Adjustable Breast Implants Provide Postoperative Versatility

In the late 1970s and early 1980s, breast reconstruction was popularized with the introduction of the Radovan expander (Heyer-Schulte, Goleta, CA). The device was initially used to expand the tissue; this was followed by an operation to remove the expander and replace it with a permanent implant. Interestingly, it was noted that several patients were reluctant to have the Radovan expander replaced because they were very pleased with the results. This observation led me to explore the concept of creating an expander in which the injection dome could be removed, the expander itself thus being left in place. This versatility would allow a tissue expander to be converted to a permanent saline implant without an additional operation.[2-4] Excellent results have been achieved in breast reconstruction through use of the expandable mammary prosthesis with prolonged overexpansion of the tight muscle/skin envelope.[5]

The original adjustable implant was actually a saline implant with an injection dome attached to the fill tube. The injection dome was buried and subsequently removed. Although valve leakage was a problem in many early cases, the valve was successfully modified, and a double-lumen gel-saline version was created so that the 2-stage Radovan procedure, in which a saline expander and a gel implant were used, could be performed in a single-stage procedure.

Indications for Breast Implants

Primary Breast Reconstruction

Tissue tension is the main concern in primary breast reconstruction. For this reason, the smooth, round Spectrum (Mentor Corp., Goleta, CA) is most commonly used. The implant is always underfilled intraoperatively. If there is any concern with regard to tissue tension or flap viability either intraoperatively or early postoperatively, all of the saline solution is removed from the implant. Filling can be initiated several days later, once viability is assured. If the muscle and skin flaps are adequate, the 25% gel/75% saline expander can be used, the implant again being underfilled and the flap carefully monitored postoperatively. In more than 50% of cases, the reconstruction can be performed in a single stage. If a second stage is required for an open capsulotomy, implant repositioning, or inframammary fold reconstruction, the original implant can be used again or a new adjustable implant can be placed during the second stage of the procedure. Volume adjustment remains a valuable tool, even after the second stage.

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Secondary Reconstruction

Volume adjustment and expansion are of great value in revision reconstruction to help correct any irregularities and to achieve breast symmetry. The single-lumen or double-lumen implant may be used, because skin flap viability is less problematic in secondary reconstruction. In this situation, the 50% gel/50% saline adjustable implant is preferred.

Poland's Syndrome

In young patients with congenital anomalies of the breast—including asymmetry and tubular breast deformity—the smooth, round Spectrum is the implant of choice. This implant can be placed at an early age and slowly expanded as the patient matures. An elevated inframammary fold and high-riding nipple are common anatomic deformities found in these patients. In the attempt to lower the elevated fold, the nipple will be further elevated. It is therefore preferable to place the expander implant in a higher position to facilitate expansion of the skin above the nipple. If necessary, the fold can be lowered at a later date.

Breast Augmentation

Adjustable implants are offered to patients who express concern about final breast size or breast symmetry.[4] In these patients, the smooth, round implant is most commonly used. In several cases in which the contour profile was used, the results have been excellent. The implants are usually placed in the submuscular position through use of an inframammary or circumareolar incision. The injection dome is placed adjacent to the incision and

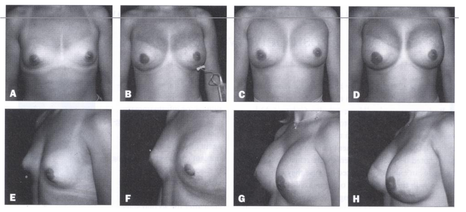

Figure. A *and* **E,** *Preoperative views of a 26-year-old woman before breast augmentation.* **B** *and* **F,** *Implants after submuscular augmentation with 375-to 450-cc smooth Spectrum implants filled to 250 cc. (Additional saline solution is added at the stage shown in* **B.**) **C** *and* **G,** *Implants after overexpansion to 500 cc.* **D** *and* **H,** *Implant volume is reduced to 400 cc for final result.*

removed through a small segment of the original incision several months later. Injection dome removal is a simple procedure performed with the patient under local anesthesia. Volume adjustments begin approximately 3 to 4 days after surgery, once the initial pain has subsided. Patient satisfaction is extremely high with the adjustable implant (Figure).

Revision Augmentation

Adjustable implants demonstrate their greatest advantage in patients requiring revision augmentation. During the conversion of implants from the subglandular to the submuscular position, there is often scarring and tightness of the muscle with a relative excess of skin. Postoperative expansion of the implant allows the muscle to be stretched, improving the surgeon's ability to fill the loose skin/gland envelope. Scar tissue deformities can also be expanded and corrected through use of the adjustable implant.

Replacement of Ruptured Implants

It is often difficult to determine the initial fill volume of a ruptured implant. Furthermore, if an open capsulotomy is performed unilaterally, the tissue dynamics are altered and achieving breast symmetry becomes a much more arduous task. Postoperative adjustment enables the surgeon and patient to maintain some control over the final outcome. The treatment of difficult complications, such as synmastia and double-bubble deformities, is greatly facilitated with an adjustable implant. These problems are traditionally treated through use of suture fixation techniques. Immediate implant replacement often imposes significant tension on the repair, leading to capsulorrhaphy rupture and recurrence of the original deformity. With an adjustable device, the implant can be replaced either underfilled or empty to allow the capsulorrhaphy to heal under conditions of minimal tension. The implants can then be expanded and gradually filled without excessive tension on the repair.

Avoiding Complications of Adjustable Implants

Adjustable implants are subject to the same complications as nonadjustable implants. However, complications related to the injection dome include kinking, valve rotation, dome infection, and, in rare cases, extrusion.

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Table 1. Options available for adjustable implants

- Current designs
  - Single-lumen saline
    - Smooth round
    - Smooth teardrop
    - Textured round
    - Contour profile
  - Double-lumen with 25% gel/75% saline
    - Smooth round Textured round Textured with contour profile
  - 50% gel/50% saline: textured round
- Future designs (available soon)
  - Single-lumen textured with contour profiling
  - Double-lumen with 75% gel/25% saline
  - Double-lumen with 25%, 50%, 75% gel
    - Textured with contour profiling

Table 2. Implant selection in author's current practice

1. Primary breast reconstruction: Smooth, round Spectrum implant (may be converted to a 50% gel/50% saline implant if necessary)
25% gel/75% saline implant
2. Secondary breast reconstruction: 50% gel/50% saline implant Smooth Spectrum implant
3. Poland's syndrome:
Smooth Spectrum implant
4. Breast augmentation:
Smooth Spectrum implant
Textured contour profile Spectrum implant
5. Revision augmentation with conversion from subglandular to submuscular position:
Smooth Spectrum implant

Kinking, usually a result of excess tubing length, can be avoided by positioning the dome in such a way that the tubing remains minimally lax, allowing movement but avoiding redundancy. Valve rotation can occur if the dome is placed in a loose pocket and allowed to move about freely. This situation can be avoided by placing the dome in a snug subcutaneous pocket and securing it to the adjacent tissue. Infection leading to extrusion can occur if the dome is positioned too superficially or directly beneath the incision; this is much less likely to occur if the dome is placed in a deeper pocket and adjacent to the incision. Finally, inadvertent puncture of the fill tube or implant can occur, but this is avoidable with appropriate attention to technique.

Conclusions

Adjustable breast implants provide the surgeon with unique postoperative versatility in tissue manipulation. Implant adjustability allows for more effective management of numerous conditions that would otherwise require surgical intervention. Any additional risks associated with these implants remain exceedingly low and are further diminished as the surgeon gains experience.

References

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