The Total Submuscular Breast Augmentation

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Abstract

Most called retromuscular or retropectoral breast augmentations consist in inserting the prosthesis behind only one muscle on the anterior aspect of the thorax, that is to say behind the pectoralis major muscle. This will mean that one third or one quarter of the prosthesis will not have a muscular cover and will be in direct contact with the breast tissue. The lack of muscle protection on a part of the prosthesis surface will lead to a possible wrinkling show on the inferior lateral aspect of the breast and a possible “double-bubble” phenomenon. These two disadvantages could be circumstantial but there is one other inconvenience, much more frequent, which is the loss of the erogenous sensation of the nipple. That problem is a consequence of the prosthesis insertion behind the only pectoralis major muscle, interrupting often the continuity of three intercostal nerves (4th, 5th and 6th), responsible of erogenous sensation of the nipple. Our approach promotes the insertion of the prosthesis behind the four muscles of the anterior thorax through a low incision in the anterior oblique and the serratus anterior, and an undermining superiority, medially and laterally to create a pocket behind the four muscles: the anterior oblique, the serratus anterior, the pectoralis minor and the pectoralis major. This surgery will preserve the functions of the three intercostals nerves, thus the erogenous sensation and contraction of the nipple and nipple areola complex.

Keywords: Breast augmentation; Retropectoral Augmentation; Total Submuscular Augmentation; Erogenous Sensation of the Nipple; Double-Bubble Avoidance.

Introduction

The simple subpectoral breast augmentation is known since several decades. This technique has gained popularity for many reasons, such as the support of the implant by a muscular hammock reducing the pressure on the skin envelope, which otherwise would have to support exclusively the implant. The second advantage of this technique was the presence of a thick muscular layer between the implant and the skin, especially in case of a small-sized or an involuted breast. The most important factor which popularized the submuscular technique was the tremendous increase of the use of saline implants during and after the “silicone crisis” in the 1990s. The saline implants presented the drawback of implant rippling when they were placed in the subglandular space because the breast tissue did not offer enough thickness to cover the rippling. The adoption of the subpectoral approach gave a supplementary layer of tissue in front of the implant and so the rippling was efficiently covered.

The standard approach in subpectoral breast augmentation

This technique, as its name mentions, consists of inserting the implant under the pectoralis major muscle.

According to the anatomical studies of the thoracic wall, the fan-shaped pectoralis major muscle, which extends from the axilla to the sternum, is in close relation with the posterior face of the breast on its upper two-thirds or three-quarters. That means that one-quarter or one-third of the breast does not cover the pectoralis major muscle but only a small part of the pectoralis minor, the serratus anterior and the external oblique muscle.

Classically, the majority of surgeons who perform the subpectoral approach in breast augmentation, whether for aesthetic or reconstruction augmentation, make their incision in the inframammary fold [Figure 1], dissect from caudal to cranial from the incision level in a retroglandular plan until the inferior lateral border of the pectoralis major. At this level, they elevate the pectoralis major and thus create the pocket meant to receive the implant. However, the implant, which is destined to increase the volume of the breast or, in case of a mastectomy, to replace the missing breast, has to respect a precise position and cannot lie into a hazardous position. Inversely, the implant cannot be hidden completely under the pectoralis major muscle because otherwise it will become deformed [Figure 2a & 2b].

This leads to an unavoidable result: with the simple subpectoral breast augmentation, the pectoralis major can cover the two-thirds or at best three-quarters of the implant. One-third or one-quarter of the implant is only covered by the breast on its inferior lateral aspect [Figure 2a & 2b].

While the central part of the implant is covered by the pectoralis major muscle and the existing breast, the lateral part of the implant is sometimes only covered by the skin in the cases of small or involuted breasts. The consequence is having the effect of “fleur de peau” (in case of thin-skinned patients) and the presence of rippling at the lateral aspect of the breast. The rippling is present even in the case of silicone cohesive implants, in various degrees ranging from the perception of these folds only by touch to visible rippling in most serious cases.
Literature review

According to the literature, the majority of surgeons use the simple subpectoral approach in their submuscular breast augmentation procedures.

