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Explantation with Lateral Pedicle Mastopexy

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Short Running Head: LPA Technique for Breast Implant Removal

Abstract

Background

While breast explantation combined with mastopexy is an increasingly common procedure, it does present certain technical difficulties. We present a technique of explantation mastopexy with the use of an extended lateral pedicle for auto-augmentation.

Methods

A consecutive series of 40 cases was retrospectively reviewed, with patient reported outcome questionnaire and photography at 3 and 12 months.

Results

The mean age was 57 years (range 40 – 70 years), and mean duration of implantation was 20.4 years (range 7 – 42 years). 12 women had undergone previous mastopexy (30%). Minor wound complications requiring simple dressings were seen in 7 cases (17.5%). Major infected wound problems occurred in 1 case, who was a smoker and had other co-morbidities. All except 1 case reported being satisfied or very satisfied with the outcome, with a mean patient reported satisfaction score of 4.9/5. When the photographs were independently assessed by a cosmetic practitioner, all cases were rated as average, good or very good, with a mean score of 4.1/5.

Conclusions

The procedure is associated with low risk of post-operative complications, good cosmetic outcomes, and a high degree of patient satisfaction. We feel this technique provides a logical, reproducible method for combined explantation and mastopexy.

Introduction

The demand for implant removal after previous breast augmentation surgery is increasing and in 2019 it was the 8th most common aesthetic operation in the US. Over a 5-year period (2015 – 2019), the number of implants removed relative to the number implanted for augmentation each year increased from 1 for every 8 to 1 for every 4 (Figure 1), most likely related to growing public concern regarding the potential for implant related health problems. One study on Google search terms for breast implant removal procedures found that they significantly and dramatically increased after the FDA Advisory Committee Meeting in 2019, which resulted in warning letters to implant manufacturers and subsequent public statements by the FDA and Allergan announcing the voluntary recall of BIOCELL® textured breast implants.[1] In addition, precipitating factors for some are the long term sequelae and limitations of breast augmentation and most women who wish to have their implants removed will have had implants in-situ for many years.[2] Common clinical findings are different degrees of one or more of the following: atrophy of breast tissue, with resulting degrees of implant visibility; implant malposition, with one or more of - asymmetry, bottoming out, waterfall deformity, or lateral deviation of the breast with a large intermammary distance; implant rupture and / or capsule.

INSERT FIGURE 1 HERE (1 piece).

Women who wish breast implant removal need to accept that the difference between pre- and post-operative aesthetic can be at least as profound as at the time of original augmentation. From a surgical perspective, there are various challenges in achieving an acceptable result, and these broadly fall into 3 categories:

1. Those with minimal native breast tissue. This often coincides with low BMI and limited options for mastopexy or auto-augmentation.
2. Those with reasonable volume of native tissue who are not accepting of a mastopexy.

3. Those with a reasonable volume of native tissue who are accepting of a mastopexy and may also have options for auto-augmentation.

The strategies for leaving a good breast shape for those in category 1 are very limited. Fat grafting may be possible but is often constrained by donor site potential and volume that can be accommodated by the host site. Aesthetic goals and patient expectation of breast shape need to be modest. The option for category 2 is usually explant alone or combined with fat grafting auto-augmentation. The options for category 3 are more varied and are addressed in this study.

Explantation and simultaneous mastopexy can be a challenging procedure, involving a large alteration in volume and shape. The surgical landscape for this operation is predetermined by the consequences of the previous surgery as well as the required capsulectomy and the degree of ptosis. Pre-operative judgement can inaccurately estimate the amount of breast tissue that will be left and its distribution. Typical appearances after simple explant would be an empty upper pole with most remaining volume in the lower and outer breast, and loose and redundant skin. Hence, a simultaneous mastopexy is often indicated. However, performing a mastopexy simultaneous with explantation is very different to that of a mastopexy in an un-augmented breast. The most obvious difference is the large retromammary implant cavity, which is usually much larger than the implant diameter and extends laterally. Another important difference is the vascular supply to the remaining breast. The posterior intercostal perforators and branches arising through the pectoral muscle over the footprint of the implant pocket are absent, as are those at the inframammary fold at the site of the original access incision. Medially, internal mammary perforators are usually present, as are the mammary branches of the lateral thoracic vessels and the lateral intercostal artery perforators, and their calibre is often enlarged.[3] Any design for a mastopexy in this situation should be cognisant of these facts.

Few techniques of auto-augmentation mastopexy after explantation have been reported[4–13] Most describe a primary supero-medial nipple/areola pedicle and a secondary inferior auto-augmentation pedicle. This secondary pedicle is usually mobilised upwards and sutured to the pectoralis to maximise volume and projection, and the dermis at its base released to facilitate reach as well as closure and to prevent tethering of the inframammary fold. It is however inherently compromised, being based at the site of previous incision and relying on secondary revascularization of this tissue. It is also usually very limited in length and reach, and has to be considered vulnerable to over mobilisation or tension.[14–16]

We describe a technique for auto-augmentation/mastopexy in combination with breast explantation and present short-term results in a consecutive series of 40 women. The technique involves a WISE or 'L' pattern mammaplasty and an extended lateral pedicle based on the lateral thoracic and lateral intercostal perforator vessels, rotated medially and superiorly to auto-augment and shape the post-explant breast.

Materials and Methods

A series of 40 consecutive patients having bilateral breast implant explantation, total capsulectomy and simultaneous mastopexy, were included. Short term outcomes at 1-3 months post-operatively were assessed to include wound and nipple and areola-related complications, and breasts were assessed for palpable lumpiness that would be consistent with fat necrosis. This study did not assess post-operative mammograms to determine if there was any fat necrosis associated with the lateral flap, however, this would be a useful follow-up study. Aesthetic outcomes were assessed between 6 months and 1-year. For this purpose, photographs were taken and assessed independently by a cosmetic practitioner on a 5-point scale: 5- Excellent, 4- Good, 3- Average, 2- Poor, 1- Very poor. Patient reported satisfaction was also recorded on the same 5-point scale.

