28 Matrix Rotation Flaps Vertical Mastopexy Grisotti Flap

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28.1 Introduction

The selection of the proper oncoplastic technique depends on many factors. Some of which are related to the patient as well as the tumor, but the surgeon's preference remains a very important element in the decision-making. As the hair of the oncoplastic surgeon grows grey, the more grows the tendency for the simpler techniques that achieve the best oncologic and plastic result. In this chapter we are describing three simple techniques for tumors in three different locations.

28.2 Conclusion

According to the legendary breast surgeon Werner Audretsch, "Matrix rotation for tumors located in the upper inner quadrant of the breast is an important technique that should be mastered by all breast surgeons."

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28.3 Matrix Rotation Flaps

28.3.1 Upper Matrix Rotation Flap

One of the very challenging breast quadrants is the upper inner quadrant of the breast. The reason for that is the limited breast parenchyma present in this quadrant. Tumors arising in this quadrant are usually very near to the overlying skin and/or to the underlying pectoralis fascia.

Upper matrix rotation was initially described by Prof Werner Audretsch as a versatile modality for tumors lying in this limited breast parenchyma quadrant. Audretsch described this flap as the priority learning flap for any specialized breast surgeon [1].

The technique is simply based on excising the tumor in an inverted triangle fashion with the apex of the triangle directed towards the nipple-areola complex either touching the nipple-areola complex or away from it. A reverse burrowing equal base triangle with the overlying skin at the axillary tail area is also excised. The bases of the two triangles are then connected together by a horizontal line cutting through the skin and breast parenchyma reaching down to the pectoralis fascia.

The most important aspect of this technique is the meticulous preoperative drawing and measurement of the triangles. The triangles have to be of equal base size. The two sides of each triangle have to be the same but not necessarily equal to the sides of the other triangle. The connecting

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line between the two triangles must be at least the size of the triangle base (Fig. 28.1).

Upper matrix rotation allows excising the tumor completely with the overlying skin and the underlying deep fascia ensuring an adequate excision with excellent safety margins (Fig. 28.2).

The lateral flap is then dissected off the underlying pectoralis fascia till easy rotation is ensured. After proper flap elevation, the two angles of each triangle base will be sutured together (Fig. 28.3).

An advantage of this technique is that there is no recognizable breast volume change in spite of the large excisions as well as that the nipple-areola complex always remains at its same position since the nipple-areola complex acts as the center of rotation. There is no new position of the nipple-areola complex and contralateral nipple repositioning to ensure symmetry is not needed in this flap (Fig. 28.4).

Another advantage of this technique is the easy performance of the axillary lymph node dissection whether sentinel node biopsy or full dissection due to the big axillary access created by the excised tissue of the burrowing triangle.

The upper matrix rotation represents also a safe modality for corrective surgery for patients with upper inner quadrant tumors who were incompletely operated with clinically and radiologically evident residual cancer postoperatively. These patients require adequate excisions with the removal of all the operative bed including the previously performed incision site (Fig. 28.5).

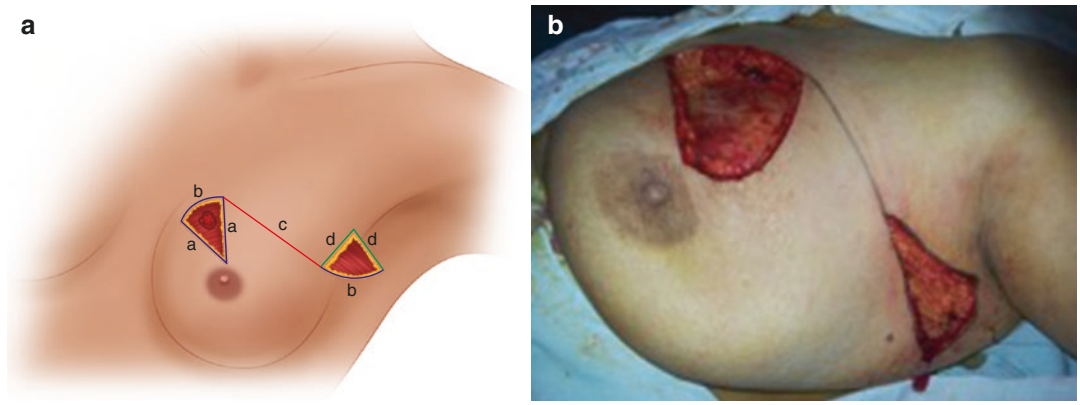

Fig. 28.1 (**a**, **b**) The measurements of the triangles and the connecting line in between

