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The Moufarrege Total Submuscular Augmentation or How to Preserve Nipple Erogenous Sensation in Breast Augmentation

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ABSTRACT

Breast augmentation is currently one of the most common plastic surgery procedures performed worldwide. However, patients who underwent this procedure always complain of postoperative sensory changes at the nipple areolar complex. The nipple nervous system includes a tactile sensation system and an erogenous sensation system, the latter being less described and commonly overlooked by plastic surgeons performing breast augmentations. The erogenous sensation is supplied by the IVth, Vth and VIth intercostal nerves who run laterally on the surface along the muscular aponeurosis. Both subpectoral (dual plane) breast augmentations and sub-glandular breast augmentations present a real and constant risk of damage to these nerves, resulting in a permanent loss of nipple erogenous sensation. In the Total Submuscular Breast Augmentation approach, the implant is inserted behind the four muscles: the external oblique, the serratus anterior, the pectoralis minor and the pectoralis major. This approach will preserve the three intercostal nerves responsible for the erogenous sensation of the nipple. In this article we describe the surgical technique and the advantages of the total submuscular breast augmentation.

ARTICLE DETAILS

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1- INTRODUCTION

The nipple nervous system of the breast is divided into 2 (1–3)

The tactile sensation system:

This sensation reaches the nipple area through peripheral subcutaneous nerves stemming from the neighbouring nervous system, which branch into a subcutaneous nervous plexus spanning the entire surface area of the breast. These cutaneous nerves take their origin from the superficial cervical plexus which is composed of the Great Auricular, Occipital, Transverse Cervical and Supra Clavicular nerves. This nervous plexus will eventually provide tactile sensation to the nipple through regenerative sprouting and axonal outgrowth in the event an intra-operative transection of the intercostal nerves has occurred, either accidentally or due to the nature of the surgery (fig. 1). In summary, these tactile sensation nerves will regenerate after having been injured, contrary to the erogenic nerves who do not regenerate.

Figure 1: Tactile sensation of the breast.

The erogenous system

The nipple's erogenous sensation and muscular function are supplied by the IVth, Vth and VIth intercostal nerves (4,5). These nerves penetrate the breast area laterally along the muscular aponeurosis and course medially towards the central part of the breast, where they plunge anteriorly towards the nipple and the peri-areolar region (figs. 2-4). Interruption of the nerve along its course will result in the loss of the erogenous sensation and the disappearance of the motor phenomenon at the level of the small intrinsic muscles of the nipple and areola.

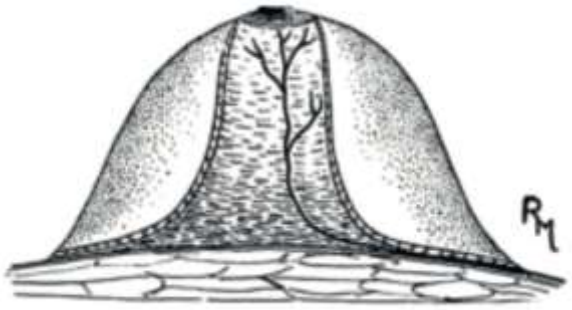

Figure 2: Breast intrinsic intercostal nerve trajectory.

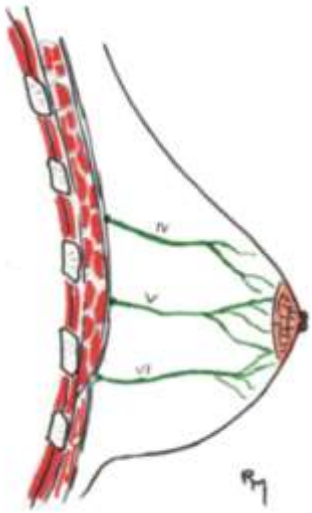

Figure 3: Sagittal section of the intrinsic intercostal nerves trajectories.