The technique

A WISE pattern or L-mammaplasty was drawn to include the old inframammary scar. The neo nipple/areola position was planned according to the planned level of the inframammary fold, varying according to estimated residual breast volume and degree of predicted ptosis. Vertical limbs were drawn in the normal manner based on lateral and medial deviation of the breast around the breast meridian. The intended parenchymal incision was then mapped by drawing a line starting at the infero-lateral extent of the breast and extending it medially on the inframammary fold to the breast meridian and then curving upwards midway between the medial vertical limb of the planned incision and medial border of the breast as shown in Figure 2. This line represents the planned arc of rotation for an extended lateral pedicle to be rotated supero-medially. The upper extent of this line is just above the neo nipple/areola position. After induction of anaesthesia, the breast is infiltrated with a 1 in 500,000 adrenaline/saline solution under the planned area of skin de-epithelialisation, along the inframammary fold and into the planned arc of lateral pedicle rotation.

The operative sequence is illustrated in Figures 2 and Figure 3. The entire area within the pre-operative mastopexy drawing around the NAC cut-out is de-epithelialized, and the dermis divided around the medial and inferior periphery of the WISE or L pattern incision. A plane is then developed medially and obliquely through the breast towards the planned arc of lateral pedicle rotation and the breast parenchyma is divided with diathermy along this arc, thus forming the extended lateral pedicle, which is then raised from the implant capsule. Full access is afforded to perform implant removal with total capsulectomy, and as one intact specimen (so called en-bloc implant and capsule removal) if desired and safely feasible. Particular care is taken to preserve any deep lateral perforators and branches of the lateral thoracic vessels, which are usually seen running on the under surface of the breast at the lateral extent of the implant pocket close to the

capsule (Figure 4). For implants in the submuscular plane, pectoralis major is then dissected free from the breast and its inferior border is sutured to the chest wall under slight tension using 2-0 PDS.

After a thorough washout, the large lateral pedicle is mobilised medially and superiorly. The most inferior and medial part of it is folded under the central part of the breast behind and above the neo nipple/areola position in a gentle rotation to give central fullness and projection. The dermal part of the pedicle is then sutured to the pectoral muscle superiorly, medially, and centrally with interrupted PDS. Medially the pedicle can also be sutured to the medial breast tissue. The degree of rotation of the lateral pedicle defines the inframammary fold, usually best visualised after tailor-tacking the upper part of the vertical skin incision, which is also helpful prior to inserting the inferior supporting sutures. The dermis below and medial to the NAC can be selectively released to allow the NAC to be sutured into its planned position un-tethered. The remaining dermis around the periphery of the skin incision pattern is divided with selective and modest skin undermining to allow skin closure with no tension or tethering. It is occasionally helpful to suture Scarpa's fascia along the inframammary fold to the chest wall using a hammock suture.[17] A drain was inserted and removed the following day in cases where there was some residual dead space, and tension-free two-layer closure of skin is performed. Videos 1 demonstrates the technique in practice.

INSERT Technique video link 1 here.

INSERT FIGURE 2 (1 piece)

INSERT FIGURE 3 HERE (6 pieces)

INSERT FIGURE 4 HERE (1 piece).

Variations in technique

Variations in technique

In some cases, it was considered easier to have a separate thin superomedial pedicle for the nipple/areola and create the extended lateral pedicle described above as a secondary pedicle (Figure 5). These cases were typically those for whom only a small degree of nipple lift was required in whom this technique allowed full mobilisation and upward rotation of the secondary lateral pedicle. In suitable cases, fat grafting was performed, mainly to the upper and inner breast. Video 2 demonstrates this technique in practice.

INSERT Technique video link 2 here.

INSERT FIGURE 5 HERE (4 pieces).

Results

Patients

The mean age of women in this study was 57 years (range 40 – 70 years), and the mean duration of implantation was 20.4 years (range 7 – 42 years). 12 women had undergone a previous mastopexy (30%). The implant was sub-pectoral in only 2 cases (5%). 3 women were current smokers (7.5%). The main reason given for wishing explantation was: symptoms related to large breast size (45.0%); symptoms thought to be associated with breast implant illness (35.0%); implant rupture (12.5%); and capsule (7.5%). 34 out of 40 (85%) specifically requested a total capsulectomy. The mean implant size was 323.5cc (range 270 – 505cc).

A Wise pattern skin incision was performed in 36 cases (90%) and a vertical or 'L' pattern in 4 cases. Total, so called 'en-bloc', capsulectomy was performed in all cases in which the implant was sub-glandular. In both sub-pectoral cases it was necessary to leave a small amount of residual capsule attached to the posterior chest wall. A superiomedial nipple pedicle with a secondary extended lateral pedicle was used in 5 cases. Simultaneous fat grafting was performed in 6 cases (15%).

Short-term outcome and complications

Minor wound complications requiring simple dressings were seen in 7 cases (17.5%). Major infected wound problems occurred in 1 case, who was a smoker and had other co-morbidities. This required open debridement and negative pressure dressings. No other infections were observed. There were no seromas that required drainage.

Aesthetic outcome assessment

Photographs were taken at 3 months and 1 year (Figure 6 and 7).

INSERT FIGURE 6 and 7 HERE (11 pieces).

All except 1 case reported being satisfied or very satisfied with the outcome, with a mean patient reported satisfaction score of 4.9/5. When the photographs were independently assessed by a cosmetic practitioner, all cases were rated as average, good or very good, with a mean score of 4.1/5.

Discussion

We present a mastopexy auto-augment technique performed in a consecutive series of 40 women having breast implant removal and capsulectomy. Our results show that this is a safe technique with low complication rates that achieves a satisfying breast shape.