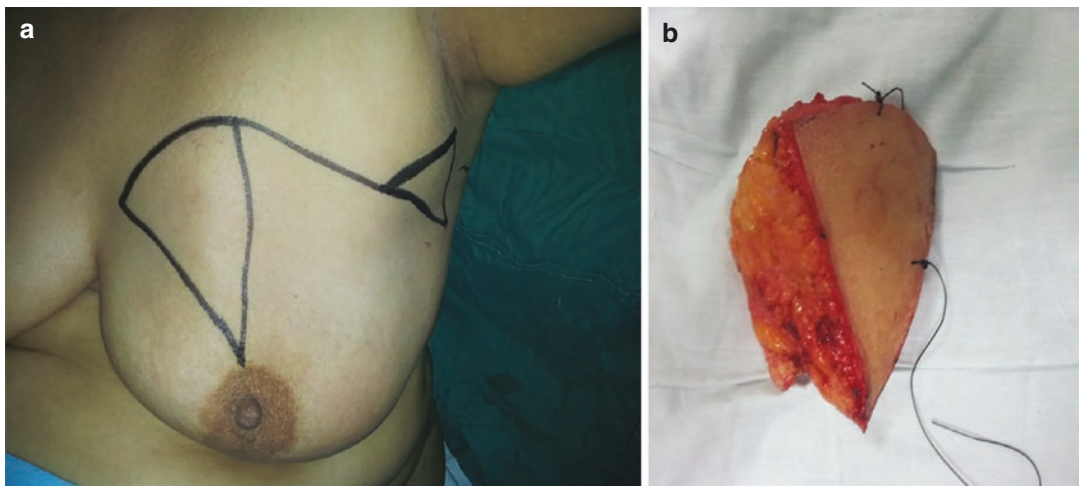

Fig. 28.2 (**a**, **b**) The preoperative marking and the specimen excised

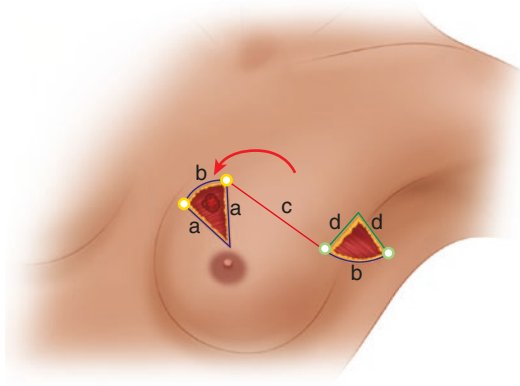

Fig. 28.3 The arc of rotation of the flap as well as the two angles of each triangle base that will be sutured together

Fig. 28.4 The equal level of the nipple-areola complex in patients performing upper matrix rotation

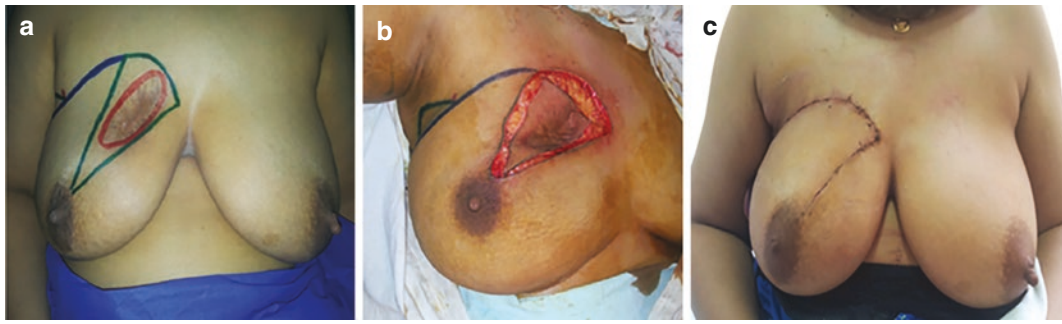

Fig. 28.5 (**a**–**c**) A patient who was improperly treated for an upper inner quadrant tumor with residual cancer. Matrix rotation represented a safe modality ensuring safe excision yet keeping similar looking breasts

Special considerations need to be put in mind when performing this technique. There are two important lines that need to be remembered when planning for upper matrix rotation, namely, the equator line and the danger zone line. The equator line is the line crossing the breast horizontally, and the danger zone line is a line drawn at 30° from the horizontal line.

As shown in Fig. 28.6, there are two very important triangles created by the crossing of the equator and danger zone lines. Upper matrix rotation should not be performed for tumors located in triangle A area since there is a high risk of ter-

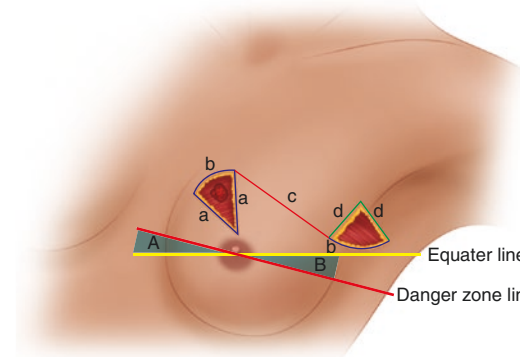

Fig. 28.6 The equator line and the danger zone line

minal flap necrosis due to excessive rotation. The flap elevation till the equator line is usually sufficient to ensure easy flap rotation, yet in some patients flap dissection could safely be extended to include the triangle B area but not crossing the danger zone line; otherwise, terminal flap necrosis could occur. In other words, going inferior to the danger zone line either by rotation or elevation of the flap is risky.

The upper matrix rotation is a very safe flap, yet the proper selection of patients is mandatory to ensure adequate results. Like all other flaps, care should be specially given to patients who have a high risk of complications like diabetes and smoking. In a series of more than 150 cases performed over the past years, only one patient suffered distal flap loss that required mastectomy in order not to delay postoperative adjuvant therapy. This patient was a poorly controlled diabetic (Fig. 28.7).

28.3.2 Lower Matrix Rotation Flap

Tumors located in the lower inner quadrant of the breast in patients with ptotic breasts have several surgical options like the therapeutic reduction mammoplasty modality, yet this technique requires a contralateral symmetry procedure to be performed either immediately or delayed. The lower matrix rotation is a surgical option that ensures the same therapeutic efficacy like the therapeutic reduction mammoplasty, yet does not require any contralateral symmetry procedure to be performed.

The technique is simply based on excising the tumor in a triangle fashion with the apex directed towards the nipple-areola complex. This is followed by incising the inframammary fold till the fascia and extending the incision towards the axilla. The flap is then adequately raised till ensuring adequate rotation of the lower breast parenchyma to completely cover the defect and reach the medial aspect of the tumor triangle (Fig. 28.8).