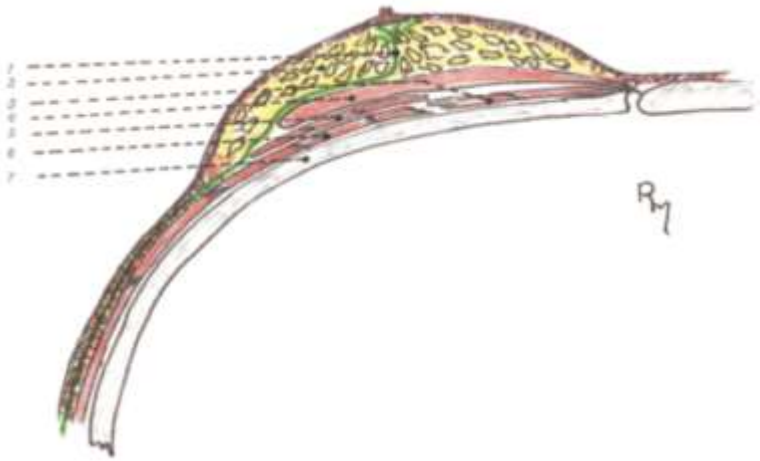

Figure 4: Cross-section of the left hemi-thorax wall showing the intercostal nerve running on the surface of the anterior wall muscles. 1. Intercostal nerve, intrinsic portion 2. Breast gland 3. External Oblique m. 4. Pectoralis Major m. 5. Pectoralis Minor m. 6. Serratus Anterior m. 7.Rib

2- THE STANDARD APPROACH IN SUBPECTORAL BREAST AUGMENTATION

This approach, 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 the lower quarter or third of the breast will lay over a small part of the pectoralis minor, the serratus anterior and the external oblique muscle (6).

Classically, the majority of surgeons who use the sub-pectoral approach in breast augmentation make their incision in the infra-mammary fold, dissect from caudal to cranial from the incision level in a retro-glandular plane until the inferior lateral border of the pectoralis major is reached. At this level, they elevate the pectoralis major and thus create the pocket meant to receive the implant (7,8). The implant cannot be completely hidden under the Pectoralis Major muscle. The only way to hide it entirely would be by positioning it too high; and this would lead to a deformed breast (9). With the simple sub-pectoral breast augmentation, the pectoralis major covers the upper two-thirds or, at best, three-quarters of the implant (fig. 5). One third or one quarter of the implant is only covered by breast tissue infero-laterally. This is the dual-plane breast augmentation (8). In these cases, consequence could be a « fleur de peau » effect and rippling at the infero-lateral aspect of the breast. Rippling can also happen with the use of cohesive implants, ranging from perception of the folds only by touch to visible rippling on the breast surface in more serious cases. In the same time, that prosthesis insertion will damage the three intercostals nerves, depriving the nipple from its erogenous sensation.

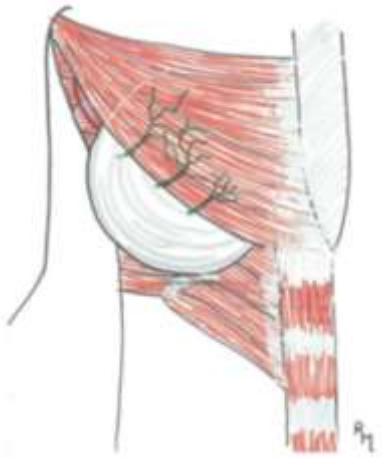

Figure 5: Traditional way of placing the prosthesis behind the Pectoralis Major muscle alone. This will leave one third of the prosthesis without any muscle protection.

3- THE SUB-GLANDULAR BREAST AUGMENTATION

Sub-glandular augmentation, where the implant is inserted between the thoracic muscles and the glandular tissue, damages the IVth, Vth and VIth intercostal nerves and completely deprives permanently the breast from the erogenous sensation of the nipple (fig. 6).

Figure 6: Sub-glandular augmentation: unavoidable interruption of the intercostal nerves.

4- THE TOTAL SUBMUSCULAR BREAST AUGMENTATION

Our approach promotes the insertion of the implant behind the four muscles of the anterior thorax through a low incision in the external oblique and the serratus anterior, and an undermining upwards, medially and laterally to create a pocket behind the four muscles: the external oblique, the serratus anterior, the pectoralis minor and the pectoralis major (10). This surgery will preserve the functions of the three intercostal nerves, thus the erogenous sensation as well as the contraction of the nipple and the nipple areola complex. I practice this technique of breast augmentation since more than 30 years, having been obliged to use saline implants during the so called «silicone crisis».

