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ORIGINAL ARTICLE
Breast

Superior Pedicle Inverted T-reduction Mammaplasty with Short Horizontal Scar

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Background: Superior pedicle breast reduction is a very popular technique among plastic surgeons. This technique has had many variations looking for fewer complications and better long-lasting results. The aim of this article is to present a novel technique of breast reduction, making variations in the design of the periareolar incision, using a superior pedicle with a constant vertical incision of 5 cm and a shortened horizontal incision.

Methods: The superior pedicle inverted T-mammoplasty with a shortened horizontal scar technique was performed in 1200 patients who underwent surgery between 2010 and 2023; follow-up examination was carried out for an average of 1 year (3 months to 3 years). A patient satisfaction survey was conducted.

Results: Patient satisfaction rate was 99%. There were no cases of total necrosis of the areola–nipple complex, 2.7% of the patients presented partial necrosis of the areola–nipple complex, 1.4% of the patients presented local infection, 1.7% presented dehiscence at some point of the vertical or horizontal suture, 4% of the patients presented a widened scar, 8% of the patients presented alteration in the sensibility of the areola–nipple complex, and 0.6% of the patients presented hematoma. With this technique, a rise of the areola–nipple complex of up to 22cm was achieved.

Conclusions: The superior pedicle inverted T-mammaplasty with shortened horizontal scar technique showed a lower number of surgical complications compared with other techniques previously used for breast reduction, even when applied in gigantomasty. It provides lasting results and a high rate of patient satisfaction.
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INTRODUCTION

The breast is a symbol of femininity and sexuality; therefore, any surgery performed in this anatomical area should not only aim to alleviate the symptoms associated with breast hypertrophy, but also seek an aesthetic and harmonious result.

Breast reduction is one of the most frequently performed procedures worldwide, with the aim of enhancing breast shape, correcting breast ptosis, and reducing breast volume (reducing symptoms associated with heavy breasts), while keeping the nipple–areola complex (NAC) viable, as functional as possible, and sensate.[1,2]

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Throughout history, the contributions of the pioneers of breast reduction surgery, such as Morestin (1907), Schwartzmann (1930), Maliniac (1953), Wise (1956), Arie (1957), Strombeck (1960), Pitanguy (1962), Regnault (1974), Peixoto (1980), Lassus (1987), and Bozzola (1990), among others, have allowed plastic surgeons today to perform different techniques to obtain good results and reduce the size of scars as much as possible.[3–16]

Breast surgery has had many variations, always looking for a breast with adequate volume for the patient's body and an ideal shape, which implies adequate proportions between the upper pole and lower pole ratio (45:55), nipple angulation (20 degrees pointing upward), straight or mildly concave upper pole slope, and lower pole convexity.[17,18] The purpose of this article was to present an innovative marking of the superior pedicle reduction mammoplasty, which consists of a wide dome marking, and as result, a short horizontal scar, allowing large NAC lifts, with the advantage of a low

Disclosure statements are at the end of this article, following the correspondence information.

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rate of NAC necrosis and obtaining satisfactory aesthetic results with a high rate of satisfaction.

MATERIALS AND METHODS

This is an observational study, based on a series of cases operated on by the authors, describing the technical aspects of the procedure to be performed, the execution, and the postoperative management after performing superior pedicle inverted T-reduction mammoplasty with a shortened horizontal scar. There are no sources of funding or conflicts of interest in the development of this study.

We analyzed the results of 1200 patients with breast hypertrophy and ptosis of up to 42 cm from the midclavicular line to the nipple and nipple inframammary fold distance up to 23 cm, who underwent surgery in Barranquilla, Colombia, between October 2010 and June 2023, with ages ranging from 16 to 73 years and an average of 32 years, and reviewed their body mass index, medical history, and comorbidities (Table 1).

Preoperative Markings

The marking is shown and detailed in Video 1 [**See Video 1 (online),** which shows a 38-year-old patient with Regnault grade III ptosis.]