The lower matrix rotation is a simple and safe technique ensuring adequate excision of the tumor with the overlying skin and down to the fascia. Like the upper matrix rotation flap, the rotation is centered around the nipple-areola complex, so there is no change in the position of the nipple-areola complex; plus there is no recognizable change in breast volume compared to the contralateral breast; hence, no contralateral symmetry procedure will be needed when using this technique.

Similar to the upper matrix rotation, meticulous preoperative drawing and measurements are a prerequisite to ensure optimum result.

This technique ensures safe excision especially in redo surgery, and similar to the upper matrix technique, it allows great exposure to the axilla allowing easy axillary surgery that is due to the fact that the breast is opened like a book. An advantage to this technique over the upper matrix rotation is limited scarring since the big part of the incision is being performed in the hidden inframammary fold (Fig. 28.9).

Fig. 28.7 (**a**–**c**) A diabetic patient with distal flap loss requiring mastectomy

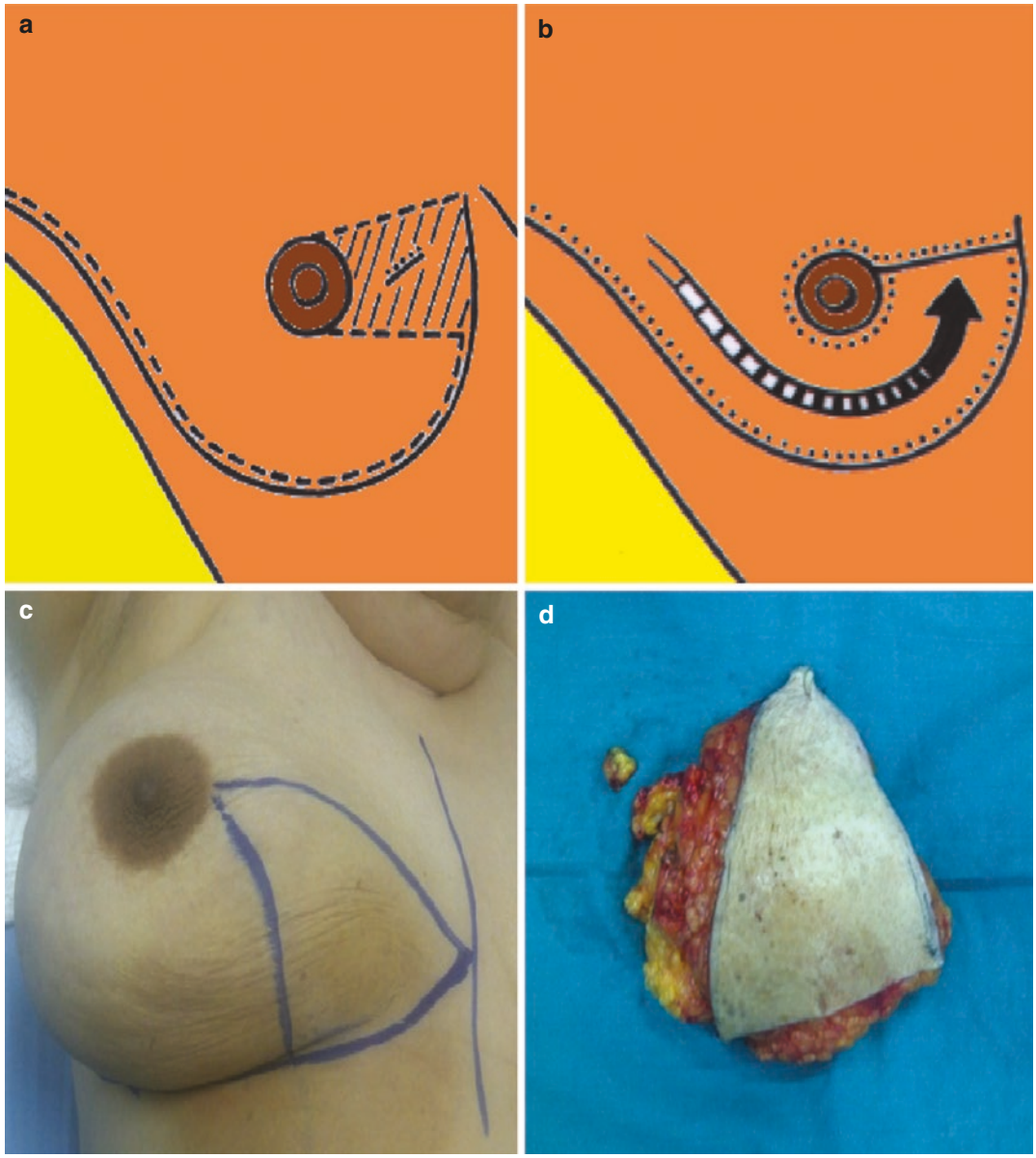

Fig. 28.8 (**a**–**d**) The concept of the lower matrix rotation flap

28.4 Vertical Mastopexy

All vertical mastopexy techniques are variations of the vertical reduction mammoplasty technique. Incisions are closed around the areola and inferiorly toward the inframammary fold. The techniques rely on parenchymal support inferiorly to narrow and cone the breast and can be applied to patients with all degrees of ptosis (Fig. 28.10).