The incision is performed at the inframammary fold (fig. 7). As I still prefer saline implants, the incision is no longer than 3 cm. After penetrating the underlying subcutaneous tissue, the muscular plane is incised horizontally using scissors. The muscular incision, which is performed in the external oblique and the serratus anterior muscles is extended medially and laterally; starting at this level (seventh and eighth rib), the submuscular undermining is extended superiorly until the second rib level (fig. 8). The pocket created by this dissection will have the rib cage as a posterior wall and will be covered anteriorly by the four muscles of the thorax: external oblique, serratus anterior, pectoralis minor and pectoralis major. The implant pocket stays always submuscular even in the lateral aspect where it remains covered by the serratus anterior. The implant is placed into this space (fig. 9). The muscular plane is closed with 1 or 2 sutures. As I use saline implants, I take away the small tube of the filling valve 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 of Marcaine 0.5% with 25 cc of 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

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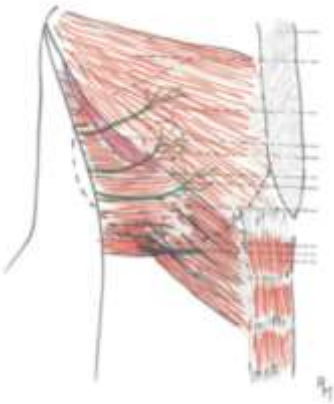

Figure 7: Total submuscular breast augmentation: the muscle incision is performed horizontally in the External Oblique and Serratus Anterior muscles 1 cm below the skin incision.

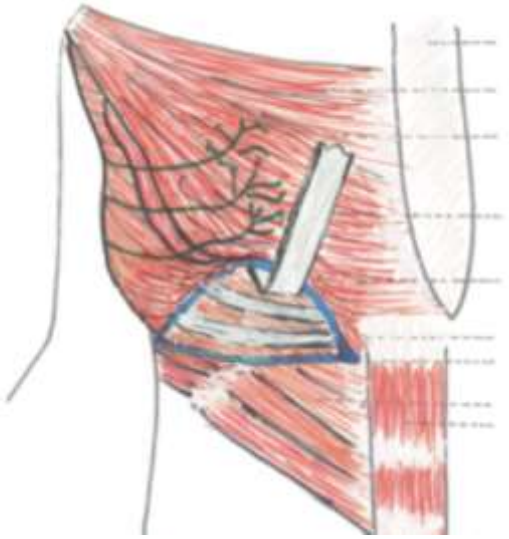

Figure 8: Preparation of the pocket meant to receive the prosthesis in breast reconstruction.

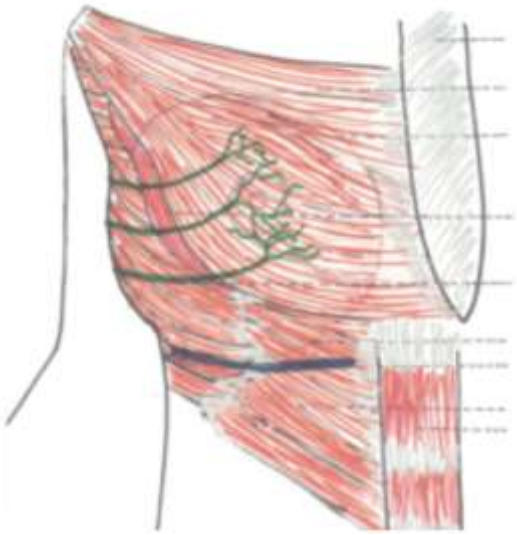

Figure 9: The prosthesis will be covered by the four anterior thoracic wall muscles, i.e. the Serratus Anterior, Pectoralis Minor, Pectoralis Major and External Oblique muscles. In this drawing, we can see the silhouette of the prosthesis entirely hidden by these muscles.