- Patient in standing position:

1. Mid-body line: extending from the most caudal point of the suprasternal notch to the umbilicus.
2. A vertical line is drawn from the midclavicular line to the nipple.
3. A vertical abdominal line is determined between 9 and 14 cm from the midline, depending on the patient's thorax and abdomen.
4. The new location of the NAC is defined using the Pitanguy maneuver. This is marked as point A, and the superior margin of the NAC is defined, on average, between 18 and 20 cm from the midclavicular line.
5. A horizontal line (line B) is drawn perpendicular to the midline of the breast, at a variable distance between 3 and 8 cm cephalic to the nipple, from which points B1 and B2 are determined, which are the upper points of the vertical incisions (Fig. 1). The exact position of line B depends on the NAC lift (Table 2).
6. The vertical lines are marked by tilting the breast laterally and medially, and a prolongation of the abdominal vertical line is made, with a constant length of 5 cm, starting from points B1 and B2.
7. A point called C is marked, which corresponds to the middle between points A and B and at a distance of 7–9 cm from the midline, which corresponds to the internal border of the dome. The two cephalic points (B1 and B2) of the vertical lines that form a dome are digitally joined by passing through points A and C.

- Patient in supine position:

8. The inframammary fold is marked.
9. The position of the medial vertical lines is verified with the lateral tilt of the breast in a natural manner; they should be aligned with the abdominal line.

Takeaways

Question: Is it possible to perform large ascents of the nipple–areola complex (NAC) safely using a superior pedicle, with reproducible and satisfactory results?

Findings: We performed 1200 reduction mammaplasties using the superior pedicle inverted-T mammaplasty with the short horizontal scar technique, demonstrating that it is possible to perform large ascents of the nipple–areola complex using a superior pedicle, up to 22 cm, without compromising its vascularity, and have a very high index of patient satisfaction.

Meaning: Maintaining a wide vascular pedicle in the case of the superior pedicle by marking an extensive domus allows for large lifts of the nipple–areola complex to be performed safely.

Table 1. Distribution of Patients by Age, Related Medical History in Each Group, and Body Mass Index

Age (y)	Medical History	No. Patients		Percentage (%)
16–26	Arterial hypertension	2	163	13.6
	Diabetes	1		
	Active smoking	10		
27–36	Arterial hypertension	9	905	75.4
	Diabetes	4		
	Active smoking	24		
37–46	Arterial hypertension	2	70	5.8
	Diabetes	2		
	Active smoking	3		
>46	Arterial hypertension	12	62	5.2
	Diabetes	6		
	Active smoking	1		
	Total		1200	100
BMI	Between 30 and 35	756		63
	Between 25 and 29.9	392		32.7
	Less than 25	52		4.3

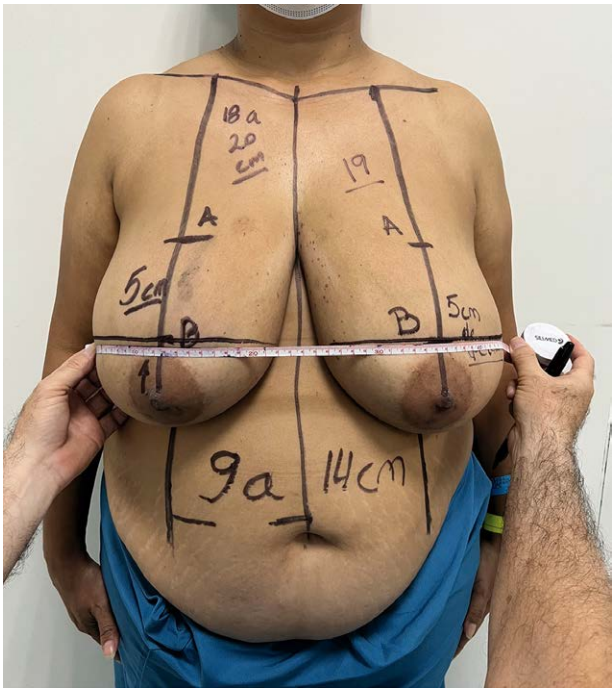

Fig. 1. Marking of line B at a variable distance between 3 and 8 cm from the nipple. This is the starting point of the vertical lines.

