

Triplane augmentation mammoplasty



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BACKGROUND: *Sub-muscular positioning of breast implants requires interrupting as well as disinserting both the abdominal and sterno-chondral fibers of the pectoral muscle; this can produce a muscular strength reduction which reveal both-ering and is often detected in some daily motions, such as cutting bread into slices.*

MATERIAL AND METHODS: *The revision of anatomy and literature induced the authors to search for a conservative approach for breast augmentation. They describe a new technique defined "Tri-plane" where the muscular fibers are not cut but simply split to create the pocket for breast implants.*

RESULTS: *Our experience evidenced that this technique gave good aesthetic results together with a more significant projection of the NAC without any strength diminution either in adduction or abduction of the arms.*

CONCLUSIONS: *This technique is a valid alternative to other techniques of breast augmentation as it conjugates the advantages of sub-glandular and sub-muscular implants without muscular deficit.*

KEY WORDS: Decreased performance, Post augmentation mammoplasty, Sub-pectoral breast augmentation, Tri-plane mammoplasty.

Introduction

In breast augmentation choosing where to locate the implant, whether sub-glandular, sub-fascial, partially or completely sub-muscular¹⁻³, depends on specific conditions, as different breast and chest anatomy claims for different indications and technical details.

The Tebbetts' "dual plane technique" (2001) combines sub-glandular and partially sub-pectoral placement, optimizing the advantages of two techniques⁴.

Tebbetts detaches the pectoral muscle fascia and disconnects its abdominal and chondro-sternal fibers, saving only the sternal fibers.

This technique gives a good implant cover with the soft tissue as well as excellent aesthetic results, but has proven harmful to pectoralis magnus function.

In fact detaching the lower third of pectoralis fibers produces a significant reduction of upper limb muscular strength during some gym exercises (bench-press; push-ups, butterfly), as Sarbak et al showed⁵.

Up to date, none of the techniques involving sub-muscular breast augmentation helps in solving these problems. In our experience the follow-up of 172 breast augmentation patients in 10 years with a partial sub-muscular technique demonstrated that in 43 patients (25%) there was a reduction of muscular strength during some movements such as pushing down or arms adduction or cutting bread into slices⁶.

In 1998 Gur demonstrated that muscles subjected to tension, such as those of a submuscular implant pocket, become fibrous and loose their function⁷.

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Khan in 2007 described a sub-muscular mammoplasty augmentation, proposed a double pocket (sub-muscular and sub-glandular) where the prostheses were inserted without cutting the muscular fibers, but splitting them⁸.

In our opinion disconnecting the chondro-sternal and abdominal fibers of the pectoralis muscle produces a decrease in muscular strength as the fibers are not working all together and some of them become hypotrophic, losing their function.

After a revision of international literature and anatomy^{11,12}, we propose a new conservative approach to sub-muscular mammoplasty with the preservation of abdominal and sterno-chondral fibers of pectoralis muscle.

Materials and Methods

ANATOMICAL PREFACE

Pectoralis magnus anatomy is well-known; consists of three parts: clavicular, chondro-sternal and abdominal^{9,10}.

When the arm is abducted the clavicular and chondro-sternal fibers give an ante-version movements; this is possible during swimming when the pectoralis muscle pushes the arm forward.

When the pectoralis muscle lowers and turns the arm inwards; the chondro-sternal and abdominal fibers move the scapula forwards¹⁰.

INDICATIONS

We believe that when Tebbetts' technique is indicated, it is possible to leave the abdominal and chondro-ster-

nal fibers of pectoral muscle intact harvesting the implant pocket changing anatomical planes: sub-muscular in the superior third and sub-glandular (and above the muscle) in the medium and third sections.

SURGICAL TECHNIQUE

We prefer to operate under general anesthesia, with the patient lying down with both arms along the body.