Breast augmentation is recognised to have many physical effects on the breast, partly due to the dissection required to create the implant pocket, and partly due to the dynamic effects of extra volume and weight. Dissection for augmentation inevitably divides the anterior intercostal perforators at the access site and perforating pectoral vessels over the footprint of the implant pocket. Lower internal mammary perforators may also be divided, particularly with dual plane techniques. MRI studies have suggested that it is mainly the lateral vessels (lateral intercostal perforators and lateral thoracic artery) that compensate for this interruption in normal vascularisation, with a mean increase in calibre of 20% and an increase in overall dominance of

supply in a similar fashion to the flap delay phenomenon.[3] Augmentation associated tissue expansion also increases vessel length. The post-augmentation breast can largely be considered as vascularised via lateral and medial vessels and hence, any pedicle fashioned as part of a mastopexy would ideally be based on one or the other.

Using an inferiorly based parenchymal pedicle to auto-augment the breast after implant removal with a superior or superomedial nipple pedicle has previously been described[4–6,8]. The inferior pedicle is, however, inherently unsuitable for this purpose due to compromised vasculature, short length and lack of mobility as has been noted by others.[16] Superior and medially based pedicles have been proposed and are very commonly used in breast reduction and mastopexy.[13,16,18] However, medial tissue is usually deficient after implant removal and a medially based pedicle does not lend itself to enhancing this part of the breast. Likewise, superior pedicles do not easily allow enhancement of the upper part of the breast. Others have described parenchymal reshaping and plication without formal flap dissection.[10,19,20]

Lateral pedicles for breast reduction or mastopexy are among the least reported in the literature. The original design is attributed to Skoog in the 1960's who used a vascularized lateral dermal pedicle without underlying glandular tissue. It has subsequently seen modifications to include a full thickness dermoglandular design and integration with the vertical scar technique.[21–23] They are less preferred by many for breast reduction as they can restrict removal of excess lateral breast tissue and may be less suitable for very large reductions. However, it could be argued that they are ideal in mastopexy after explantation, where all tissue is preserved and lateral to medial redistribution of tissue is invariably advantageous. Their role as an extended pedicle to fill upper and medial defects after breast cancer removal is well utilised in oncoplastic breast conserving surgery.[24]

The extended lateral pedicle allows a large proportion of the breast, including the nipple, to be mobilised as one flap, with good options for securing it. In our series, we have secured the pedicle with multiple sutures to the pectoral muscle and the medial breast parenchyma. Importantly, the flap allows easy definition of the new inframammary fold, which usually needs to be raised. A higher inframammary fold is usual with a smaller breast, compared to an augmented breast, and allows easier bra fitting. In 12.5% of cases in our series, a separate superomedial pedicle was used for the nipple areola to allow greater lateral pedicle mobility.

Another advantage of a large lateral pedicle is the potential to retain breast and nipple sensation.[25] Although not formally assessed in our study, this may be particularly important when some sensation has already been lost with the original augmentation. In addition, for some women the ability to retain the possibility of breast feeding may be important and a large lateral nipple-bearing pedicle fulfils the desired criteria to maximise the chances of this.[26]

Most cases in our series were managed with Wise skin pattern, with a 'L' pattern being used in those cases where only a small volume of skin reduction was required. A vertical based skin pattern promotes a narrow base and breast projection, minimises scarring, and the L-pattern modification allows shortening of the vertical scar in those with excess loose skin.[27,28] Minimal scarring is often prioritised in this group of patients. However, we found that the degree of skin excess in most cases dictated that a Wise pattern allowed the easiest route to achieving a smaller, compact breast shape. Easy access to perform total capsulectomy, with so-called en-bloc removal of implant and capsule if desired, is afforded by these incisions and by raising a large lateral pedicle, so exposing almost the entire anterior capsule. Total capsulectomy is increasingly requested in our experience, with many also requesting photographic evidence. It was requested by 85% of cases in our series, and it was feasible in 95% of all cases (100% of those with sub-glandular implants. We also found

that both ease and speed of capsulectomy is facilitated by the technique we have described, as is re-siting of the pectoral muscle after explant of submuscular implants.

It can often be difficult to achieve a good ratio of upper to lower breast volume with mastopexy after explantation. The situation is different to that of a normal mastopexy or breast reduction, in which there is attachment of the whole breast to the chest wall and usually much more volume in the upper breast to start with. Breast shaping after explantation relies on mobilisation of breast tissue into the implant cavity and attaching it to the chest wall to reconstruct the breast over the desired footprint. Large glandular flaps can do this much more effectively than a short or thin pedicle. A good ratio of upper to lower breast volume has been used by other authors to define a "good" breast shape.[29,30]

Just how much the compact shape that was achieved in our cases is retained over time and over and above any other form of mastopexy would be debatable and not evidence based in this study. Studies have suggested that breast morphology stabilises at approximately 6 months and 9 months for Wise and vertical pattern reductions respectively.[31] Our early outcomes at 1 year showed little change from the outcome at 3 months as shown by the 2 examples in Figure 2. Overall, we believe that the technique described is safe, reproducible, and associated with a high degree of patient satisfaction.

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FIGURE LEGENDS:

Figure 1: Number of augmentations and implant removals between 2015 and 2019 in the USA (Data from - Aesthetic Plastic Surgery National Databank, https://www.surgery.org/media/statistics)

Figure 2: The Operative Sequence (diagrammatic representation)

Figure 3a, 3b, 3c, 3d, 3e, 3f: The Operative Sequence (photographic representation)

Figure 4: The typical location of the main branch of the lateral thoracic artery or a large lateral intercostal artery perforator.

Figure 5a, 5b, 5c, 5d: A case where a superomedial nipple pedicle and secondary extended lateral auto-augmentation pedicle was used.