Fig. 2. Dissection of the flap. Lateral view.

Table 2. Location of Line B Marking in Relation to the Lift of the Nipple–Areola Complex

Position of Line B	
Lift of the Nipple–Areola Complex	**Distance between the Nipple and Line B**
>18 cm	B-line marking 8 cm cephalic to the nipple
15–17 cm	B-line marking 7 cm cephalic to the nipple
12–14 cm	B-line marking 6 cm cephalic to the nipple
10–11 cm	B-line marking 5 cm cephalic to the nipple
9–10 cm	B-line marking 4 cm cephalic to the nipple
<9 cm	B-line marking 3 cm cephalic to the nipple

10. From the vertical lines, a spindle marking is made, joining the lower points of the vertical lines with the inframammary fold.
11. The area to be de-epithelialized is demarcated for the superior pedicle flap.

Surgical Procedure

All patients underwent surgery under general anesthesia, and the surgical procedure is detailed in Video 2. [**See Video 2 (online),** which shows the same patient in Video 1 undergoing reduction mammoplasty with a superior pedicle and short horizontal scar.]

1. Scalpel incisions are made up to the dermis of all the demarcated lines.
2. De-epithelialization of the superior pedicle flap is performed, extending 1–3 cm below the caudal end of the neo-areola.
3. The dissection of the superior flap is performed with a thickness of approximately 1.5–3 cm, the lifting of which is done from caudal to 2–4 cm cephalic of the points B1 and B2, and from there continues the dissection in depth up to the pectoralis major fascia, forming a resection keel in the superior pole (Fig. 2).
4. The marked vertical and horizontal incisions are dissected up to the pectoralis major fascia, and the breast tissue is resected.
5. Two stitches are made for the glandular conformation. The NAC is carried to point A, and a second stitch is made between B1 and B2, representing

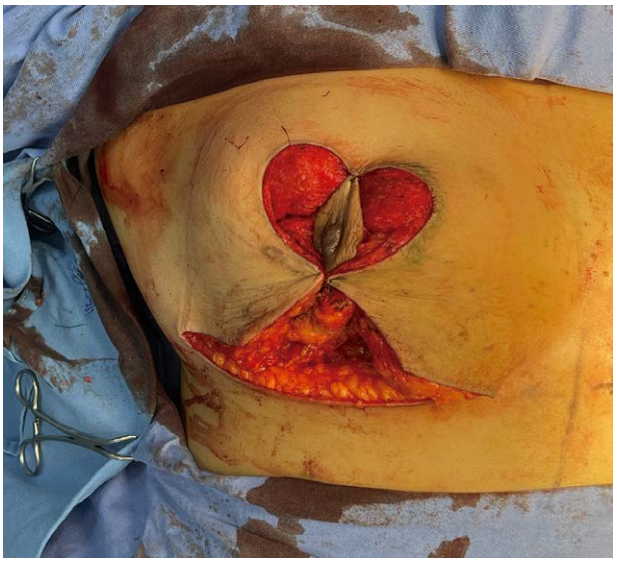

Fig. 3. Nylon 2.0 stitch from the upper edge of the areola to point A and another stitch from point B1 to point B2.

the circumference of the new areola with nylon 2.0 (Fig. 3).

6. An intradermal periareolar suture (round block) is made to establish a new diameter for the areola, and an intradermal suture of the areolar skin is made with nylon 2.0.
7. Subsequently, for the centralization of the glandular tissue, a stitch with polyglactin 1.0 is made from the lateral flap to the lateral border of the pectoralis major muscle to centralize the breast and provide greater projection.
8. Closure by plane is performed with polyglactin 2.0, and intradermal cutaneous suture with nylon 2.0. Subsequently, interrupted stitches are made with 4/0 nylon, and a 1/4 hemovac drain is placed.

