

## BREAST AUGMENTATION: Plastic Surgery's Flagship

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Since its dawn, aesthetic breast augmentation has been the sine-qua-non of modern plastic surgery. Many methods for achieving larger breasts have been used throughout history. Some of the first materials marketed for breast enhancement such as paraffin, oils, and liquid silicone, ended in catastrophic results [1-3]. Among the many options for breast augmentation, silicone implants have stood the test of time as the preferred choice among plastic surgeons worldwide since the first case in 1962 [4].

If this method is so widely used, so popular among plastic surgeons and patients to the point of becoming the number one aesthetic surgery surpassing liposuction in almost every country, why are there so many different opinions on which technique is superior and which implants are best? The answer isn't simple; in part this may be influenced by the vast confronting data among surgeon's series. Two things are certain: implants have been incorporating small improvements on their design throughout time. Second, breast augmentation techniques have been evolving since longer follow up of patients and better data are available.

During the first decades, surgeries were performed with far more tissue trauma compared to modern techniques. There were no special instruments or a standard series of steps. Data about capsular contracture was practically nonexistent and biofilm was decades away of becoming of concern. Most implants available had thick, smooth outer shells and the main plane of augmentation was sub-glandular. When surgeons encountered the unacceptable high contracture rate of breast implants, new operative techniques were devised to address the problem. The logic maneuver at the time was to change the plane from sub-glandular to sub-muscular in an effort to provide more tissue coverage and hopefully minimize contracture visibility and palpability. Implant companies on the other hand, addressed this problem with improved implant designs such as thinner shells, higher viscosity filling, saline-filled implants, and a polyurethane outer layer during the 70's. [5,6] Some of these measures helped decrease symptomatic contracture rates [7,8].

The first useful improvement that notably decreased contracture rates was a polyurethane film that covered the implant. [8] After a pair of animal studies suggested a link of polyurethane with foreign body reaction and sarcoma formation in lab animals companies voluntarily withdrew them from the American market in 1991. [9-11] the excellent performance of polyurethane against capsule contracture drove many implant companies to replicate this effect by texturizing the surface of the implant's shell. This process involves adding salt granules, customized prints, and other maneuvers while the implant's shell is still hot. This modification to the implant's outer shell was designed to perform just right in the sub-glandular plane. Inside this virtual space, the rugged surface provided a scaffold for tissue in growth that minimized symptomatic contracture rates [12].

As was expected, with better implant technology available, surgeons adopted both saline filled implants and texturized silicone gel implants. Most of these implants were placed in the sub-muscular plane as it was the trending technique by the time. Let's remember that polyurethane covering and most texturized shells were designed specifically to perform well in the sub-glandular space. With new implant technology, new problems surfaced. Rippling became of concern when saline filled implants were under filled and when they deflate over time. Again, the logic steps to overcome this emerging problem were more tissue coverage (sub-muscular placement) and over-inflation of these devices. Other problems emerged such as implant visibility and palpability when larger implants were used. One more time, surgeons relied on the same life-saving maneuver; sub-muscular placement. Over time, new phenomena were identified by patients and surgeons. The waterfall effect, for example, was more and more common as the breast tissue slid down the pectoral muscles after sub-pectoral augmentation. An unnatural breast shape with pectoral contraction was also encountered by patients undergoing sub-muscular augmentation. Late seromas, double capsules, and Anaplastic Large Cell Lymphoma (ALCL) are being increasingly recognized and documented in recent years [13-15].

While breast augmentation's main objective has remained unchanged (which is the delivery of an implant beneath breast tissues), contemporary surgeons adopted better techniques in light of better data, to simplify breast augmentation, minimize tissue trauma, and decrease the incidence of overall complications. Some obsolete techniques, such as blind digital dissection, are perpetuated by surgeons who adopted (decades ago) a method of breast augmentation with which they feel comfortable and refuse to change despite hard scientific data. These blind, traumatic maneuvers must be abandoned and room for improvement is always desirable. One elegant technique that came to solve many of the problems associated to breast augmentation was "dual-plane" augmentation. The truth is that every augmentation with an implant larger than the patient's own breast resulted in partial muscle coverage on the cephalic portion and a thinner gland/subcutaneous tissue coverage at the caudal portion of the implant. What is interesting and of great value from this contribution is the systematization of steps in breast augmentation that include but are not limited to, different degrees of gland dissection, caudal pectoral transection medially, and the minimization of tissue trauma. This permits replicable results among surgeons [16,17].

In recent years, the utilization of high-cohesive form-stable anatomic implants, the use of acellular dermal matrices, and the so-called "composite" breast augmentation which combines implants and fat transfer are gaining prospects. [18] With adequate follow up they could provide solutions to many of the undesirable problems of conventional breast augmentation with the underside of increased costs. Although some of the more complex breast augmentation options show promising results in experienced hands, we should stop for a moment and think about the cost-effectiveness of these approaches.

Breast augmentation with silicone-filled implants is reaching its 50th anniversary. For being one of the most performed aesthetic operations worldwide it deserves a special place among plastic surgeons. It is time to rethink where are we getting at, as we incorporate so many new products and techniques to our breast augmentation repertory. From a critical point of view, for as long as patient's thoracic relations are not violated and tissue characteristics are taken into consideration when planning our operation, we can deliver superior results consistently. Breast augmentation should adapt to each patient; not the patient to our operation. It is time to embrace breast augmentation as our specialty's flagship and master our devices and techniques to create flawless form and proportion consistently.

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