5- THE ADVANTAGES OF THE TOTAL SUBMUSCULAR BREAST AUGMENTATION

1. Better muscular hammock

The total submuscular breast augmentation provides a better muscular hammock for the support of the implant's weight. The implant which is supported solely by the pectoralis major muscle in a retro-pectoral augmentation imposes to the skin through its weight a certain stretching and consequently leads to breast ptosis on a short, middle or long-term depending on the implant size.

On the contrary, inserting the implant completely under the four muscles, as we do, offers to the implant the chance to be supported by a more complete hammock thus preventing breast ptosis in comparison to the standard partial retro-pectoral breast augmentation (figs 10-14).

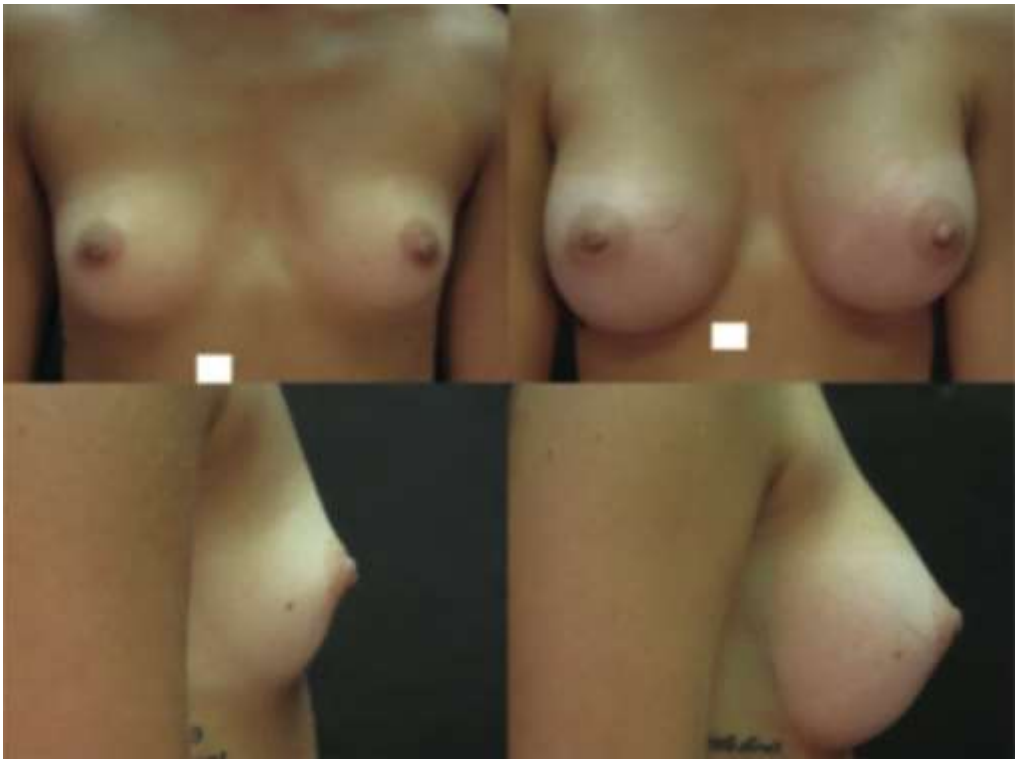

Figure 10: Pre-operative and post-operative appearance of a breast augmentation with the total submuscular breast augmentation technique