Through either an infra-mammary fold or an inferior periareolar (from three to nine o'clock) 4 cm access, breast parenchyma is bluntly separated from the underlying muscle up to the NAC level, where the chondro-sternal fibers spread from, to dissect the sub-glandular pocket.

The sub-muscular pocket is harvested splitting the muscular fibers, following their oblique direction and detaching the muscle up to the second intercostal space and laterally to the anterior axillary line; particular care is taken not to extend the dissection crossing this important line.

We use anatomical cohesive prefilled silicone gel implants, micro-textured with a medium-high profile.

The upper part of the implant (35%) is placed in the sub-muscular pocket, the lower part is put on the chondro-sternal and abdominal muscular fibers, which are adherent to the chest, and under breast parenchyma (Figg. 1, 2).

Surgical layers are closed in monocryl 3/0 e 4/0 and a compressive dressing is applied for 48 hours.

We always use suction drainages.

When a breast ptosis is associated, we remove a small 3 cm strip of muscular fascia on the superior third of the pectoral muscle to create an adherence between the mus-

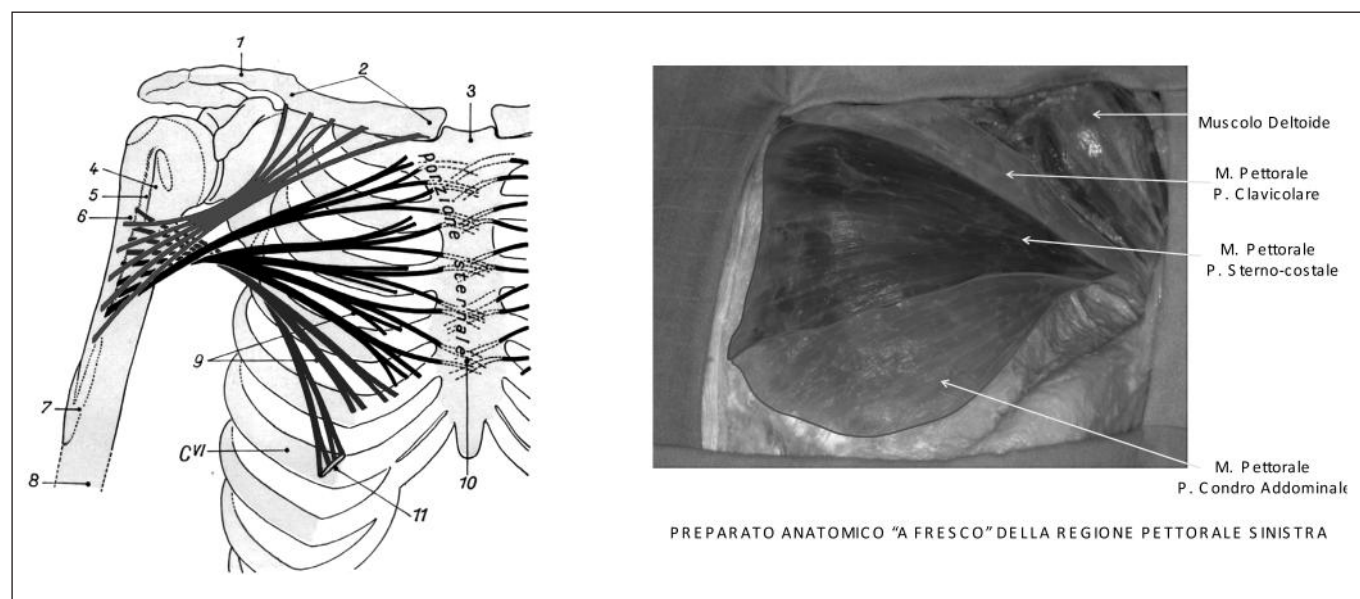


Fig. 1: Anatomy of pectoralis magnus. A) adapted from Testut e Jacob, Anatomia topografica, vol II (UTET Torino, 1946); abdominal (red), chondro-sternal (black), and clavicular (green) components; B) dissection specimen.