Figure 6a: Case 1 - pre-operative photograph

Figure 6b: Case 1 - pre-operative surgical markings photograph

Figure 6c: Case 1 - 3-months post-operative photograph

Figure 6d: Case 1 - 3-months post-operative photograph

Figure 6e: Case 1 - 12-months post-operative photograph

Figure 7a: Case 2 - pre-operative photograph

Figure 7b: Case 2 - pre-operative surgical markings photograph

Figure 7c: Case 2 - 3-months post-operative photograph

Figure 7d: Case 2 - 3-months post-operative photograph

Figure 7e: Case 2 - 12-months post-operative photograph

Figure 7f: Case 2 - 12-months post-operative photograph

VIDEO LEGENDS:

Video 1:

Video demonstrating the removal of the implant in the en-bloc fashion, with the blood supply persevered laterally. The breast is then divided medially to form a large extended lateral pedicle. The pedicle can then be rotated and folded towards the upper inner quadrant. The dermal surface of the pedicle can then be quilted in multiple rows to the pectoral fascia. The dermis of the pedicle is released to facilitate closure. The upper breast can then be closed.

Video 2:

A separate superomedial pedicle has been used for the nipple and the extended lateral pedicle has been raised and similar to video 1 this is then rotated and folded towards the upper inner quadrant.

Figure 1

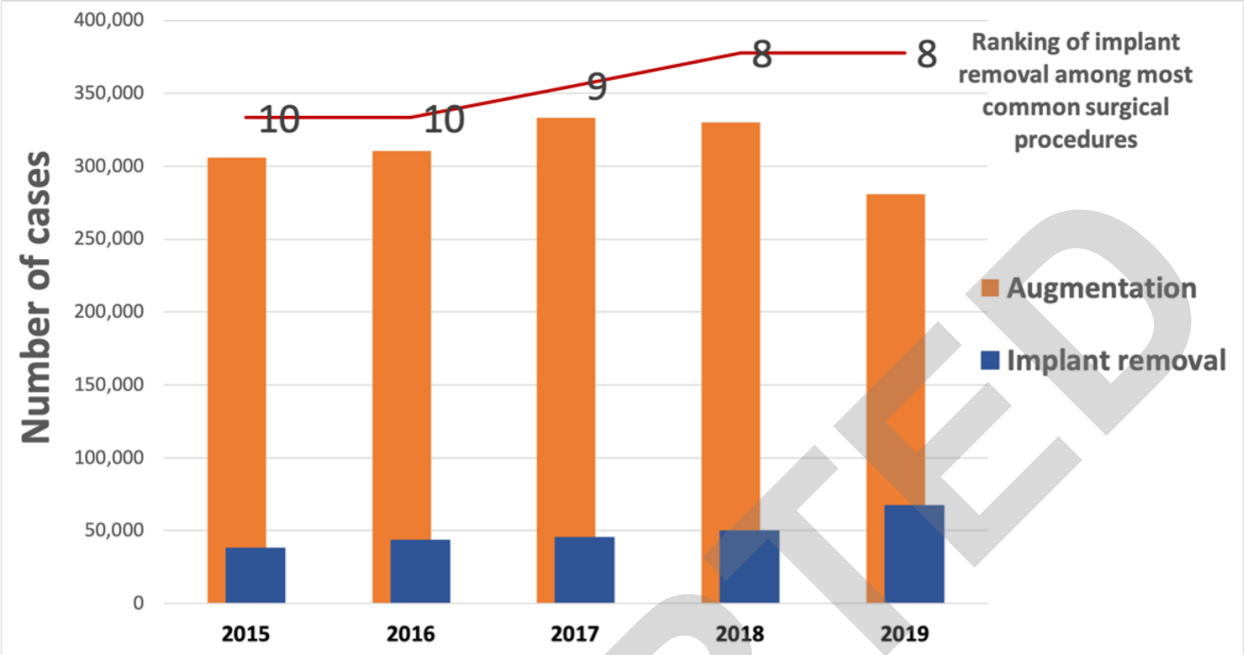
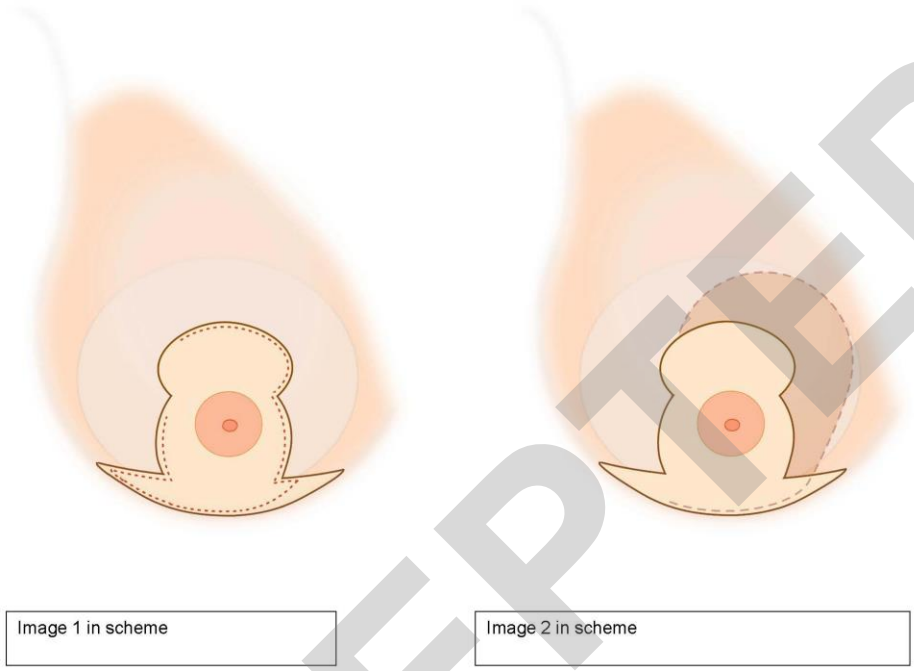