Madeleine Lejour derived her variation of the vertical scar technique by modifying concepts from Lassus, Marchac, Arie, and Pitanguy. This

Fig. 28.9 (**a**–**i**) All the steps of lower matrix rotation

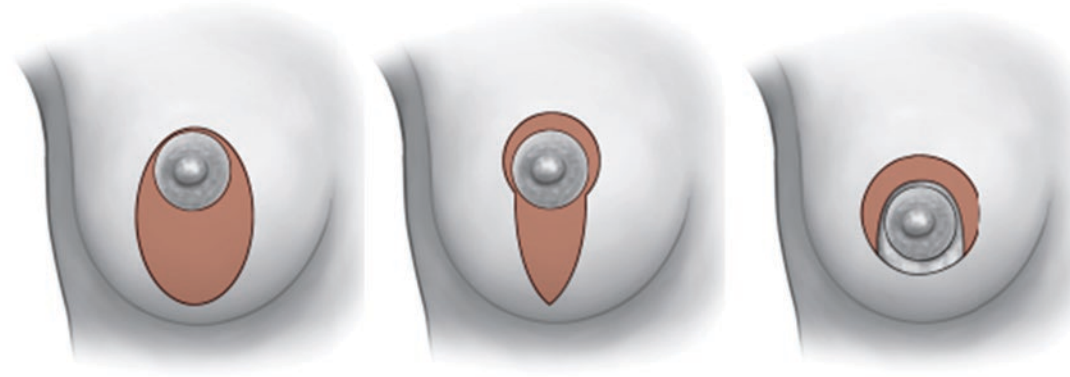

Fig. 28.10 Vertical scar mastopexy techniques of Lassus (left), Lejour (center), and Hammond (right) (reproduced with permissions from Farah Fouad Thakeb)

technique uses adjustable markings, a superior pedicle for the areola, and central pedicle reduction when necessary, with lower pole skin undermining. Lejour's modifications can be described by the following three principles: wide lower pole skin undermining to promote skin retraction and to reduce the amount of scarring and overcorrection of the deformity to promote better late results. The Lejour technique can be used either as a reduction technique or as a mastopexy technique; therefore, it is applicable to many breast sizes and skin qualities [2–4].

The superior pedicle pattern was thought to put at risk the sensation of the nipple-areola complex because of the belief that it transected the lateral branches of the fourth intercostal nerve. The sensory branches to the nipple-areola complex are now known to run deep at the level of the chest wall and perforate superficially through the breast parenchyma to reach to the nipple-areola complex. For this reason, keeping parenchymatous resections just above the level of the chest wall preserves the nerve supply to the nipple-areola complex and, thus, its sensation.

Another reason for which this pattern of parenchyma resection was not widely approved was the thinking that the vascular pedicle may get kinked or compressed while folding the dermoglandular portion of the breast over to inset the areola up on its new location. Currently, good evidence exists supporting the knowledge that the breast is adequately supplied by the superior dermoglandular pedicle that results as a consequence of this pattern of parenchyma resection. This pattern of resection preserves the area that is less prone to undergo further ptosis secondary to downward pulling action of gravity, as well as maintaining fullness in the upper pole of the breast [5].

28.5 Surgical Technique

- Liposuction is performed in larger breasts to reduce parenchymal volume and mobilize superior dermal-parenchymal pedicle.
- Inferior skin, fat, and gland are resected.
- Wide undermining is performed, and medial and lateral breast pillars are closed inferiorly.
- The skin is closed in a single vertical line; the redundant skin remains as fine wrinkles between inferior sutures (Fig. 28.11).

28.6 Application of This Technique in Breast Cancer Patients as a Breast Conservative Surgery

- This technique is used basically for tumors at 5–7 o'clock in non-ptotic breasts of medium size.
- Tumors located in the superior pole require modifying the NAC pedicle, so this technique is contraindicated to be performed.

28.7 Preoperative Markings

- The midline and inframammary folds are marked.
- The transposed location of the inframammary fold is marked on the breast anteriorly, as is the breast meridian. The breast is then manually distracted laterally and then medially to estimate and mark the medial and lateral vertical limbs, respectively.
- The cephalic extents of these vertical limbs will become the bottom of the new areola. Often the vertical limbs can be manually approximated to simulate the mastopexy. The upper curved line represents the new areola boundary and is usually 12–14 cm in length.

28.8 Step-by-Step Surgical Demonstration

- The breast parenchyma and incision lines are injected with 20–40 mL lidocaine and dilute epinephrine. The pedicle epidermis that surrounds the areola is de-epithelialized to a point 2–3 cm below the areola. Because the pillars provide long-term support for the reduced breast, they must be left intact for suturing [6].