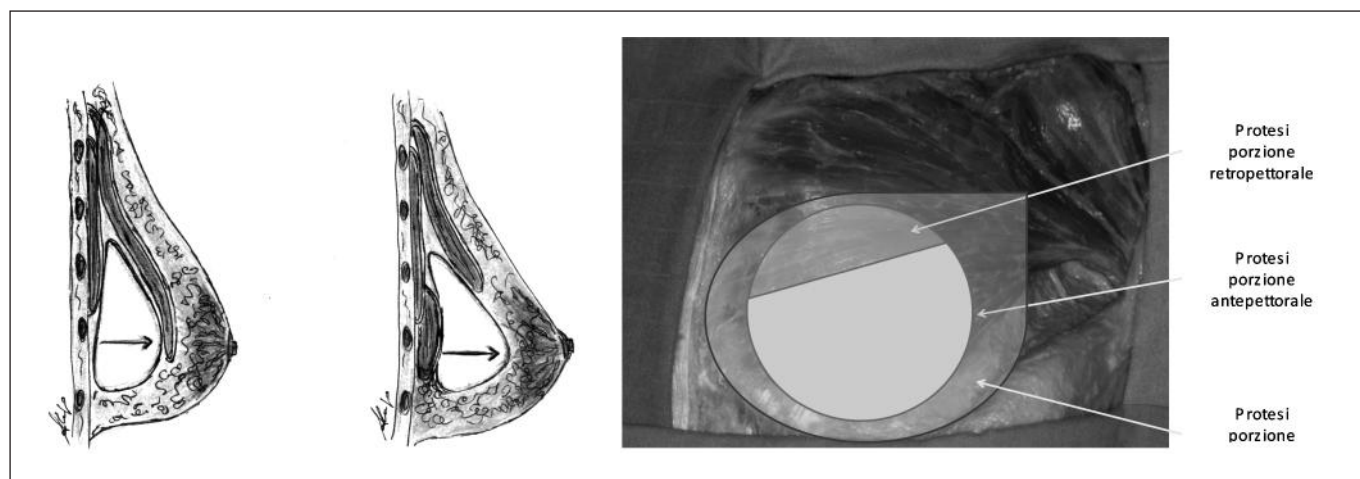


Fig. 2: Achieving a better breast projection by pectoralis splitting (A right) than without splitting (biplane A left); B) dissection specimen showing a front view of implant positioning in the triplane technique.

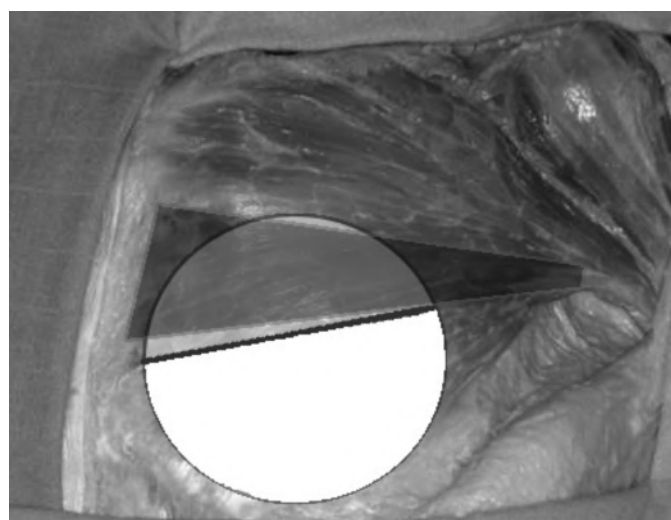


Fig. 3: A view of the aponeurotomy (the red area) the Senior Author usually applies in case of ptosis : scarring between muscle and implant (the blue area) results in a natural suspension effect. In severe cases stitches are added proximally to the aponeurotomy to secure the lift procedure.