Figure 2



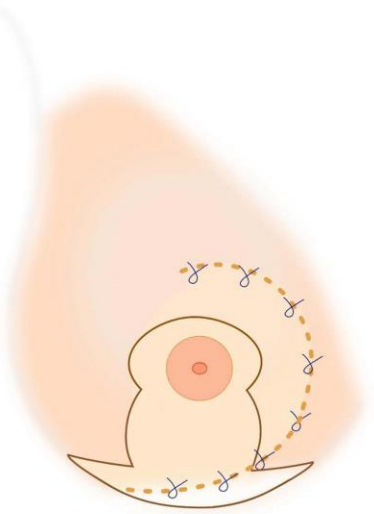


Image 3 in scheme

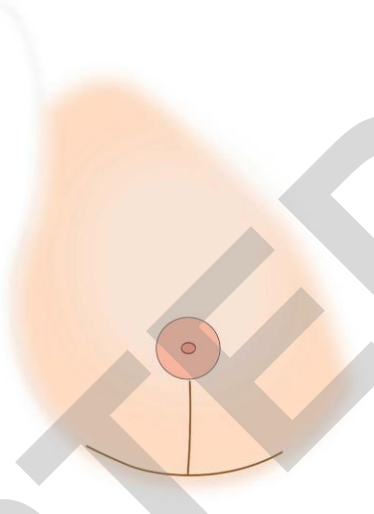


Image 4 in scheme

Figure 3a

Figure 3b

Figure 3c

