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ORIGINAL PAPER

Optimization of the dermal wrap in inferior pedicle reduction mammoplasty: An Egyptian experience

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Abstract

Background Reduction mammoplasty using the inferior pedicle technique has been used for more than five decades. Without doubt, it has many advantages, especially in patients with moderate to severe macromastia. Although the esthetic outcome of reduction mammoplasty in the early postoperative period is usually satisfactory, typical esthetic drawbacks appear during the first year. These drawbacks include bottoming out, loss of superior fullness, box-shaped breasts, poor definition of the infra-mammary fold (IMF), elongation of the vertical scar, star gazing of the nipple-areola complex (NAC) and, of course, the scar burden. Parenchymal reshaping and suspension have been introduced as an additional step to eliminate the drawbacks of the inferior pedicle procedure.

Methods This is a prospective study done in a period from March 2016 to March 2018 in Kasr Al-Ainy Hospital (Cairo University hospitals) by the senior author and his team of co-authors. Reduction mammoplasty (Wise pattern) with the inferior pedicle and dermal wrap technique (using two dermal wings) was performed in 20 patients. The distance from the suprasternal notch (SSN) to the NAC was > 30 cm.

Results The patients' ages ranged from 28 to 55 years (average age, 39 years). Body mass index (BMI) ranged from 27 to 35 kg/m^2 (average BMI, 33.3 kg/m^2). The distance between the SSN and NAC ranged from 33 to 45 cm (average distance, 40 cm).

The nipples were lifted by 11 to 19.5 cm. The distance from the nipple to the IMF ranged from 18 to 24 cm. This distance was reduced postoperatively to between 9 and 11.5 cm (p value < 0.001).

Conclusions Follow-up of the patients revealed that suspension of the breast parenchyma and plication of the dermal flap improved the esthetic results following inferior pedicle breast reduction.

The addition of volumetric and geometric adjustment "preoperatively" may significantly improve the results and minimize the operative time of this relatively lengthy procedure (4–6 h for both breasts).

Level of Evidence: Level IV, terapeutic study.

Keywords Breast · Reduction · Mammoplasty · Dermal · Suspension · Plication · Inferior · Pedicle

Introduction

Reduction mammoplasty using the inferior pedicle technique has been used for more than five decades. Without doubt, it has many advantages, especially in patients with moderate to severe macromastia. In addition to achieving desirable breast size, reduction mammoplasty preserves the nipple sensation and viability.

Although the esthetic outcome of reduction mammoplasty in the early postoperative period is usually satisfactory, typical esthetic drawbacks appear during the first year. These drawbacks include bottoming out, loss of superior fullness, box-shaped breasts, poor definition of the infra-mammary fold (IMF), elongation of the vertical scar, star gazing of the nipple-areola complex (NAC) and, of course, the scar burden. Most of these drawbacks are due to relying on the skin for re-draping to maintain breast shape, which will eventually be lost over time following the surgery.

Parenchymal reshaping and suspension have been introduced as an extra step to eliminate the drawbacks of the inferior pedicle technique. Many authors have described different

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Fig. 1 The inferior pedicle was adjusted according to the 3-1 rule

techniques of dermal suspension and plication using either autologous or alloplastic materials.

The early modification of the inferior pedicle was described by suspension of the pedicle to the pectoralis fascia and plication of the pedicle to shorten the distance between the NAC and the IMF [1]. Further refinement aimed at designing dermal flaps has been based on the inferior pedicle. Other authors have described different designs of dermal flaps: either de-epithelization of the whole Wise pattern [2, 3] or by designing four flaps, either rectangular [4] or triangular flaps [5].

The dermal flaps were suspended to either the pectoralis fascia [2, 3] or the second and fourth rib periosteum [4, 5] using either absorbable or non-absorbable suture material.

The addition of plication of the flap was recommended by many authors to minimize the distance between the NAC and IMF [1, 2]. In contrast, other authors do not recommend this step to avoid the risk of NAC de-vascularization.

In this study, we tried to optimize the esthetic outcome using inferior pedicle reduction mammoplasty with providing an internal tissue support through wrapping of the breast parenchyma.

Patients and methods

During the period from March 2016 to March 2018, 20 patients were included in this prospective study. All patients underwent reduction mammoplasty with an inferior pedicle and dermal wrap technique by the senior author and co-authors. This was carried out in Kasr Al-Ainy hospital, one of Cairo University hospitals. Patients with a distance between the suprasternal notch (SSN) and NAC ≥ 35 cm were included in this study. The distance between the nipples and the IMF was less than 24 cm. The body mass index (BMI) of the patients ranged from 27 to 35 kg/m^2. The patients' ages ranged between 28 and 55 years old.