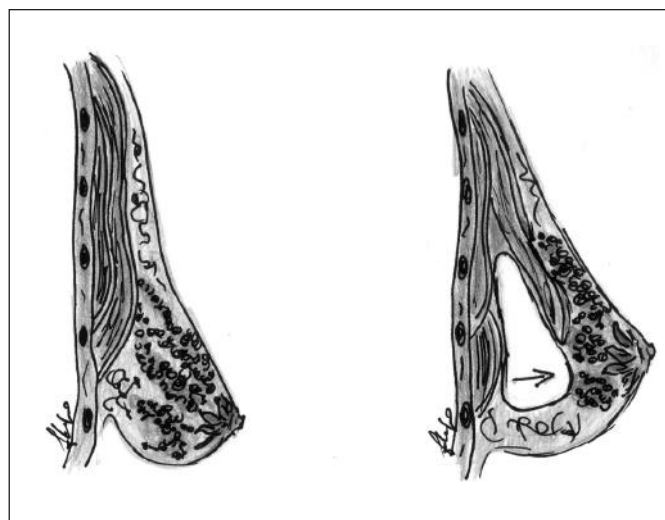


Fig. 4: A schematic drawing of the triplane technique applied to breast ptosis: the planes are clearly shown, as well as the new projection achieved with the implant.

cle and the upper part of the gland fixing it higher (Fig. 3 and 4). This technical tip is own of the Senior Author and is added with sutures to best lift the gland to the muscle in the area over aponeurotomy in severe cases.

Results

In a 24 months follow-up, all the patients presented good aesthetic and functional results and high satisfaction. In fact a better projection of the NAC was achieved owing to implant location in an oblique position, following the muscular fibre orientation of the abdominal and chondro-sternal parts of the pectoralis major muscle. This effect is

implemented through a push forward and upward of both the implant and the breast (fig. 5 e 6). Moreover, respecting the integrity of the lower part of the pectoralis muscle produces a faster recovery, without a reduction of muscular strength during gym exercises or simple movements of the arms (for example cutting bread into slices).

Discussion

The “tri-plane augmentation mammoplasty” is a simple technique which can be proposed in any type of chest or breast with good aesthetic and functional results.