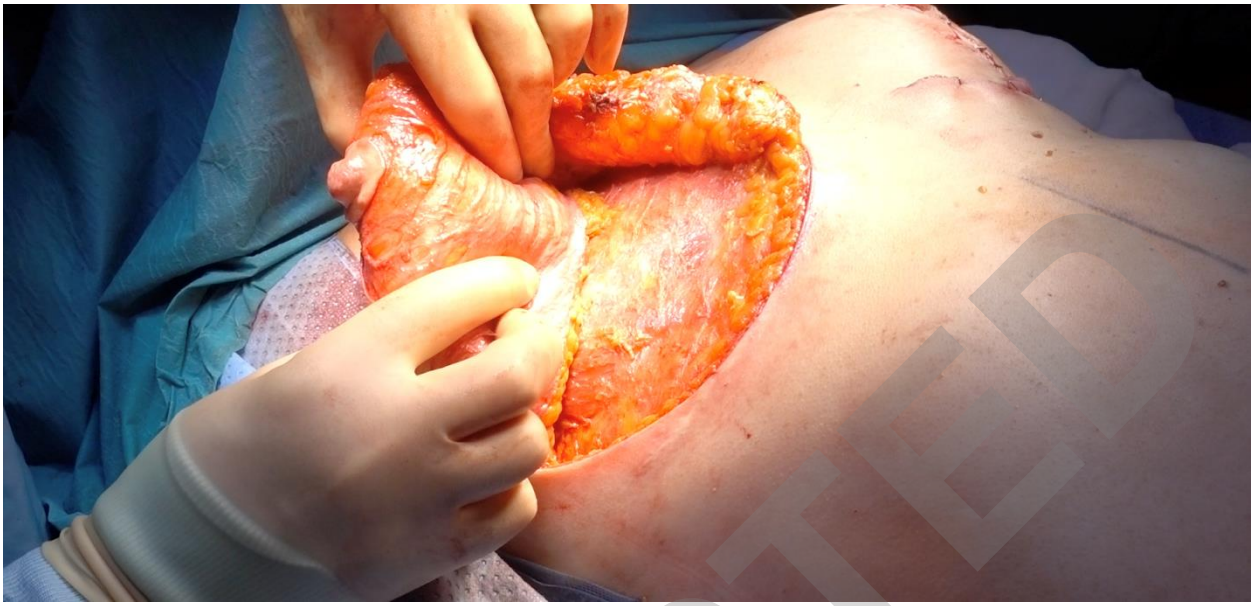


Figure 3d

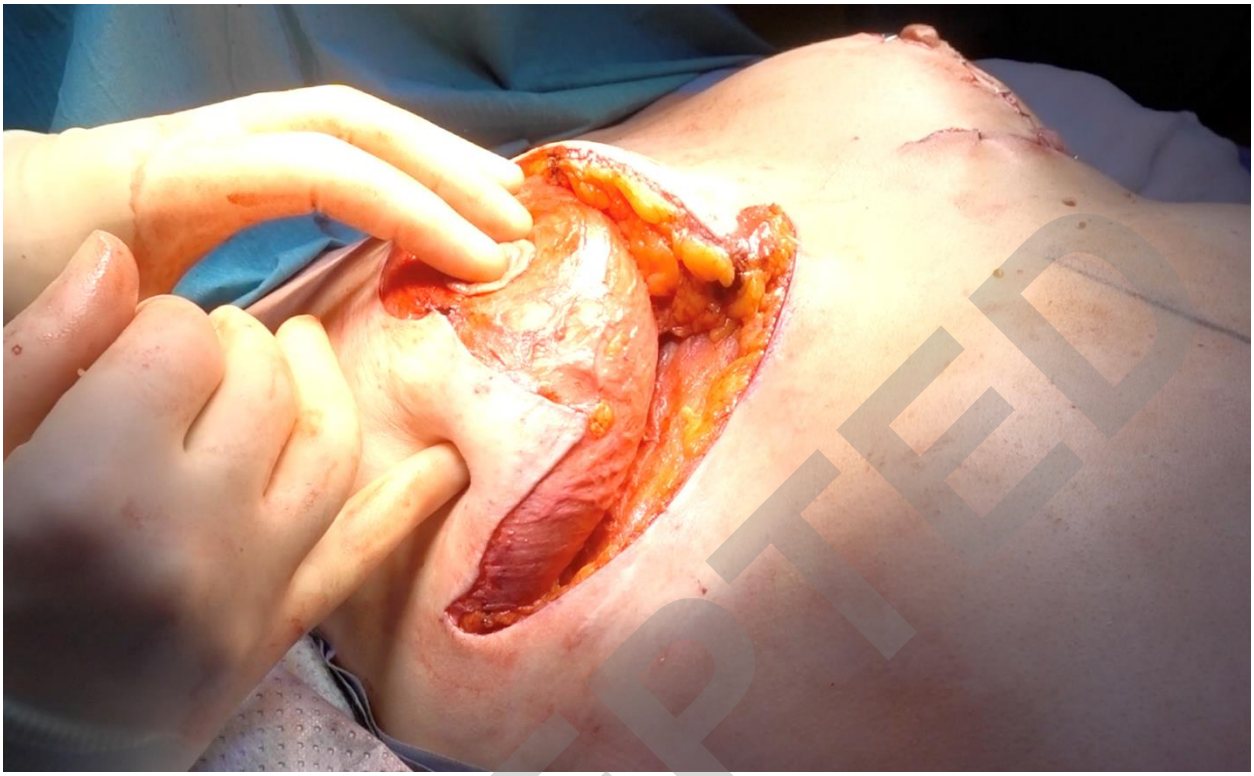


Figure 3e

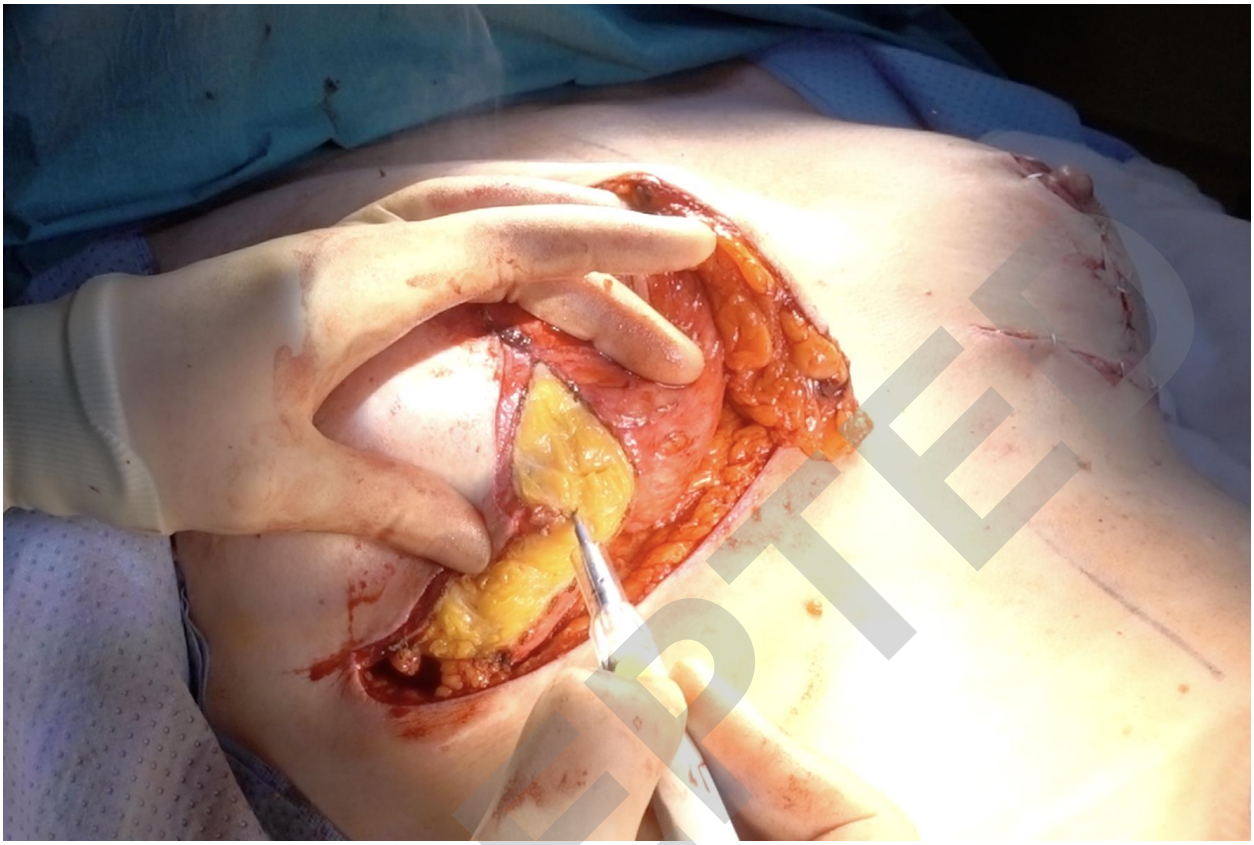


Figure 3f

Figure 4