Postsurgical Care

At the end of the procedure, nitrofurazone gauze was placed over the wounds, and antiallergic adhesive tape was placed over the lower pole to provide support to the sutures. A sports bra was placed over the breast without underwire, preferably with a front closure. After 6 hours, the viability of the NAC was evaluated, hematoma development was ruled out, the patient was discharged, and the drain was removed according to its production (30 mL or less/day). The sutures were removed 20 days after the procedure.

The patients were monitored monthly for the next 3 months and then annually for up to 3 years. The average follow-up was 1 year because some patients did not return for consultation. Three patients who underwent

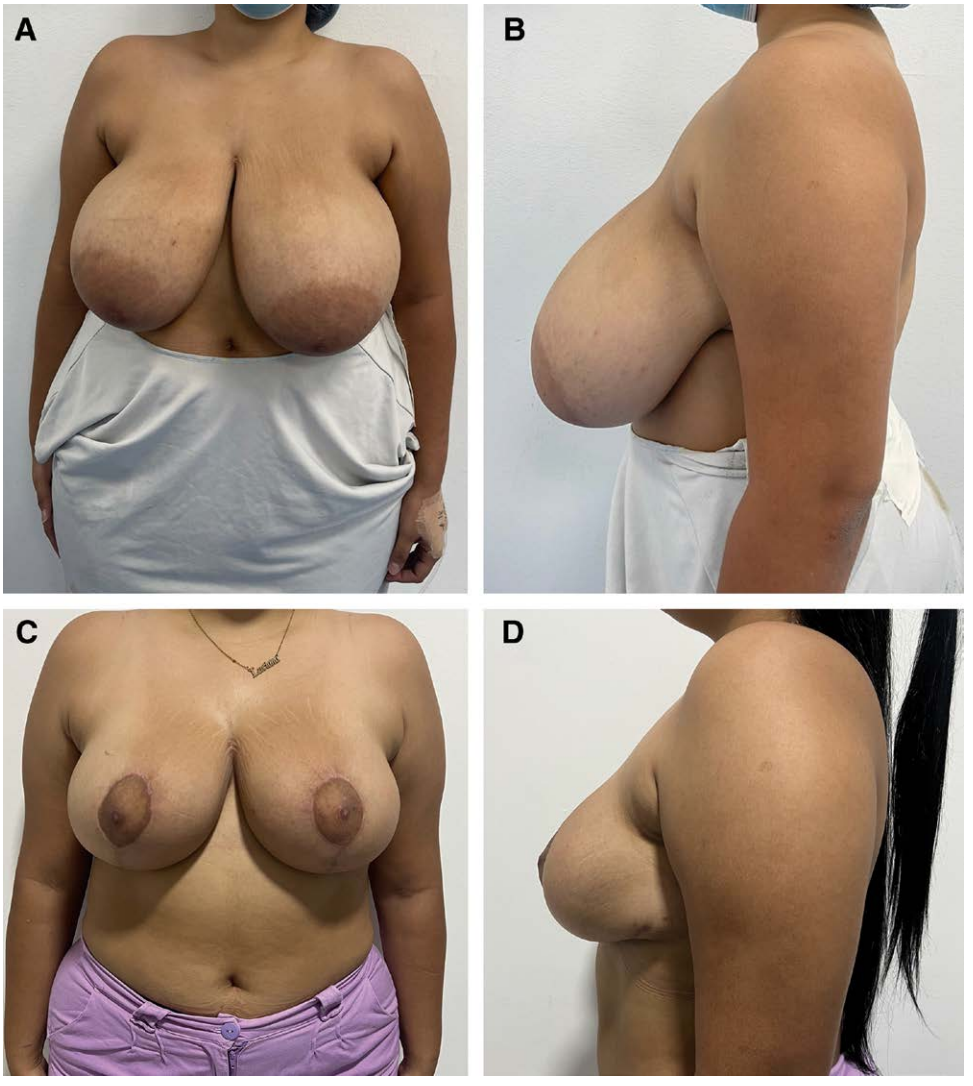

Fig. 4. A 38 year old patient, with SSN-to-nipple distance of 39 and 42 cm right and left, respectively. Repositioning of the nipple at 20 cm. Nipple lift: 19 cm and 22 cm, respectively. Resection weight was 1020 g and 1230 g for the right and left breasts, respectively. Preoperative anterior (A), and left lateral (B). Postoperative anterior (C), and left lateral (D) view at 9 months showing breast symmetry. Note the nipple pointing upwards 15 degrees as well as the central projection of the breast, the satisfactory upper pole fullness, and the lower pole convexity.

