use a simple elliptical excision along the lateral border of the labia majora. More specifically, the elliptical section is resected, along with a small amount of underlying fat, followed by bupivacaine injection and surgical closure.

Surgeons can combine labia majora reduction with labiaplasty, but if they do, it’s best to perform the labia minora resection first; recovery from the combined procedure is also somewhat more difficult for patients, Dr. Hamori says. Additionally, surgeons must educate patients presurgically that labia majora reduction scars tend to be more visible than those of labiaplasty because the linear scar from the former procedure is located on perineal skin rather than the corrugated labial mucosa, she says.

For a traditional clitoral hood reduction, the first step involves marking an inverted crescent shape on the clitoral hood, Dr. Hamori says. After injecting local anesthetic, “Grasp the redundant clitoral hood tissue to determine the width of the crescentic resection.” This procedure removes only part of the foreskin of the clitoris, she adds.

Physicians can close the incision in two layers, with interrupted 5-0 Monocryl (poliglecaprone 25, Ethicon) sutures in the deep dermis and 5-0 Vicryl Rapide (poliglutactin 910, Ethicon) externally, Dr. Hamori says.

FILLER INJECTIONS AND MORE

Regarding injectable treatments, “I realized that perimenopausal women, and some younger women, have wrinkling of the labia majora,” Dr. Hamori says. “It becomes deflated, similar to how the face deflates as we age.

“One patient in her 50s complained to me that when she had sex, her mons pubis hurt because she had no fat there anymore,” Dr. Hamori adds. “This started me thinking that instead of excising liposuctioning the mons pubis and labia majora, maybe we need to inflate them a little bit.”

Dr. Hamori says she usually uses 4 cc to 5 cc of Restylane (Medicis) diluted 2:1 with lidocaine (Lambros V. Aesthet Surg J. 2011;31(1):89-94). Additionally, she has used Radiesse (calcium hydroxylapatite, Merz Aesthetics) in the labia majora and mons area, typically injecting one 1.5 cc to 3.0 cc per patient.

With injectable treatments other than fat, which requires general anesthesia, “I use topical anesthetic with BLT (benzocaine 20 percent, lidocaine 6 percent and tetracaine 4 percent) cream about 20 minutes beforehand (available from the New England Compounding Center). I also inject a little local anesthetic in small pinwheels around the area because it’s uncomfortable injecting the vulvar area without topical and local anesthesia.”

SKIN TIGHTENING

Before injecting fillers, Dr. Hamori says she sometimes uses radiofrequency (RF) skin tightening with the Thermage device (Solta Medical) to shrink the labia majora skin. “If a patient has a lax labia majora, I perform RF treatments (approximately 200 pulses with a 3 cm tip delivering an average of 22 J/cm²) at the time of the labia minora reduction to smooth out this area. Just like with the face, controlling the skin envelope by shrinking it then volumizing with fillers or fat produces the best appearance.” At press time, Dr. Hamori was beginning a manufacturer-sponsored study of this treatment regimen.

To maximize patient safety during any of the above procedures, “It’s important to use L-shaped stirrups that the patient can rest the entire calf and foot in, as opposed to a candy cane-type stirrup in which only their knees are suspended,” Dr. Hamori says, adding that the latter stirrups create a risk of perineal nerve injury that L-shaped stirrups avoid by supporting the entire lower leg.

Disclosures:
Dr. Hamori is a speaker and trainer for Sanofi-Aventis and Medicis.
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