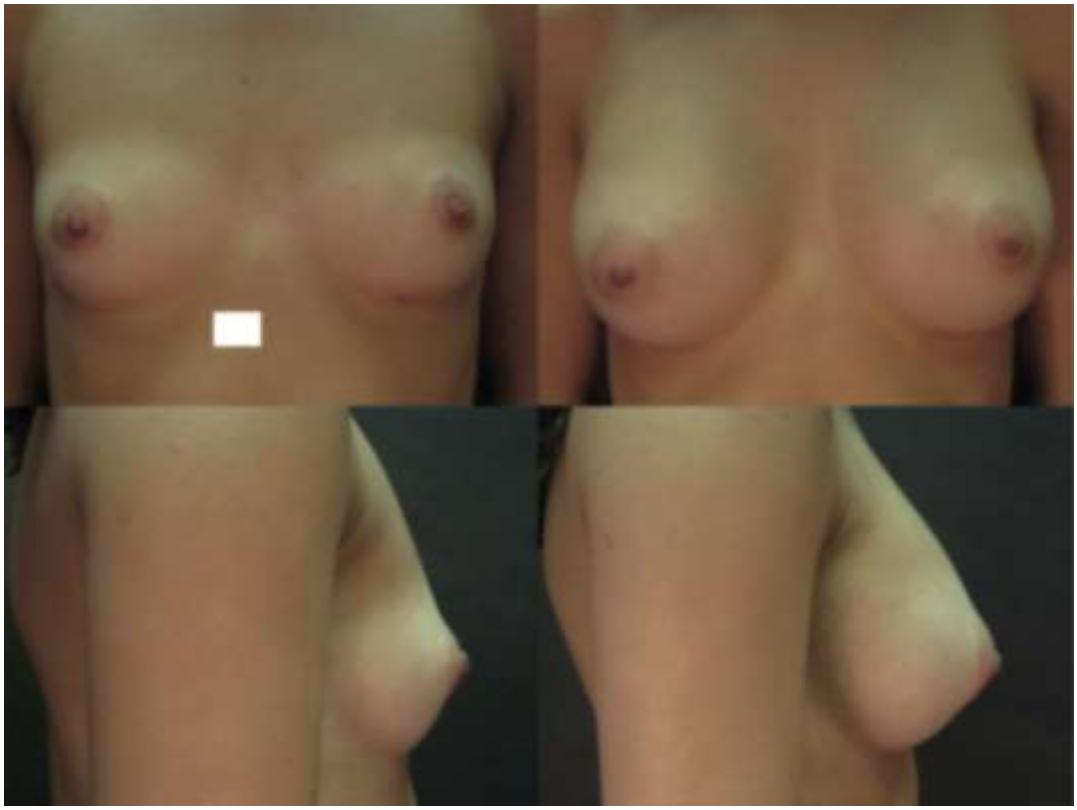

Figure 11: Pre-operative and post-operative appearance of a breast augmentation with the total submuscular breast augmentation technique