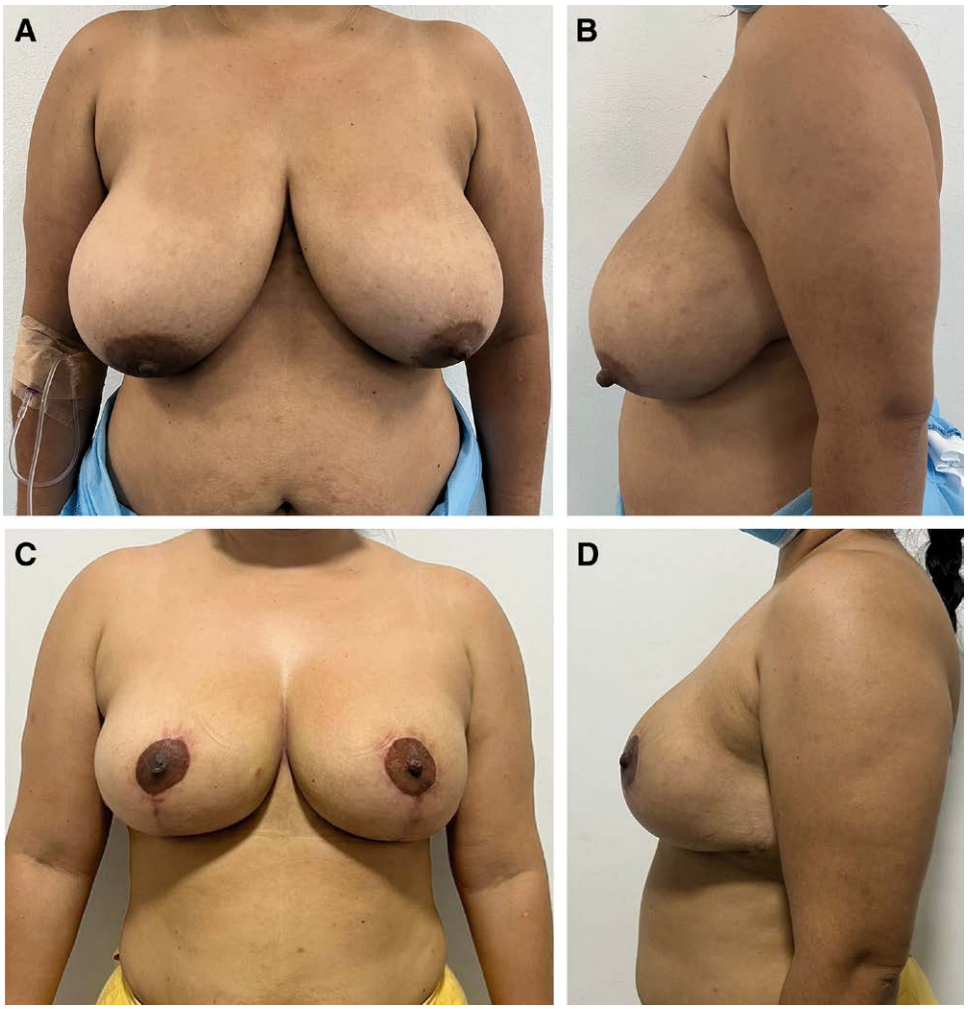

Fig. 5. A 33-year-old patient with a SSN-to-nipple distance of 35 and 34 cm right and left, respectively. Repositioning of the nipple at 20 cm. Nipple lift: 15 cm and 14 cm, respectively. Resection weight was 510 g and 480 g for the right and left breasts, respectively. Preoperative anterior (A), and left lateral (B) view. Postoperative anterior (C), and left lateral view (D) at 10 months showing breast symmetry. Note the short horizontal scars, as well as the straight upper pole, lower pole convexity, and the nipple pointing upward 10 degrees.

surgery were randomly selected for photographic follow-up (Figs. 4–6).

Ethical Considerations

All patients provided informed consent for the procedure, including authorization for the use of photographs for research purposes. The study adhered to the principles of the Declaration of Helsinki, local guidelines, and protocols for human subjects. The study was approved by the ethics committee at each of the participating plastic surgery centers.

RESULTS

We analyzed the results of 1200 patients who underwent surgery between October 2010 and June 2023. Their ages ranged from 16 to 73 years, with an average of 32 years, and the average time of surgery was 2 hours 30 minutes, varying between 1 hour and 30 minutes to 3 hours of surgery. In total, 372 patients (31%) presented with severe breast hypertrophy or gigantomasty according to Berrocal Revueltas classification[19] (Table 3). Thirty-two patients (2.7%) presented partial necrosis of the NAC, as shown in Table 3. The higher the degree of breast hypertrophy, the higher the incidence of necrosis of the NAC; all healed by second intention with wound dressings. There were 17 cases (1.4%) of surgical infection, of which only one had breast abscess formation, requiring in-hospital management with antibiotic therapy and drainage of the abscess with divulsion with forceps without removing the sutures. Twenty cases (1.7%) had wound dehiscence, seven patients (0.6%) presented hematoma, and seven patients (0.6%) had widening of the areola after round block breakage (Table 4).