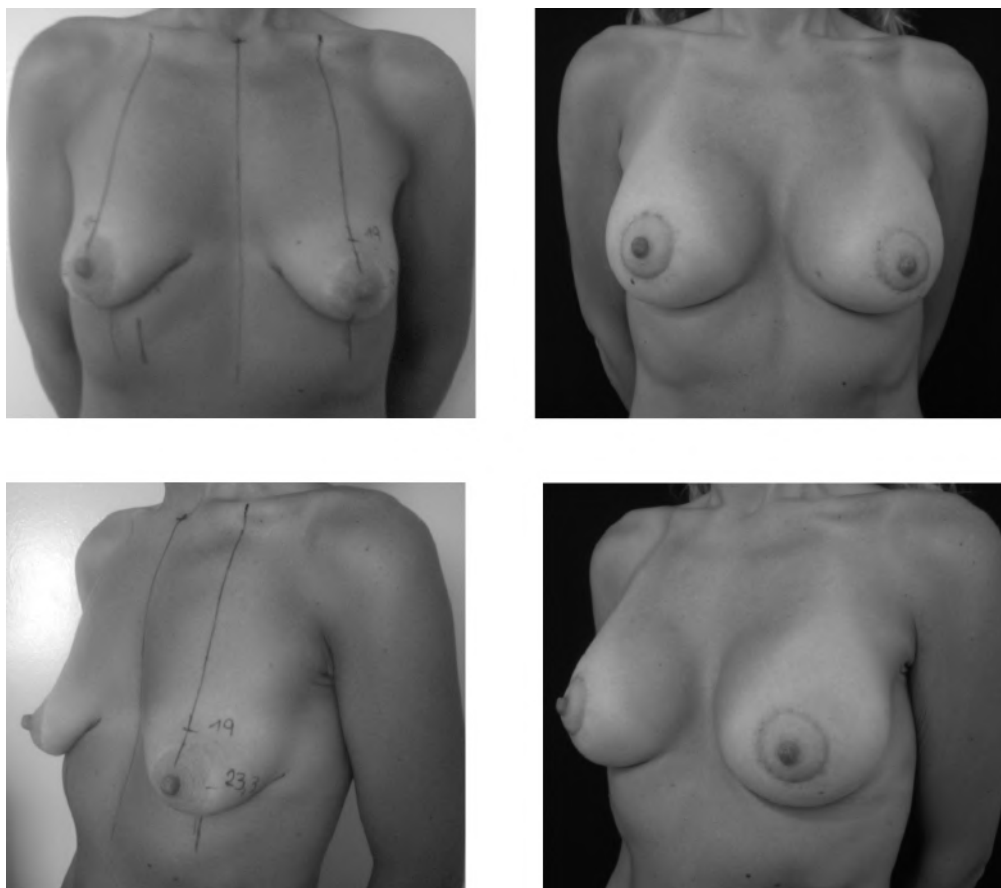


Fig. 5: Case 1. A mild bilateral breast ptosis with parenchymal hypotrophy is showed before (A-B) and six months after triplane technique implant positioning (anatomic implant 290cc, moderate profile and projection).

There are three advantages:

- the lower part of the pectoralis major muscle is neither cut nor dissected and left capable to exert its function;
- a better as well as major projection of the breast is achieved;
- a good implant cover is performed through a more natural and less invasive approach.

Further studies of pectoralis muscle functions, before and after surgery, such as electromyography, and evoked potential tests, are in progress.

Conclusions

We conclude that the “tri-plane augmentation mammoplasty” combines the advantages of sub-glandular and sub-muscular techniques, as just the Tebbetts’ dual plane did, but unlike Tebbetts’ technique, is more conservative as it doesn’t require cutting the muscular fibers.

We propose this technique as a valid alternative for breast augmentation.

Riassunto

L’aumento mammario è l’intervento più richiesto e che da maggiori soddisfazioni alle pazienti.

Diverse tecniche sono state proposte negli anni a seconda del caso da risolvere retroghiandolari retrofasciali, retromuscolari; tutte queste presentavano vantaggi e svantaggi finché nel 2001 Tebbetts propose la tecnica “Dual Plane” che racchiudeva i vantaggi della tecnica sottoghiandola e quelli della tecnica sottomuscolare.

Negli anni, però, è emerso un altro problema, ovvero la possibile riduzione della forza muscolari delle braccia, nell’esecuzione di alcuni esercizi, nelle pazienti sottoposte a mastoplastica additiva retromuscolare (JM Sarbak 2004).

Gli autori hanno revisionato l’anatomia della regione pettorale e la letteratura deducendo che era possibile eseguire una mastoplastica additiva preservando i fasci sterno-condarali e addominali del muscolo pettorale che normalmente venivano interrotte per il posizionamento delle protesi.

Khan nel 2007 ha proposto una tecnica di mastoplastica additiva con posizionamento di protesi retroptorale