Maher et al., Matarasso, Tebbetts, Davidson, Strasser, De Haan et al., Lesavoy et al., Zeitouné et al., Hage et al., Shi et al., and Vidya et al. perform breast augmentation behind the pectoralis major which implies that one third of the prosthesis is not covered by the muscle in its inferior lateral aspect.

Graf et al. and Tebbetts proceed behind the pectoralis major fascia using a submammary approach.

Pelle-Ceravolo et al. creates his implant pocket behind the pectoralis major using a vertical incision behind the lateral free edge of the muscle.

Barnett prepares his implant pocket using a retrofascial approach of the pectoralis major trough an axillary passage.

Price advocates the subpectoral addition using the axillary approach.

Pound and Rinker use a retropectoral approach starting from the abdomen.

All the authors mentioned above therefore use an approach behind the pectoralis major muscle whether submuscular or subfascial to perform breast augmentation. Consequently, one third of the prosthesis does not get its surface covered by any muscle.

Hendricks appears to be the only author presenting breast augmentation behind the four muscles using, however, a periareolar approach. This allows him to penetrate the submuscular space centrally and dissect centrifugally an implant pocket behind the four muscles of the anterior hemithorax. This approach, however, puts in danger the continuity of the intercostal nerves even though, in some cases, we can hope for nerve sparing.

Finally, our literature review reveals that only Hendricks places the prosthesis behind the four muscles of the anterior hemithorax. However, his approach differs from ours in that he creates a submuscular implant pocket trough a breach in the pectoralis major muscle and a centrifugal dissection. This approach cannot ensure the integrity of the intercostal nerves.

Our approach, which consists in undermining the four muscles starting from a horizontal incision in the external oblique and the serratus anterior muscles is the only way to preserve nerve integrity and thus the erogenous sensation of the nipple.

Breast reconstruction by subpectoral implant

In case of retropectoral breast reconstruction, the mastectomy that precedes leaves the implant without any breast coverage in the inferior lateral third of the breast surface and therefore the prosthesis will sit in the subcutaneous layer on its lateral anterior aspect. That’s why surgeons are obliged to use dermal matrices in order to restore the lack of muscular support of the implant. We all know the inherent risk of these matrices in terms of seroma (risk multiplied by four) and infection (risk multiplied by five and a half).

Breast augmentation by axillary approach

The breast augmentation by axillary approach is attractive by the fact that it gives the impression of protecting the implant by the absence of incision in the inframammary fold. In fact, once the implant has...
passed under the humeral portion of the pectoralis major, it is inserted into the pocket covered by the pectoralis major at its upper medial two-thirds or three-quarters. If the implant is well placed, it is situated under the skin and the breast and in front of the musculature (pectoralis minor, serratus anterior and external oblique muscles) especially in the inferior lateral area of the breast [Figure 2a & 2b].

The erogenous sensation of the nipple

We know that the erogenous sensation of the nipple originates from the superficial branch of the fourth, fifth and sixth intercostal nerves.

These nerves become subcutaneous approximatively at the level of the posterior axillary line and they lie into the areolar tissue on the surface of the serratus anterior, the pectoralis minor and the pectoralis major muscles. When the fourth, fifth and sixth intercostal nerves arrive at the free border of the pectoralis major, they continue their course along its anterior aspect until the vertical axis of the breast, where they arise anteriorly into the breast and innervate the nipple-areolar complex and the surrounding areas. This portion of these three nerves at the level of the free border of the pectoralis major muscle is the most vulnerable during the dissection of the subpectoral space. Sometimes the nerves are not divided but rather compressed or stretched by the finger during the dissection. Generally speaking however, the risk of cutting these nerves is high. In this context, the fifth and sixth intercostal nerves are almost always traumatized during the submuscular breast augmentation while the fourth nerve is hurt to a lesser extent.

The total submuscular breast augmentation

I practice this technique of breast augmentation since more than 25 years, being obliged to use saline implants during the so called “silicone crisis”.