In the remaining patients, the scar had a normal behavior, becoming hyperchromic in the initial months and adopting its normal color approximately 6 months after the surgery, presenting widened scars in 48 patients (4%).

Fig. 6. A 37-year-old patient with a SSN-to-nipple distance of 37 and 35 cm right and left, respectively. Repositioning of the nipple at 20 cm. Nipple lift: 17 cm and 15 cm, respectively. Resection weight was 480 g and 460 g for the right and left breasts, respectively. Preoperative anterior (A), and left lateral view (B) Postoperative anterior (C) and left lateral (D) view at 14 months showing breast symmetry. Note the absence of bottoming out of the lower pole as well as the upper pole fullness and lower pole convexity.

Table 3. Classification of Breast Hypertrophy According to Berrocal Revueltas,[19] Resected Breast Tissue Volume and Incidence in Each Group of Partial Necrosis of the NAC

		Total Patients		Partial Necrosis of the Nipple–Areola Complex	
Degree of Breast Hypertrophy	Resected Amount (g)	No. Patients	Percentage (%)	No. NAC	Percentage (%)
Grade I or light	<500	470	39.2	4	0.85
Grade 2 or moderate	500–800	358	29.8	7	1.95
Severe hypertrophy	800-1000	202	16.8	11	5.44
Gigantomasty	>1000	170	14.2	10	5.88

Alterations in the sensibility of the NAC occurred in 96 cases (8%), all began with anesthesia of the NAC. After 6 months, 92 patients had completely recovered sensibility and reported that they had the same sensibility as before surgery. Two cases had residual anesthesia of the NAC, and two cases presented hyperesthesia (Table 4).

At 1 year postoperatively, the vertical scar had a size range between 5 and 7 cm, whereas the horizontal scar had a size range between 10 and 14 cm. The patient satisfaction index was reported as very satisfied in 90%, satisfied in 9%, and dissatisfied in 1% (BREAST-Q questionnaire).