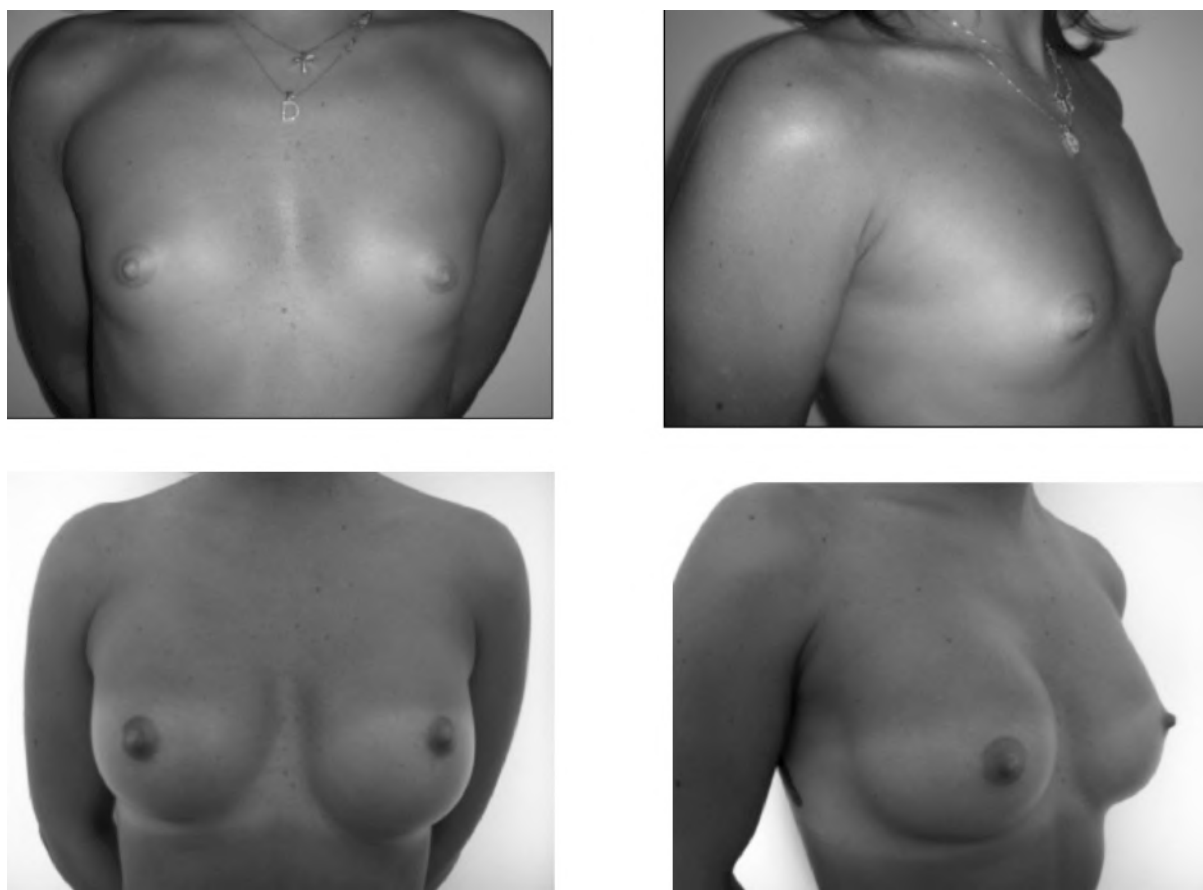


Fig. 6: Case 2. A bilateral breast hypotrophy is showed before (A-B) and twelve months after triplane technique implant positioning (round implant 240cc, moderate projection).

in cui le fibre muscolari non venivano interrotte ma semplicemente divaricate.

Gli autori revisionano tale tecnica e la propongono come valida alternativa nelle mastoplastiche additive. La tecnica consiste nel creare uno spazio tra i fasci muscolari all'altezza del CAC in modo da posizionare la protesi per il 1/3 superiore sotto il muscolopettorale e per i rimanenti 2/3 sopra il muscolo e dietro la ghiandola mammaria (mastoplastica a piani alternati o triplane).

Tale tecnica permette una più rapida ripresa nel post operatorio, l'assenza di deficit muscolari e una maggiore proiezione della mammella garantita dal muscolo pettorale lasciato in situ.

Studi di indagini strumentali (elettromiografia e potenziali evocati) sono in corso per dimostrare che la forza muscolare rimane invariata prima e dopo il posizionamento delle protesi.

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