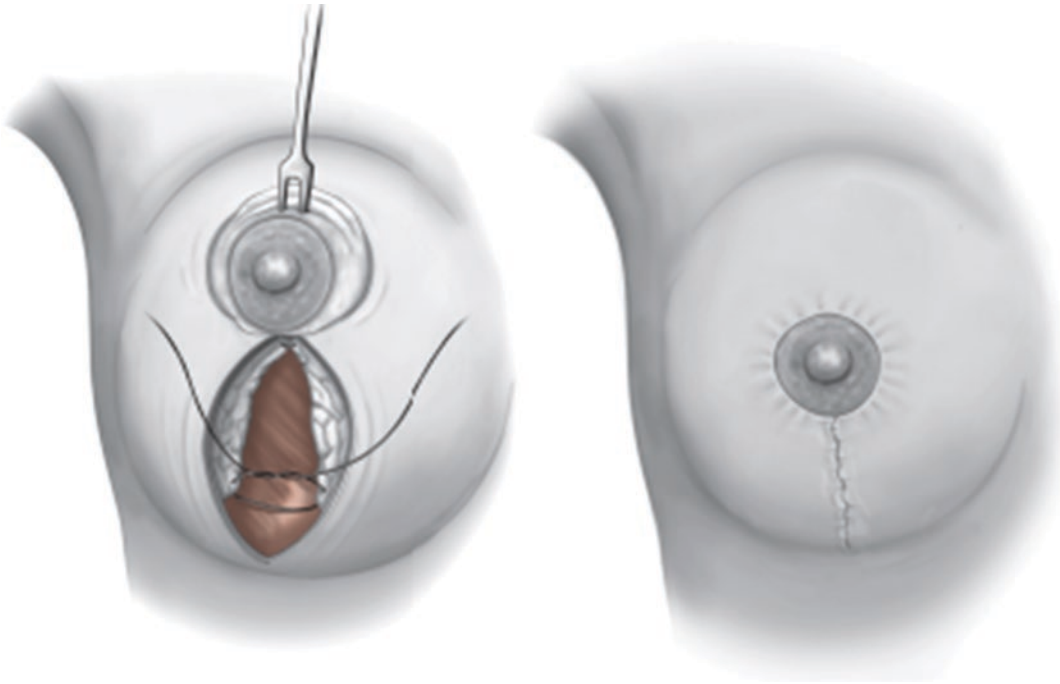

Fig. 28.11 Vertical mastopexy without undermining. Inferior skin, fat, and gland are resected en bloc. The nipple is transposed to the desired position, followed by vertical closure of the medial and lateral breast pillars (reproduced with permissions from Farah Fouad Thakeb)

- Next, the medial, lower, and lateral segments of the breast are resected, with undermining of the skin below the lower curved marking.
- Incisions are made along the lateral breast markings, and wide skin undermining is performed medially, laterally, and inferiorly to the level of the IMF in a plane similar to that in a subcutaneous mastectomy.
- Superficial dissection at a uniform depth allows skin redraping and contraction postoperatively. If the undermining is performed at a deeper plane, an abnormal lower breast bulge may result.
- No undermining is performed outside the periareolar markings. The lower central segment of the breast is elevated off the chest wall from the IMF to the upper margin of the gland, creating a 6–8 cm central tunnel. Vertical cuts are made in accordance with the degree of the desired reduction, creating the new medial and lateral pillars.
- A 2–3-cm-thick superior dermoglandular pedicle is elevated, completing resection of the lower central segment. A single absorbable suture elevates the nipple to its new position. The suture begins at the level of the future areola on the deep surface of the pedicle and is sewn to the pectoralis fascia and muscle at the highest level of chest wall dissection. It is important to secure this suture to the deep aspect of the pedicle and not to the dermis to allow for some degree of mobility of the NAC for ease of final transposition, inset, and skin closure.
- The medial and lateral aspects of the pedicle are sutured to the chest wall, creating a conical underlying breast mound. Although the skin flaps may appear excessive, no further resection is performed. Rather, the skin flaps are gathered and closed in two layers. Sufficient skin gathering must be performed with this vertical suturing to reduce the closure length to 6–7 cm. A longer closure length must be avoided, as this can result in final scar extension below the IMF.
- The NAC is inset, and the pillars are approximated with absorbable suture. The skin is

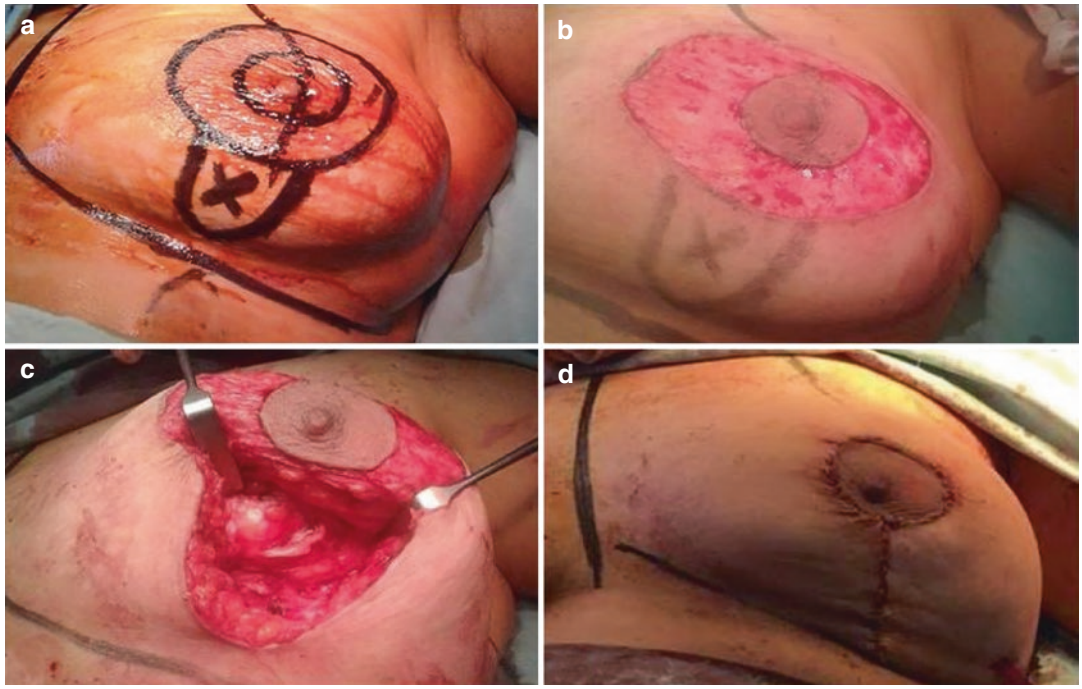

Fig. 28.12 Intraoperative resection for a lower pole tumor with creating a superior pedicle for NAC elevation and preservation of both medial and lateral pillars for closure

closed in two layers with dermal and subcuticular sutures. Although it is ultimately the surgeon's preference, drains can be avoided. Current evidence suggests that the incidence of seroma and wound complications in breast reduction patients is the same with and without drains (Fig. 28.12).

Advantages of the Technique

- Limited vertical scar is achieved without horizontal inframammary fold incision.
- Inferior parenchymal closure provides additional support to limit recurrent ptosis.