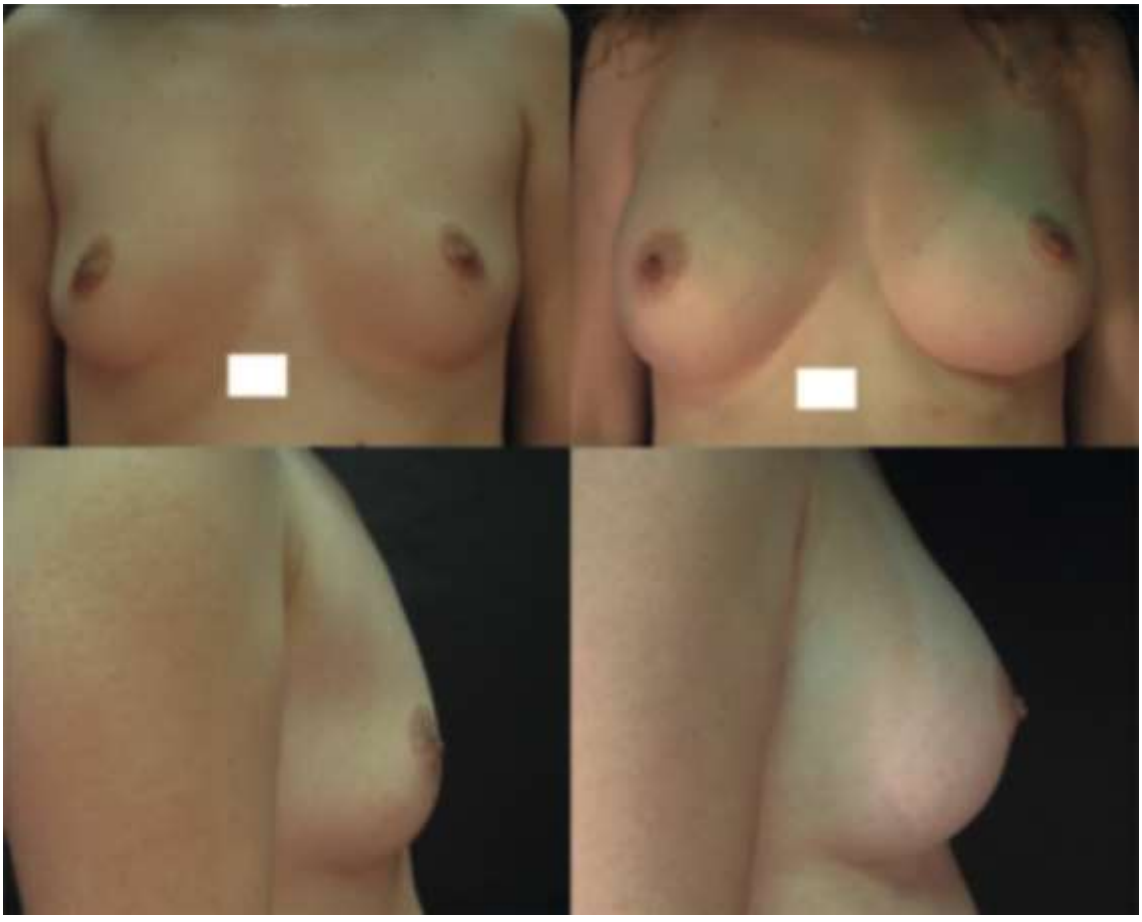

Figure 12: Pre-operative and post-operative appearance of a breast augmentation with the total submuscular breast augmentation technique

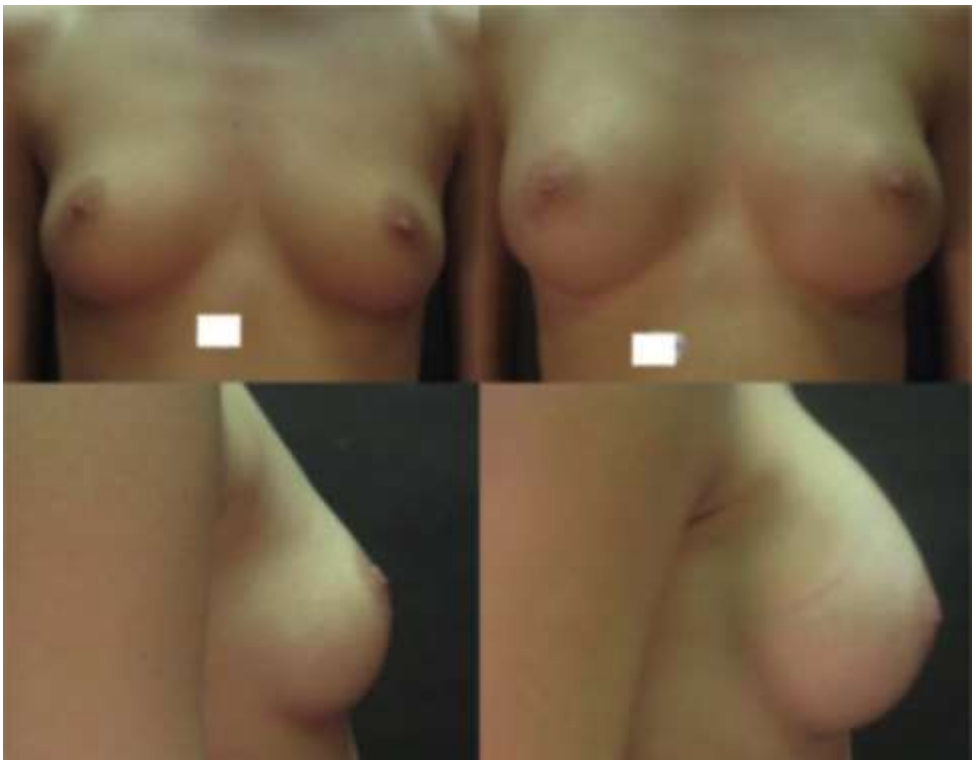

Figure 13: Pre-operative and post-operative appearance of a breast augmentation with the total submuscular breast augmentation technique

