Original Article

The Double-pedicle Tip Anchor Flap (DPTA-Flap) Preservation Technique for Autologous Breast Augmentation Circumvertical Mastopexy

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ABSTRACT

The ultimate breast mastopexy technique allows a reliable and consistent transposition of the nipple-areolar complex (NAC) with preservation of nipple viability, sensation, and lactation potential. Ideally, good upper pole fullness with a durable result is achieved. However, as the inferior pole parenchyma often gravitates downward, the long-term result remains unsatisfactory. Anchoring remains a key procedure in autoaugmentation mammaplasty as the flap needs to be stable against gravity. We hereby describe a further refinement of a chest wall-based flap for the support of the upper pole, namely a double-pedicle tip anchor flap (DPTA-flap). By using this technique, good upper pole fullness is achieved, sensation is preserved, and lactation remains likely.

Level of Evidence: V

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Introduction

Ideally, transposition of the nipple-areolar complex (NAC) in mastopexy is reliable, with preservation of sensation, lactation potential, and nipple viability. However, traditional mastopexy patterns fail to provide a good upper pole fullness over time. Commonly, mastopexy patterns are able to fill the upper pole through tightening of the skin envelope, with secondary upward displacement of the parenchyma. However, the inferior pole parenchyma often gravitates downward, and skin tension alone is inadequate to maintain shape. That being said, skin excision is for redundant skin only and not for parenchymal shaping.

A chest wall-based flap using a pectoral sling was described previously for the support of the upper pole. Ribeiro’s technique, an inferior pedicle flap rotated in the upper pole, provides improvement in upper breast fullness in autoaugmentation mammoplasty. It is important however that the pectoralis major muscle fascia remains preserved to ensure vasculature and sensation. The NAC is innervated primarily by the fourth intercostal nerve. The nerve travels within the serratus fascia to the lateral border of the pectoralis muscle and turns anteriorly at a right angle to enter into the mammary gland. Ultimately, the preserved fascia can be used to anchor the autoaugmentation flap. This autoaugmentation mammoplasty procedure is especially suitable for patients who would like a repositioning of their breast with autologous tissue or re-autoaugmentation after implant removal without another breast implant. Hereby, any of the risks and complications associated with breast implants are obviated. Thus, we describe a further refinement of the technique, namely a double-pedicle tip anchor flap (DPTA-flap).

Patients and Methods

Patient Selection

This mastopexy technique is especially suitable in patients with severe deflation in the upper pole and with a moderate/moderate-to-severe degree of breast ptosis. Moreover, this technique is ideal for patients who would like more upper pole fullness but do not desire an implant. Written informed consent was obtained from all patients, and the guidelines of the Declaration of Helsinki as well as the STROBE guidelines were followed accordingly.

Operative Technique

First, the areola is marked with a 40-mm areola marker. Subsequently, the planned superior pedicle and central pole autoaugmentation flap are de-epithelialized and incised accordingly. Hereby, the dermis of the central pedicle tip is left intact, which acts as an anchor flap for strong stabilization of the pectoralis major muscle fascia in the superior pole. The remaining dermis of the centrally based full-thickness pedicle is removed for better duct recanalization (Figures 1 & 2) and also to facilitate free mobilisation towards the cranial part. The breast septum with its associated neurovascular structure is preserved. The superior dermoglandular pedicle is developed to a depth of approximately 2.5 cm to protect the neurovascular supply. Beyond this depth, the dissection is bevelled superiorly under the gland and continues along and above the pectoralis major muscle fascia. The medial and lateral parenchymal pillars are incised to a depth of approximately 2 cm and bevelled medially and laterally in order to avoid narrowing the base of the autoaugmentation flap. After further mobilisation at the inferior extent of the central pedicle, the autoaugmentation flap is inset at the superior pole and under the superior pedicle without tension at the level of the third intercostal space using three PDS 2-0 (Ethicon, Belgium) single stitches. To achieve symmetry, the autoaugmentation flap can be trimmed accordingly. In order to avoid lateral herniation after flap inset, the lateral dermis of the flap is sutured on both sides to the pectoralis major muscle fascia to maintain central and medial projection. The autoaugmentation flaps of both sides are inset at the same height respective to the ribs. Then, the medial and lateral pillars are re-approximated over the autoaugmentation flap using Monocryl 3-0 (Ethicon, Belgium). The superior pedicle with the NAC is rotated into position and inset with 3-0 Monocryl (Ethicon, Belgium) (Supplementary Video). The remainder of the wound is closed.
with 4-0 Monocryl Plus (Ethicon, Belgium) interrupted inverted deep dermal sutures and running intradermal sutures. The skin at the level of the inframammary fold is defatted along its edges, and a running tobacco-pouch-suture is performed to the new inframammary fold by grasping the thoracic fascia with 3-0 Monocryl (Ethicon, Belgium), as previously described. In this way, the vertical scar is reduced in length. Eventually, incisions are dressed with Steri-Strips, dry gauze, and the patient is placed into a postsurgical bra. At final follow-up, the patients were asked about their overall satisfaction using a Likert scale from 0–10 (0 = poor result, 10 = very satisfied), as previously described.