Disadvantages

- Immediate postoperative result often displays pronounced upper pole fullness that settles over time.
- Inferior skin redundancy occasionally does not retract, requiring horizontal excision later.

28.9 Modifications and Pitfalls

- To limit redundancy in inferior pole skin, the vertical closure is brought obliquely laterally (creating a J shape). This eliminates excessive inferior skin redundancy and prevents a medial horizontal scar.
- Patients with macromastia and tumors not located in the superior medial pole of the breast were considered candidates for an oncoplastic breast reduction technique using the vertical scar superior-medial pedicle pattern for immediate reconstruction. This pattern is a versatile oncoplastic technique that allows breast tissue rearrangement for various tumor locations (inferior, lateral poles and NAC). It is oncologically beneficial and is associated with high patient satisfaction (Figs. 28.13 and 28.14) [7].

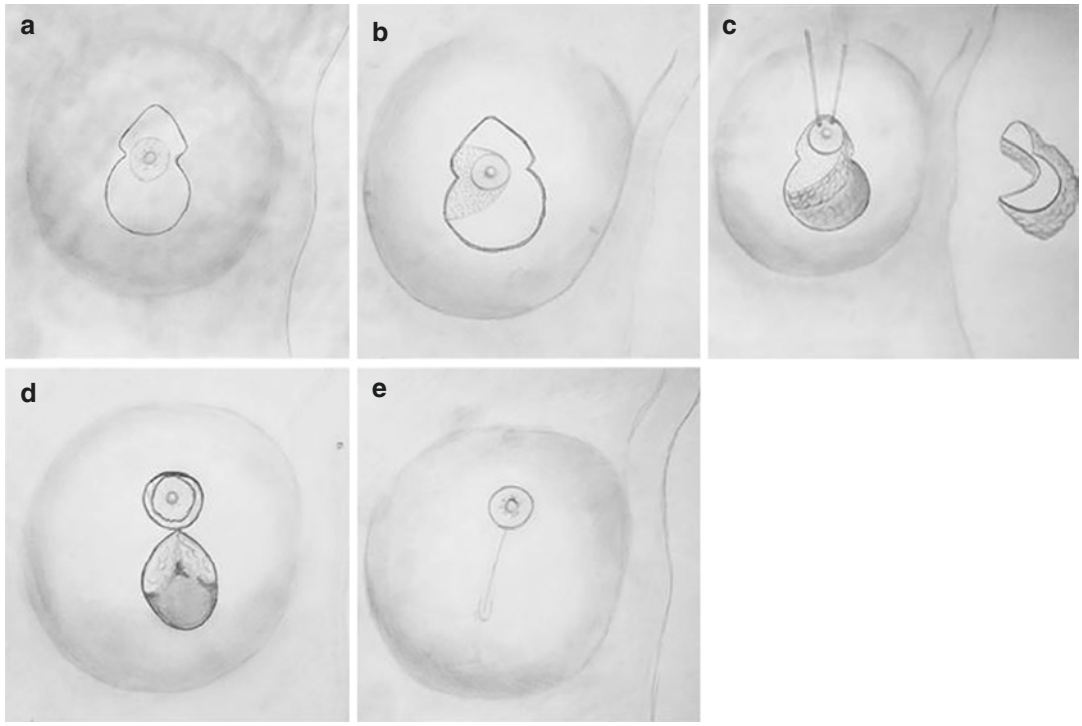

Fig. 28.13 The superior medial modification for the technique for various tumor locations (courtesy of Dr. Ahmed Mustafa)

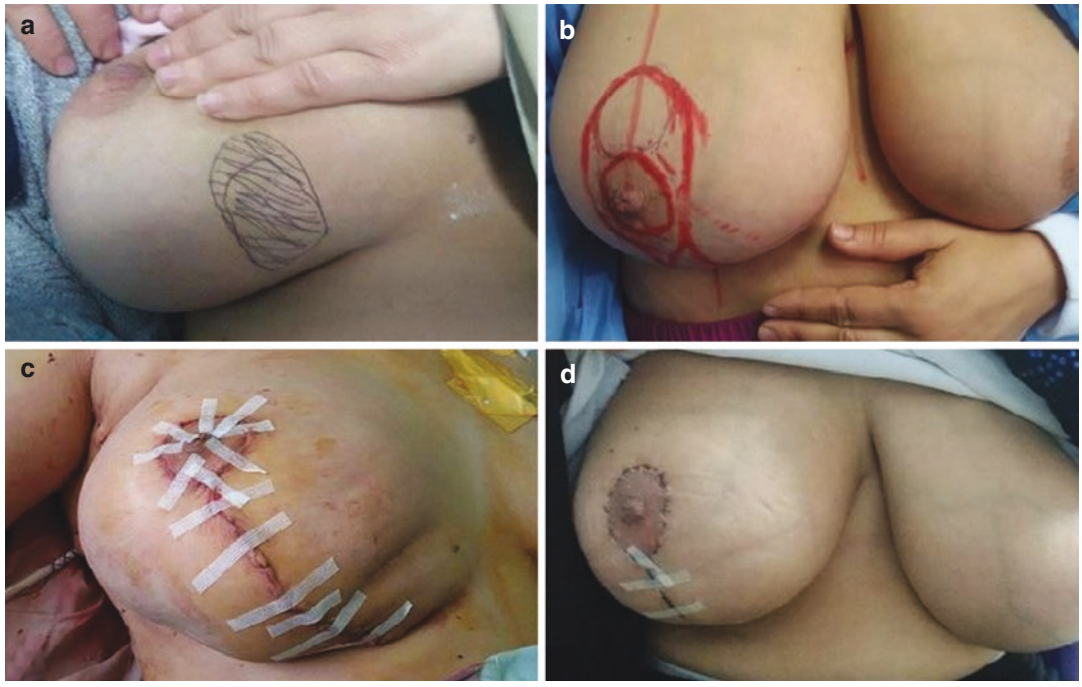

Fig. 28.14 The versatility of the technique in managing lower pole breast cancer patients

28.10 Grisotti Technique

Patients with centrally located breast cancer account for 5–20% of breast cancer cases, and, for a long time, they have been denied breast conservation surgery (BCS) and instead been conventionally treated with mastectomy.