Preoperative marking

The preoperative markings were performed as shown in Fig. 1 to include the midline, breast meridian, and the location of the new nipple position. The Wise pattern was drawn using a template. The vertical limbs were adjusted to 7 cm to minimize tension on the triple junction during closure, and hence, wound dehiscence. The width of the inferior pedicle was adjusted to the rule of 3-1 for safe transposition of the NAC with a maximum width of 8 cm to avoid a bulky pedicle.

Markings of the three triangles for de-epithelization were then followed by a superior triangle connecting the NAC to its new position. The medial and lateral wings were drawn

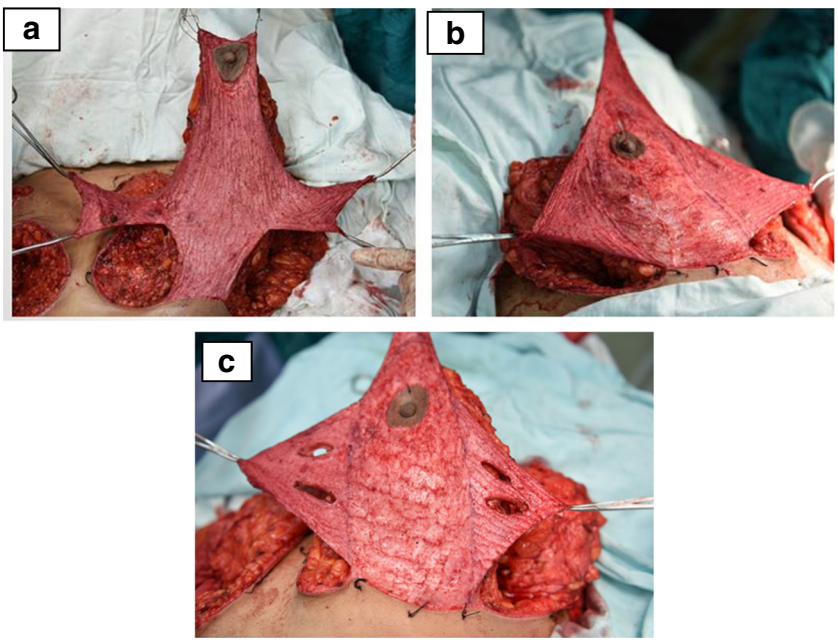

Fig. 2 **a** De-epithelization of the two dermal wings (SSN-to-NAC distance > 40 cm). **b** De-epithelialization of the whole area below the keyhole design (SSN-to-NAC distance < 40 cm). **c** Fenestration of the dermal wings to minimize hematoma collection in the confined space

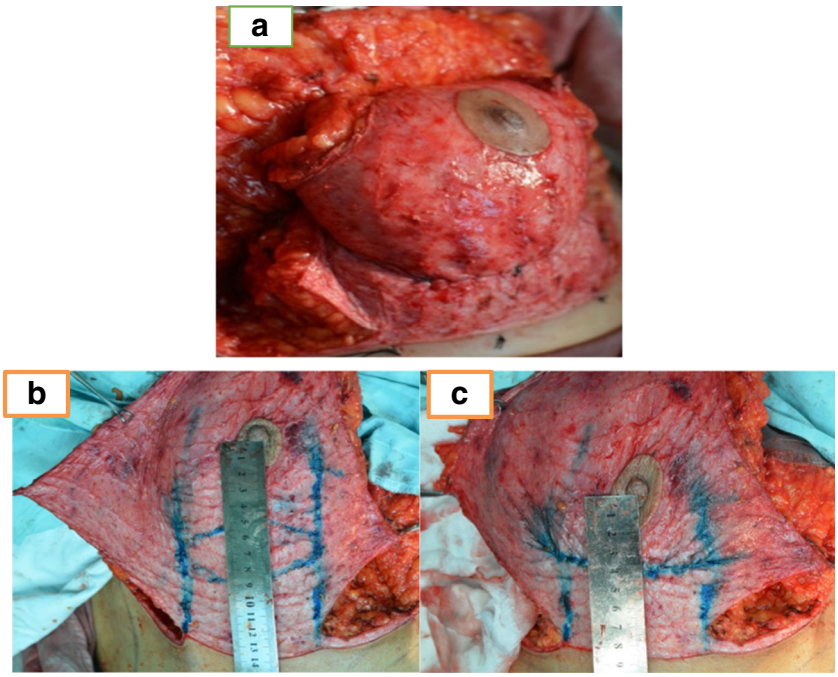

Fig. 3 **a** Thinning of the flap. **b, c** Plication of the inferior pedicle

extending from the IMF upward, with a distance quals to the proposed pedicle length.