Figure 5a

Figure 5b

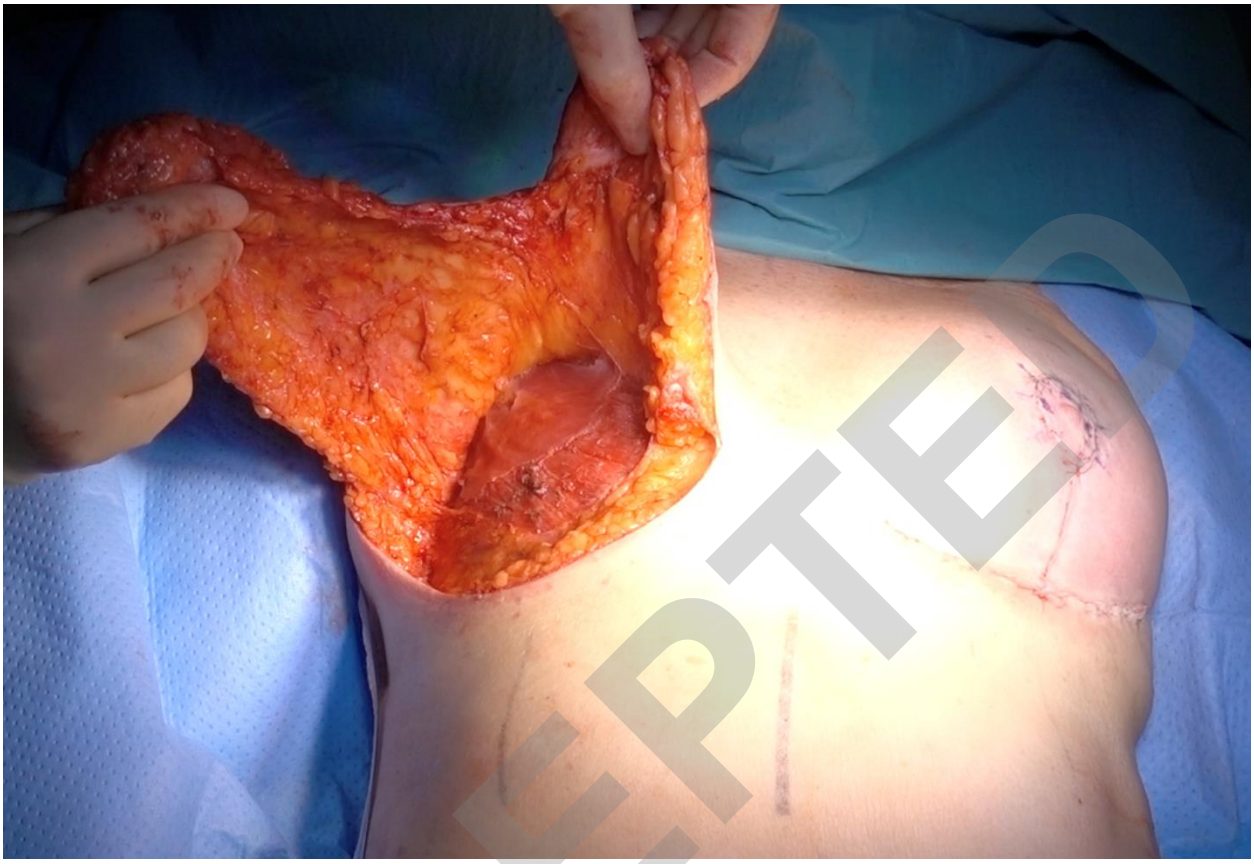


Figure 5c

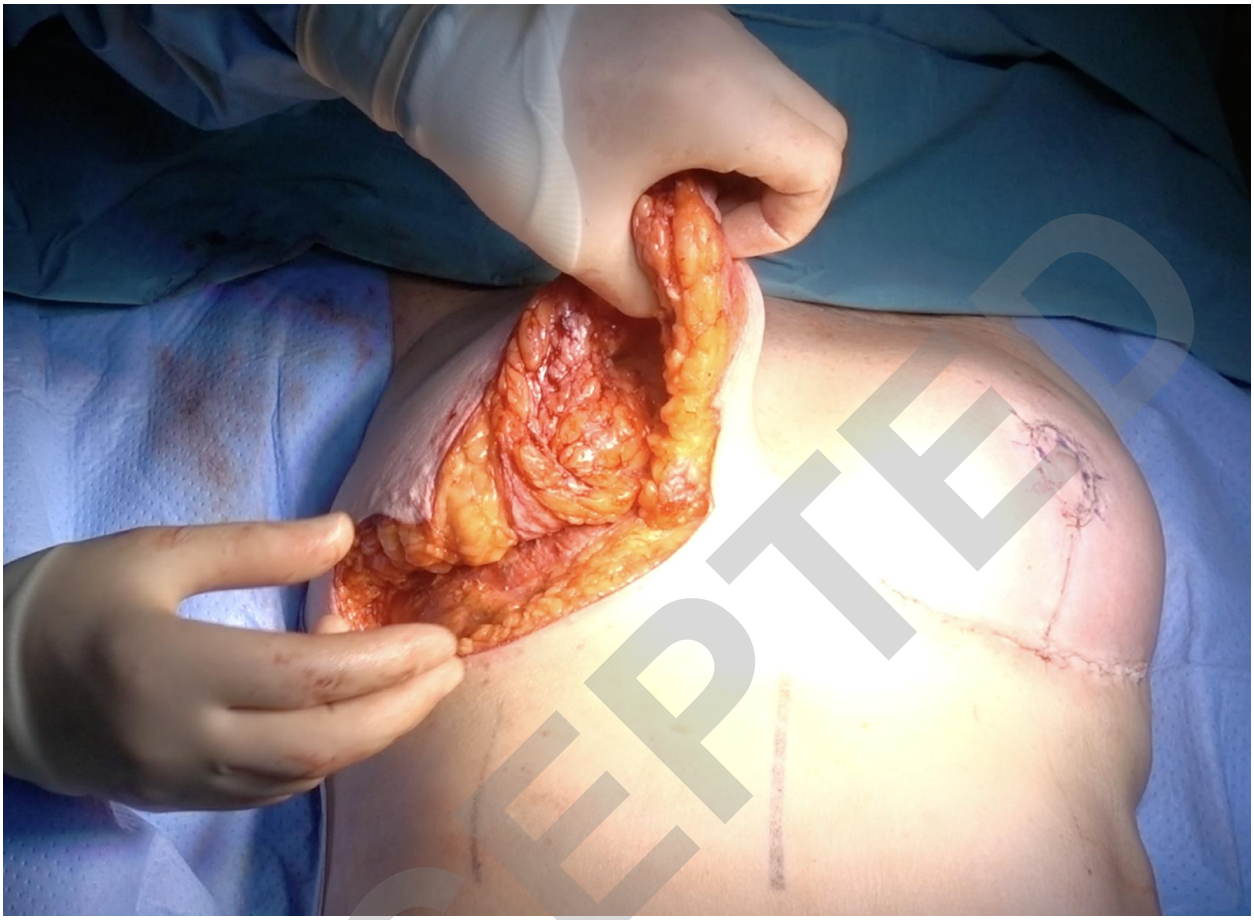


Figure 5d

Figure 6a

Figure 6b