This technique allows conservative treatment for retroareolar tumors or in Paget disease, with oncologic safety and excellent cosmetic results

In centrally located breast cancer, there is a high incidence of NAC involvement associated with these tumors that necessitates nipple and areola resection together with an adequate safety margin around the tumor. Acceptable cosmetic results and oncological control can be obtained by a relatively simple procedure which is the Grisotti flap (Fig. 28.15) [8].

The procedure starts by the preoperative marking of the areola outline, another 4 cm circle is drawn just below the NAC, and also the inframammary fold is marked. The medial and lateral borders of the flap are drawn extending from the medial and lateral margins of the areolar down to the inframammary fold and converging distally to give a comma-shaped appearance (Fig. 28.16).

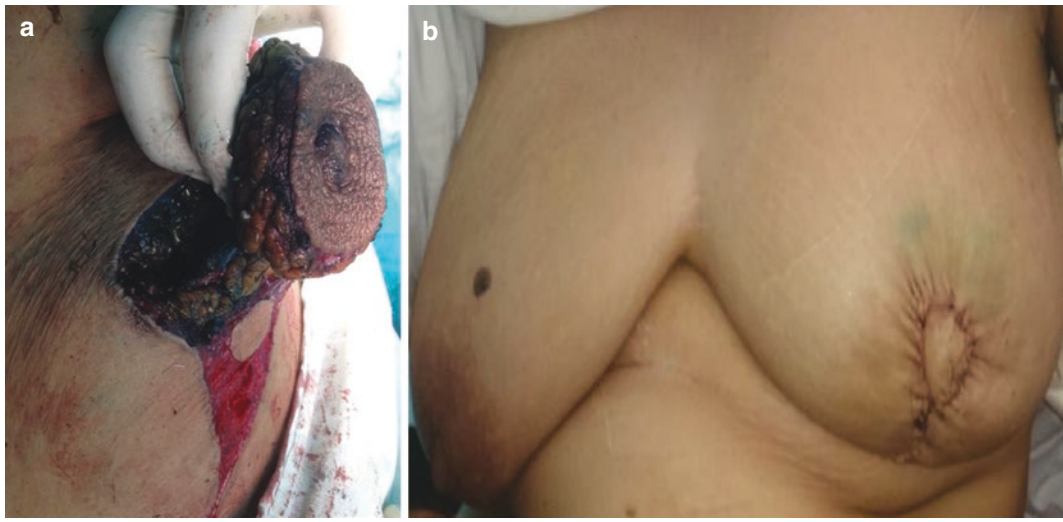

Fig. 28.15 (**a**, **b**) The basic concept of the Grisotti flap for centrally located tumors. (**a**) Tumor excision with NAC. (**b**) Final appearance with the new areola

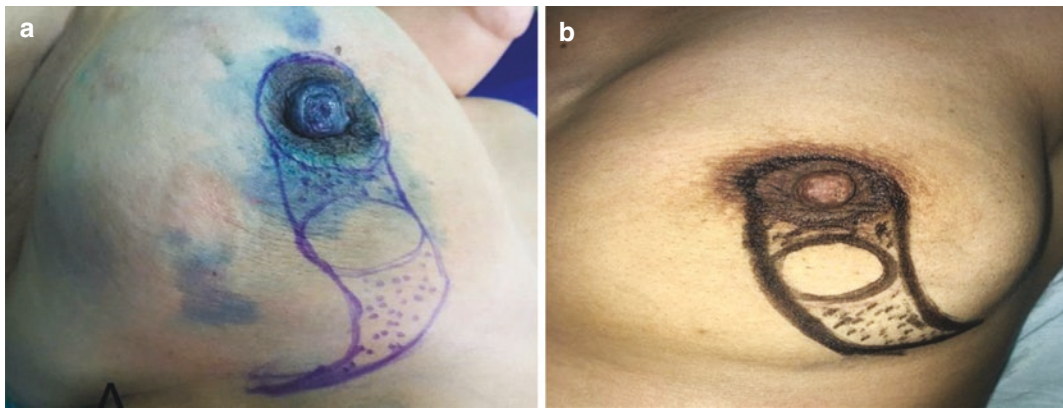

Fig. 28.16 (**a**, **b**) The drawing and planning for the excision of a centrally located tumor in two patients (patient A, right breast) and (patient B, left breast)

Then complete de-epithelialization of the flap (except the new areola) will be done (Fig. 28.17).

Central quadrantectomy including NAC and tumor with a column of tissue from the subcutaneous layer down to the pectoral fascia will be done (Fig. 28.18) [9].