Dermal suspension technique

All patients were subjected to general anesthesia. To minimize the operative time, two teams worked synchronously except during breast shaping, which was performed by the same surgeon.

De-epithelization of the two dermal wings was performed in continuity with the inferior pedicle (Fig. 2a). Then, de-epithelization of an apical projection extending from the NAC to its new position was performed in a keyhole design (Fig. 2b) to suspend the parenchyma with three dermal flaps: a medial, lateral, and superior flap. The thickness of these flaps was limited to the dermal thickness, and only a layer of fat beneath the dermis was used to preserve the subdermal plexus. The step of de-epithelization was tailored according to the need for suspension to minimize the operative time. According to the distance between the NAC and SSN, the area of de-epithelization was determined. If the distance was less than 40 cm, the entire area below the keyhole design was de-epithelialized (Fig. 2b). In cases where this distance was more than 40 cm, the de-epithelization was limited to two lateral wings (Fig. 2a). In cases utilizing the entire lateral wings for suspension, fenestration was performed to avoid the potential hazard of hematoma collection in a confined space (Fig. 2c).

Dissection of the superior skin flaps was kept as thin as possible (just beneath the subcutaneous plane, less than 1 cm thick), so the re-draping was able to reflect the proposed breast shape and avoid apparent boxing influenced by thick flaps (Fig. 3a). An adequate bulk of breast tissue was kept beneath the NAC to allow for adequate projection (as recruitment of tissues from the superior quadrant was not feasible).

Plication of the inferior flap to shorten the distance between the nipple and IMF was performed to enhance breast projection and minimize tension on the triple junction (Fig. 3b, c). Plication was tailored to keep the nipple facing forward with some degree of laxity to avoid tension over the breast parenchyma, with the potential risk of compromising the blood supply of the NAC. This step was performed in conjugation with the suspension of the superior limb of the dermal wing to provide a balanced position and projection of the NAC.

The wrap was performed by stitching the medial and lateral wings to the pectoralis fascia in a descending curve following

Table 1 Comparison between preoperative and postoperative measurements (at 1 month) between the right and left SSN:NAC

	Preoperative		Postoperative		*P* value
	Mean	SD	Mean	SD	
Right SSN:NAC	39.20	3.24	21.20	1.11	< 0.001
Left SSN:NAC	40.45	3.77	21.20	1.11	< 0.001

Table 2 Comparison between preoperative and postoperative measurements (at 1 month) between the right and left NAC:IMF

	Preoperative		Postoperative		*P* value
	Mean	SD	Mean	SD	
Right NAC:IMF	21.10	1.68	8.20	0.57	< 0.001
Left NAC:IMF	21.95	1.99	8.50	0.73	< 0.001

Fig. 4 A 38-year-old patient presenting with bilateral breast hypertrophy with a SSN to NAC distance of 35 cm in the preoperative period. Patient at 9 months postoperative of inferior pedicle with dermal plication technique, with a SSN to NAC distance of 22 cm

the medial and lateral foot print of the breast to achieve the desired breast shape.

Suspension of the superior dermal flap was adjusted at the level of the second rib to the pectoralis fascia with 0 PDS (polydioxanone) suture. Closure of the wounds was performed over drainage tubes that were removed when the output of the drain was 30 cc or less.

Statistical analysis

Data were coded and entered using Statistical Package for the Social Sciences SPSS) version 25. Data were summarized using the mean and standard deviation for quantitative data. Comparison of serial measurements within each patient was performed using a paired *t* test when comparing two periods or using repeated measures ANOVA with a post hoc test when comparing three periods [1]. *P* values less than 0.05 were considered statistically significant.

Results

In this study, 20 patients who fulfilled the inclusion criteria recovered well postoperatively. The age ranged between 28 and 55 years old, with an average age of 39 years. BMI ranged from 27 to 35 with an average BMI of 33.3. The distance between the SSN:NAC and NAC:IMF is summarized in Tables 1 and 2 respectively.

The additional operative time for de-epithelization ranged between 37 and 55 min (average time 48.5 min).

The follow-up period ranged between 6 and 36 months (average 14 months).