The incision is performed at the inframammary fold [Figure. 1]. As I still prefer saline implants, the incision is not bigger than 3 cm. After penetrating the underlying subcutaneous tissue, the muscular plane is incised horizontally using scissors [Figure 3a] [10]. The muscular incision is extended medially and laterally; at this level (seventh and eighth rib), it implicates, as well, the serratus anterior and external oblique muscles [Figure. 3a #10]. From this moment on, the dissection is done close to the ribs under the serratus anterior, external oblique, pectoralis minor and finally, pectoralis major muscles [Figure. 5]. The implant pocket stays submuscular even in the lateral aspect where the pectoralis major is absent. The implant is placed into this space [Figure 4a, 6, 7]. The muscular plane is closed with 1 or 2 sutures. As I put saline implants, I take away the small tube of the valve filling after the implant is filled, and then I put again this small tube into the pocket just before the muscle closure. Once the skin is sutured, this tube serves to inject into the submuscular pocket a Marcaine solution (5 cc Marcaine 0.5% with 25 cc saline 0.9%) after what the tube is removed. This infiltration provides an analgesic effect on the detached muscles which can last up to 12 hours.

The advantages of the total submuscular breast augmentation compared to the standard simple subpectoral breast augmentation

1. Better muscular hammock

The total submuscular breast augmentation should provide a better muscular hammock for the support of the implant’s weight. The
The total submuscular breast augmentation provides a better coverage of the implant by the four muscles of the thoracic wall on every side of the implant especially on its lateral and inferior aspect. In fact, the standard subpectoral breast augmentation leaves the implant uncovered by muscle and covered only by skin on its lower lateral third of its surface. Putting the implant into the total submuscular space as we described previously will allow the implant to be covered by muscles on its whole surface and consequently will allows to avoid the rippling which could otherwise show on the lateral aspect of the breast.

2. Better coverage of the implant

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3. Sparing of the erogenous sensation of the nipple

The introduction of the implant in the standard subpectoral technique is often accompanied by a lesion of the fourth, fifth and sixth intercostal nerves which leads to the loss of the erogenous sensation of the nipple [Figure 2b].

The total submuscular breast augmentation as proposed by us should not have any negative effect on these nerves so the erogenous sensation of the nipple is preserved [Figure 4b].

4. Crucial role of the total submuscular position in breast reconstruction

The breast reconstruction technique with a total submuscular implant provides an efficient coverage and avoids the use of supplementary material by placing the implant under the four muscles of the thoracic wall by an incision in the serratus anterior and the external oblique.
The breast reconstruction with the implant placed only under the pectoralis major [Figure. 3a & 3b] leaves a big portion of the implant under the skin without muscle coverage. The use of dermal matrices has been adopted by plastic surgeons as a solution for providing support and protection to the implant. The use of these matrices has two significant drawbacks:

a. The first problem is related to the high complication rate with the use of these matrices. These complications consist in two main effects: infection and seroma. The risk of infection is described in some publications as being five and a half times superior compared to surgery without the use of matrices, whereas the risk of seroma is described as being four times superior compared to surgery without the use of matrices [21-26].

b. The second problem is related to financial disadvantage, as the price of such material increases enormously the cost of the breast reconstruction. This will cause a non-neglectable financial charge on the patient’s expenses or on the community depending on the medical coverage system.

The immediate breast reconstruction with an implant placed under the four thoracic muscles (external oblique, serratus anterior, pectoralis minor and pectoralis major) allows the implant to be completely covered by the muscles and avoids the use of dermal matrices with all the drawbacks that we described before.

Conclusion

The total submuscular breast augmentation or reconstruction includes the following advantages:

1. The implant is supported by a muscular hammock, which is stronger, and which relieves the skin from supporting the weight of the implant.
2. It prevents the famous “double-bubble deformity”.
3. The four muscles provide to the implant a better coverage avoiding the rippling effect caused by the implant surface under the skin.
4. The erogenous sensation of the nipple is completely preserved whereas it is endangered by the standard partial submuscular technique.
5. The immediate breast reconstruction with implant using the same four muscle coverage principle is performed without using a dermal matrix and therefore avoids its complications and unnecessary cost fees.
6. Although our practice has regularly shown all benefits described in this article including avoidance of “double-bubble” deformity, lower rates of ptosis and most importantly – preservation of the erogenous sensation of the nipple, a retrospective study will be conducted in the near future comparing our series with the traditional dual plane technique retrieved from the literature.

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