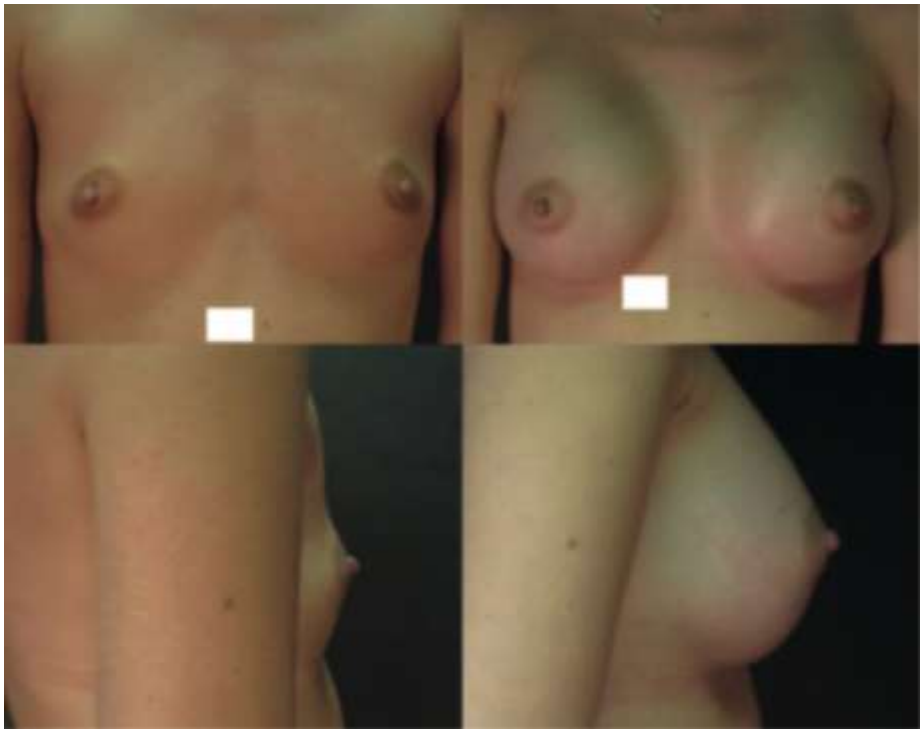

Figure 14: Pre-operative and post-operative appearance of a breast augmentation with the total submuscular breast augmentation technique

2. Better coverage of the implant

The Total Submuscular Breast Augmentation provides a better coverage to the implant thanks to the help of the four thoracic muscles on every side of the implant especially on its lateral and inferior aspects.

In fact, the standard subpectoral breast augmentation leaves the implant covered only by skin and gland on its lower lateral aspect. 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 prevent rippling.

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 IVth, Vth and VIth intercostal nerves which leads to the loss of the erogenous sensation of the nipple (fig. 15). The Total Submuscular Breast Augmentation should not have any negative effect on these nerves thus preserving the erogenous sensation of the nipple. (fig. 16).