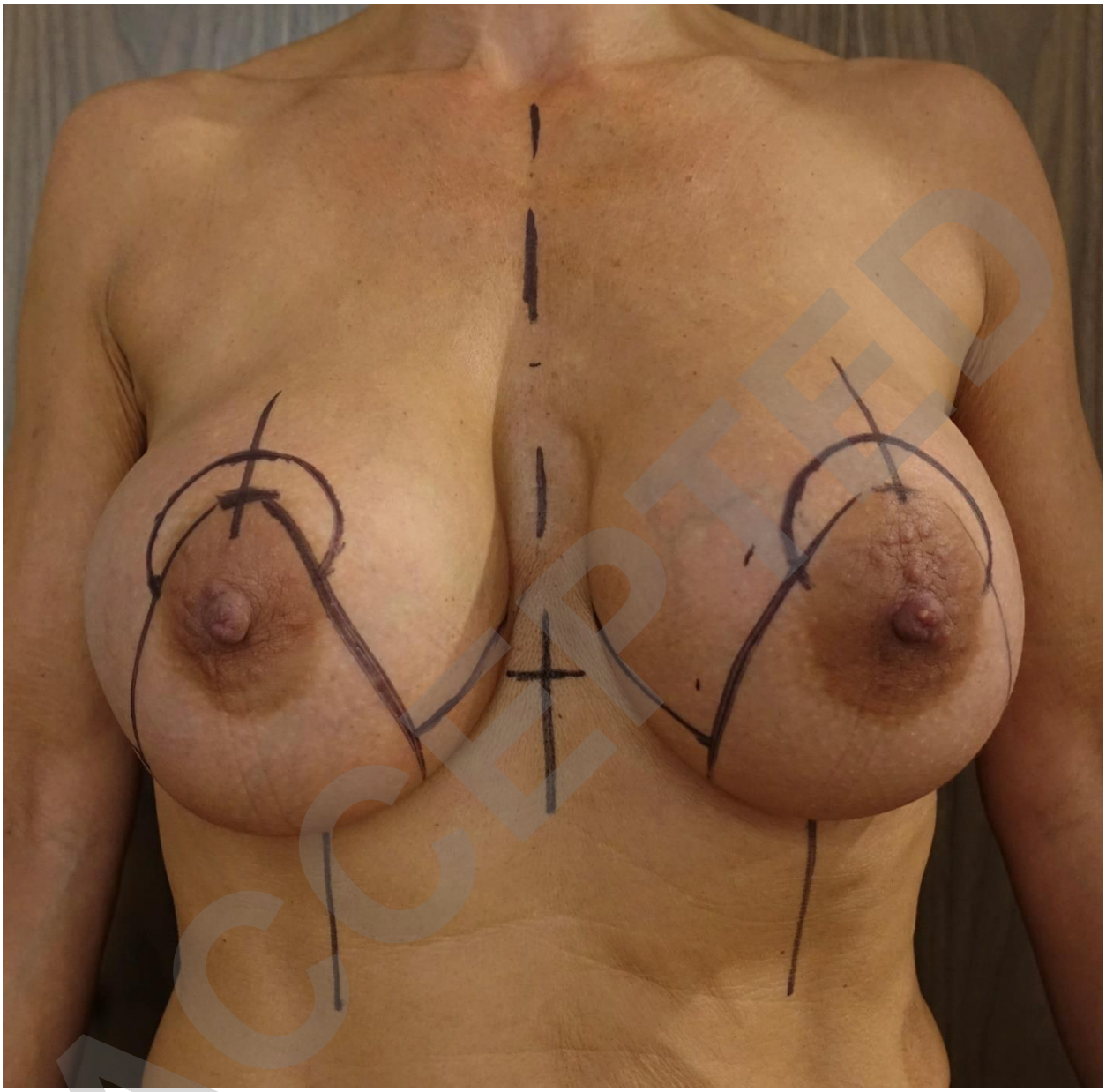


Figure 6c

Figure 6d

Figure 6e

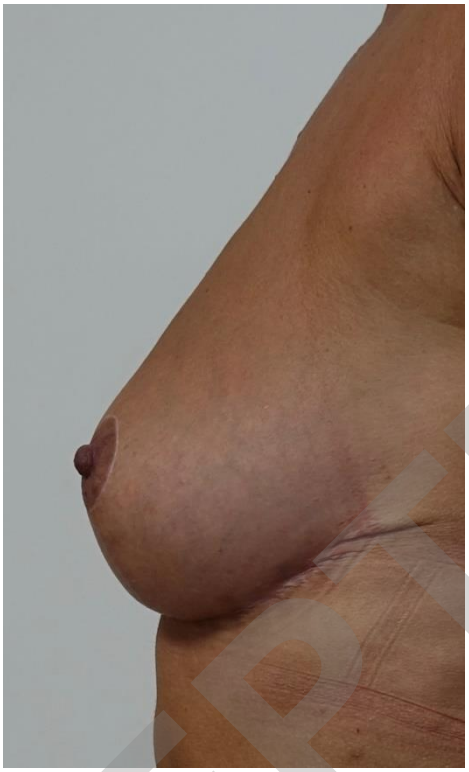


Figure 7a

Figure 7b

Figure 7c

Figure 7d

Figure 7e

Figure 7f