Case 1

A 31-year-old non-smoking and otherwise healthy patient presented with moderate breast ptosis, breast asymmetry, and involution of breast parenchyma. She requested a breast lift and upper pole fullness without an implant. Moreover, she required preservation of sensation and lactation. A preoperatively performed ultrasonography of the breast revealed a cyst in the left lower quadrant of about $11 \times 11 \times 7$mm size. The decision for an autologous breast augmentation circumvertical mastopexy using a DPTA-flap together with synchronous removal of the cyst was made. The peri- and post-operative courses were uneventful. The cyst was histologically a fibroadenoma that was removed entirely. The results three months postoperatively showed a pleasant shape with sufficient upper pole fullness and preserved sensation. The patient was very much satisfied with the result (Likert scale preoperatively 4, Likert scale postoperatively 9) (Figure 3).

Case 2

A 50-year-old non-smoking and otherwise healthy patient presented with moderate breast ptosis, breast asymmetry, and involution of breast parenchyma. She requested a breast lift and upper pole fullness without an implant. A preoperatively performed ultrasonography of the breast revealed no pathology. The decision for an autologous breast augmentation circumvertical mastopexy using a DPTA-flap was made. The peri- and post-operative courses were uneventful. At final follow-up after
Figure 2. Surgical intraoperative steps of the double-pedicle tip anchor flap (DPTA-Flap) technique for autologous breast augmentation circumvertical mastopexy. De-epithelialized skin shows the tip anchor (white arrow) (a). After elevation of the double pedicle flaps (white arrow shows the superior pedicle and black arrow shows the centrally based tip anchor island flap) (b). After insetting of the centrally based tip anchor island flap into the superior pole and under the superior pedicle without the dermis (black arrow) (c). Final on table result (d).

Figure 3. A 31-year-old patient with moderate breast ptosis and involution of breast parenchyma in the upper pole before (a – e) and three months after double pedicle tip anchor autoaugmentation circumvertical mammaplasty (f – j).
six months, a pleasant shape has been achieved with sufficient upper pole fullness and preserved sensation. The patient was very much satisfied with the result (Likert scale preoperatively 2, Likert scale postoperatively 10) (Supplementary Figure).

Discussion

The DPTA-flap is felt to provide long-term stability, has a robust blood supply, preserves sensation, and has potential for lactation. Ultimately, patient satisfaction is high, as evaluated in our study by a 10-point Likert scale. It has been shown that this method of measuring satisfaction has a good validity and reliability and can be used in clinical trials due to the ease of administration and interpretation.

It appears that lactation is possible regardless of the pedicle technique. The health effects of breastfeeding are well reported. Another relevant factor is the desire to experience a sense of bonding with the newborn. In a study by Chiummariello et al., superior breastfeeding rates were reported at three weeks with the superior pedicle technique (61%) compared to the inferior, medial, and the lateral pedicle techniques (43%, 48%, 55%, respectively). The limiting factor for lactation appears to be the connection of the NAC to a significant portion of the ducts and lobules. If this connection remains patent, some degree of recanalization and lactation are possible. There seems to be a direct correlation between the amount of parenchyma left in continuity with the nipple and subsequent ability to breastfeed. With a fully central dermoglandular pedicle under the superior pedicle, the milk ducts may not recanalize because the de-epithelialized surface may act as a barrier between the NAC and breast parenchyma.

Hammond et al. described a technique of circumvertical mastopexy with autoaugmentation of the upper pole using a lower island flap transposition. In this technique, the periareolar and vertical segments are de-epithelialized, and the vertical segment is incised through skin to the breast parenchyma. Then, the flap was transposed superiorly into the upper pole of the breast. We now further refined this technique by de-epithelializing only the tip of the lower flap. Hereby, the flap can be transposed in a more unrestricted fashion, and milk duct recanalization from the breast parenchyma to the NAC without dermis in between is more likely.

Anchoring remains a key procedure in autoaugmentation mammoplasty as the flap needs to be stable against gravity. It has been shown in previous studies that sufficient anchoring using a de-epithelialized part of the flap helps to integrate and stabilize flaps. Maintaining a full-thickness pedicle together with preserved pectoralis major muscle fascia also allows for the protection of the deep branch of the fourth intercostal nerve. It has been suggested that the resultant nipple sensitivity is an important factor influencing lactation as altered nipple sensitivity may interfere with the reflex arc normally stimulated via suckling.

Ultimately, the blood supply remains very robust. The centrally based pedicle with its preserved breast septum receives its blood supply directly from the fourth, fifth, and sixth intercostal perforating vessels of the internal mammary arteries, together with vascular contributions from the lateral thoracic artery and thoracoacromial artery by means of the pectoralis major muscle. Preservation of the subdermal blood supply of the superior pedicle results in improved circulation for the NAC.

Conclusion

The DPTA-flap for circumvertical autoaugmentation mastopexy is safe with a robust blood supply and provides a durable result. Sensation is preserved, lactation remains likely, and the cosmetic result is pleasant with restored upper pole fullness. Further longitudinal studies with a larger sample size and long-term follow-up are needed to verify our findings.

Declaration of Competing Interest

The authors declare that they have no conflicts of interest to disclose.
Ethical approval
Not required.

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Supplementary materials
Supplementary material associated with this article can be found, in the online version, at doi: 10.1016/j.jpra.2022.08.009.

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