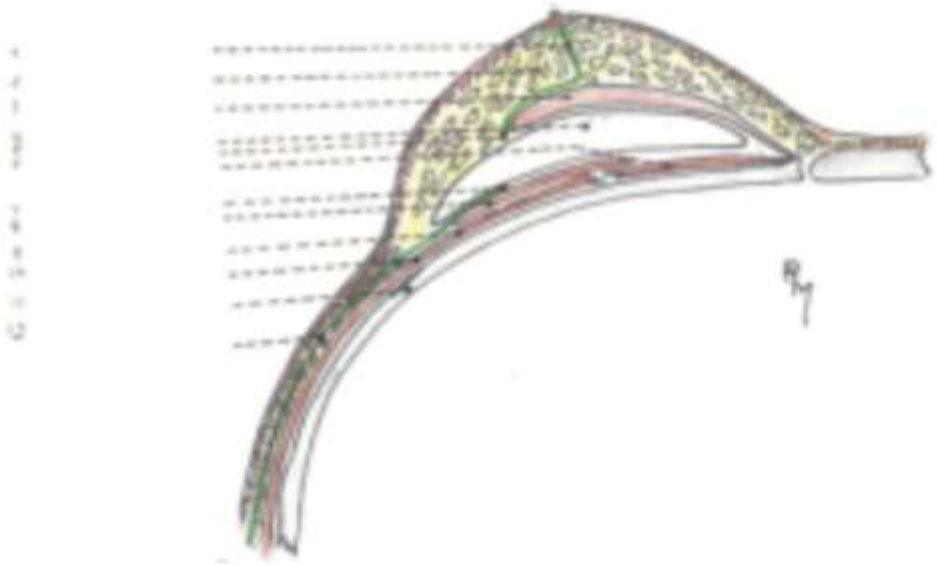

Figure 15: Traditional retro-pectoral augmentation: a transverse section of the left hemithorax wall shows the prosthesis partially covered by the Pectoralis Major. Its introduction has harmed the intercostal nerve. 1. Intrinsic trajectory of the intercostal nerve 2. Breast gland 3. Pectoralis Major m. 4. Prosthesis 5. Distal stump of the intercostal nerve at the level of its interruption 6. External Oblique m. 7. Proximal stump of the intercostal nerve at the level of its interruption 8. Pectoralis Minor m. 9. Serratus Anterior 10. Serratus Anterior m. 11. Rib 12. Intercostal nerve

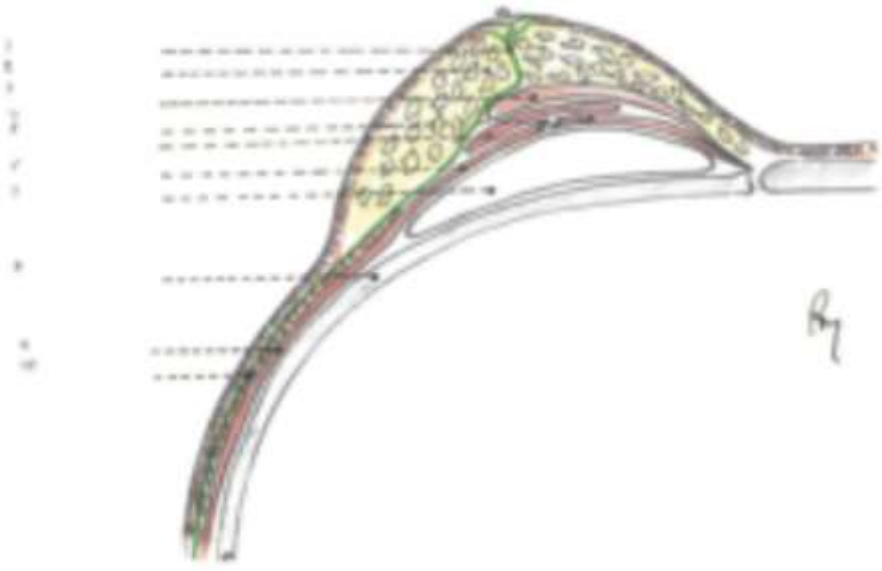

Figure 16: The Moufarrege Total Submuscular augmentation: a transverse section of the left hemithorax wall shows the prosthesis entirely covered by the four hemithorax muscles. Its introduction does not interrupt the course of the intercostal nerves. 1. Intrinsic trajectory of the intercostal nerve 2. Breast gland 3. Pectoralis Major m.4. External Oblique m. 5. Pectoralis Minor m. 6. Serratus Anterior m. 7. Prosthesis 8. Rib 9. Serratus Anterior m. 10. Intercostal nerve

6- CONCLUSION

The Total Submuscular Breast Augmentation described by Moufarrege is the only breast augmentation technique which preserves the erogenous sensation of the nipple, in addition to all other all advantages due to a better coverage and support of the prosthesis.

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FIGURE LEGENDS

Figure 1: Tactile sensation of the breast.

Figure 2: Breast intrinsic intercostal nerve trajectory.

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