Mobilization of the flap will be done using one of the following techniques:

1. The medial margin of the flap will be incised down to the pectoral fascia with wide mobilization of the flap from the pectoral fascia; then, the flap will be advanced and rotated to fill the defect.
2. The dermis of the medial and lateral margins of the flap will be released to the required extent but keeping its base on the pectoral fascia intact to preserve blood supply. This technique gives

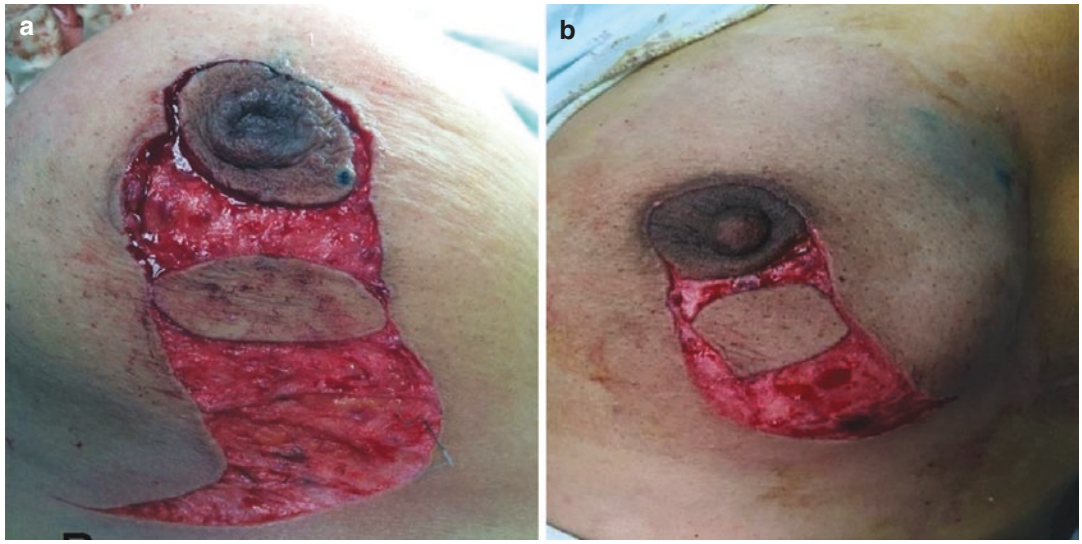

Fig. 28.17 The de-epithelization done for the same patients (patients A and B)

Fig. 28.18 The cavity created after excising the tumor with the overlying NAC in the same two patients (patients A and B)

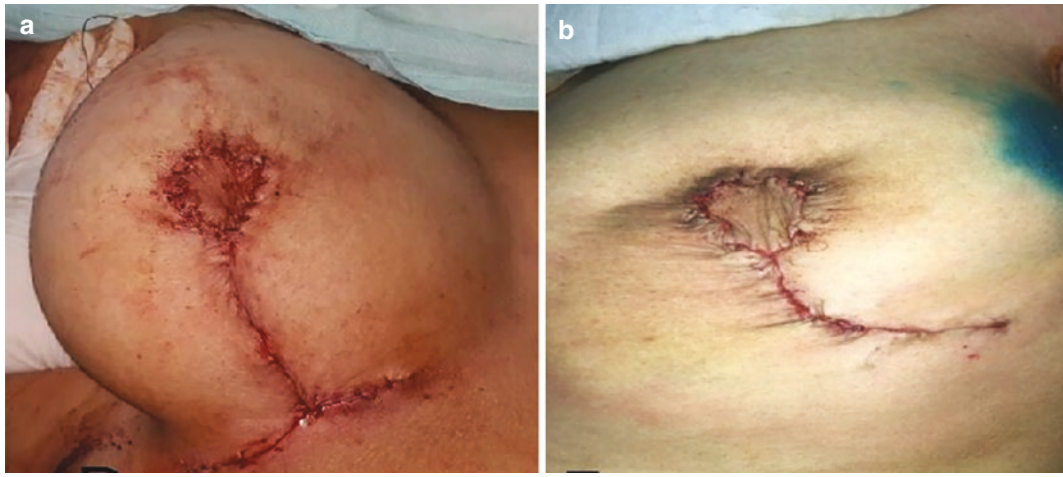

Fig. 28.19 The final appearance and the creation of the new areola for the same two patients (patients A and B)

better mobility of the flap, and the new areola rests comfortably in its new position without comma-shaped deformity (Fig. 28.19).

28.11 Grisotti Flap with "E/3" Modification

With a conventional Grisotti flap, the new areolar disk of skin is initially anchored in the 12 o'clock position following correct orientation after transposition of the dermal glandular pedicle. Further sutures are placed in the 3 and 9 o'clock positions to gradually approximate the breast skin envelop around the new areolar disk of skin. A final suture must be placed at 6 o'clock at the point where the areola meets the vertical limb of the suture line. This can sometimes be associated with tension upon the tissues which can lead to wound dehiscence and a poor cosmetic result.

To overcome this problem, a small triangle of skin can be preserved at the superomedial extremity of the dermal glandular flap. This results in an upper medial skin edge shaped like a figure "3" when the operation is on the right side and an "E"-shaped outline when on the left. This modification helps to reduce skin tension at the point of final skin closure. This triangle of skin can be trimmed as necessary to provide optimum apposition and cosmesis (Fig. 28.20) [10].

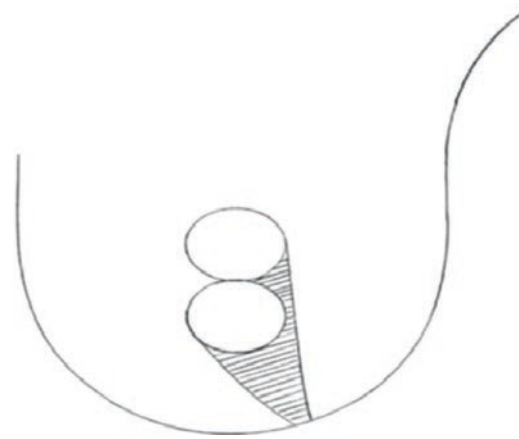

Fig. 28.20 The Grisotti flap modification

Tips and Tricks

Careful selection of the proper technique for each patient remains the most important and challenging step in the patient management. The preoperative patient and tumor evaluation together with meticulous planning are mandatory in order to achieve the best possible oncologic and plastic result.

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