Fig. 5 A 40-year-old patient presenting with bilateral breast hypertrophy with a SSN to NAC distance of 37.5 cm in the preoperative period. Patient at 11 months postoperative of inferior pedicle with dermal plication technique, with a SSN to NAC distance of 21 cm

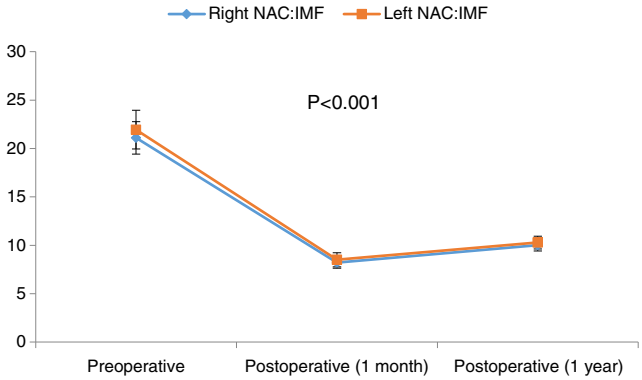

Fig. 6 The transition of NAC:IMF distance over time. Measurements for both breasts, at 1 month and 1 year

No nipple areola loss or major wound dehiscence occurred in any patient.

Two patients had minor wound dehiscence (one case affected a peri-areolar location, and the other case affected the vertical limb). The dehiscence was managed conservatively with frequent dressing changes (Figs. 4 and 5)

Discussion

Reduction mammoplasty is a commonly performed plastic surgery procedure that is performed both for medical and esthetic indications. Many techniques have been described to achieve long-lasting esthetic outcomes and to preserve nipple vascularity and sensation.

The inferior pedicle technique was first described by Courtiss and Goldwyn [6] and then later by Robbins [7], and it is still commonly used by many plastic surgeons. The inferior pedicle reduction mammoplasty is well known for its safety and minimal risk of nipple areola complex necrosis [8, 9]. In addition, it has a superior advantage for preservation of NAC sensation; however, the long-term esthetic goals and breast shape are difficult to be maintained.

When relying on the skin to maintain the breast shape, it usually fails to do so for a long time. Internal sutures suspending the breast parenchyma are placed to allow for better control of the breast shape as well as to maintain the desired shape for a longer period.

Many authors have described different techniques of dermal suspension and parenchymal sutures to the inferior pedicle [10]. The rationale is almost the same for all authors: parenchymal suspension and reshaping can be achieved using internal sutures.

In our study, some modifications were added. Initially, two lateral wings were designed from the skin that is discarded in the classic inferior pedicle design. Attempts to perform superior suspension of the breast parenchyma resulted in a superiorly directed NAC. The misdirected NAC resulted in an unnatural appearance as well as tension on the peri-areolar sutures during closure; hence, an apical dermal flap was designed and de-epithelialized from the skin superior to the NAC. This apical dermal flap was suspended to the pectoralis fascia.

Fenestration of the lateral dermal wings was used in cases when the suspension was too tight to minimize the incidence of collection (forming either a hematoma or seroma) beneath the pedicle that may jeopardize its blood supply.

Thinning of the superior skin flaps to reflect the proposed shape of the breast was also performed. This step is crucial to avoid boxing of the breast and to achieve better lateral breast contour and an esthetically pleasing breast.

Follow-up of the patients revealed that suspension of breast parenchyma and plication improved the esthetic results of the inferior pedicle breast reduction. In addition to the former advantage, long-term follow-up shows that the results of early postoperative outcomes can be maintained for longer periods.

One of the main drawbacks of this technique is its lengthy operative time. The time was consumed mainly in the extensive de-epithelization process of the dermal flaps and apical projection. The average added time for de-epithelization was 48 min. In cases where the SSN to NAC distance was greater than 40 cm, the design of the two lateral wings was limited and did not include all of the skin that was discarded.

Another drawback was that there was no apparent control for volume measurement; assessment of breast symmetry was performed by measuring the weight of excised breast tissue and visual assessment of the residual volume, i.e., relying on subjective not objective measurements.

The extent of pedicle plication was randomly defined. The placement of the superior stitch was randomly selected and depended upon the un-calculated volume. The placement of the medial and lateral stitches did not coincide with the footprint of the breast. The stitches were placed at a lower level than that of the superior stich according to the subjective visual assessment of the operator.

Lastly, the projection of the breast depended upon the retained volume rather than the desired projection (Fig. 6).

Conclusion

Suspension of the breast parenchyma and plication improve the esthetic results of the inferior pedicle breast reduction technique. In addition, the early postoperative outcome can be maintained for a longer period.

The addition of volumetric and geometric adjustment "preoperatively" may significantly improve the results as well as minimize the operative time needed to adjust the points of suspension and symmetry.

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Compliance with ethical standards

Ethical approval Ethical approval from a local ethics committee was obtained for this study.

Informed consent Written and verbal consent was obtained from the patients.

Conflict of interests Tarek Mahboub and Rama Ahmed declare that they have no conflict of interest.

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