Table 4. Complication Rate

Complication		No. Patients		Percentage (%)
Total necrosis of the areola		0		0
Infection		17		1.4
Wound dehiscence		20		1.7
Widened scar		48		4
Altered sensibility		96		8
Hematoma		7		0.6
Round block suture breakage		7		0.6
Partial necrosis of the areola	Extent of partial necrosis of the nipple–areola complex: 10%–20%	14	32	2.7
	Extent of partial necrosis of the nipple–areola complex: 21%–40%	12		
	Extent of partial necrosis of the nipple–areola complex: 41%–60%	6		

DISCUSSION

An array of different vascular pedicles have been described in the literature; yet the inferior pedicle remains the predominant technique for reduction mammoplasty worldwide. We consistently use the superior pedicle, with the advantage that this pedicle provides: upper pole fullness and breast projection, achieving better aesthetic results, with a higher rate of satisfaction when compared with the inferior pedicle, without compromising the NAC's safety.[20–22] Our study presents encouraging findings that may motivate surgeons to use the superior pedicle technique with the proposed novel marking, as it has demonstrated safety even in cases of extensive NAC ascents (22 cm ascent).

In traditional beliefs, performing a superior pedicle mammoplasty with NAC ascents greater than 30 cm was considered impractical due to a high risk of necrosis. This often necessitated alternative techniques such as inferior pedicle, superomedial pedicle, or even free nipple grafts[23]; however, our technique demonstrates the feasibility of achieving significant NAC elevations using a superior pedicle even in ascents up to 22 cm, maintaining vascular safety. Our results align with previous studies[24–26] that have demonstrated the effectiveness of the superior pedicle in achieving large NAC ascents. The key to this success lies in designing a wide vascular pedicle.

In the present study we describe a personally modified superior pedicle technique, with a novel marking for breast reduction. The key aim characterizing our approach is to obtain an aesthetic breast (instead of a simple reduced breast), with a low complication rate.

The true innovative concept of our technique that leads to good aesthetic results with fewer complications is the wide dome marking, which enhances the superior pedicle vascularization, enabling us to perform large breast lifts with confidence, resulting in a shorter horizontal scar (10–14 cm). This is because the wider periareolar is used to sculpt the breast form, reducing the need for an extensive horizontal incision to achieve the desired shape, which gives a higher satisfaction rate in patients because they are often concerned about the size of the scars, and it is frequent that the horizontal scar in other techniques extends to the mid-axillary line or beyond, and sometimes joins at the midline or is very close to joining.[27–29]

The fact that this technique has been used in patients of all age groups with variable degrees of mammary hypertrophy (Tables 1 and 3) demonstrates its versatility. These tables showcase the successful application of our technique in patients across various age groups and with varying degrees of mammary hypertrophy and nipple–areola complex ascent. Additionally, during the operative procedure, the amount of tissue to be resected can be readily adjusted to achieve optimal final outcomes. This adaptability contrasts with the Wise pattern technique, where modifications during the surgical procedure are restricted once the incision is made.

The overall complication rate in reduction mammoplasty varies between 6% and 43%.[28–30] The most frequent complication, independent of the technique used, is delayed healing with reports of up to 30%.[31,32] With this technique, we found complications in only 11.3% of patients, which means a considerable reduction in the number of complications compared with other reported techniques. The most frequent complication was transient loss of sensibility, of which only four patients (0.3%) had long-term anesthesia or hyperesthesia. This coincides with other superior pedicle mammoplasty reduction techniques in which the incidence of hypesthesia was initially 30%, and at 1 year postoperatively, it was less than 1%.[29]

Although some studies report a higher rate of NAC sensitivity loss with superior pedicle when compared with superomedial or inferior pedicle,[33] these studies have been performed with classic techniques of superior pedicle reduction mammoplasty such as Lassus or Lejour, where sometimes it is necessary to reduce the width of the pedicle to be able to assemble the breast correctly, being necessary to section part of the innervation of the nipple–areola complex. Our proposed wide-dome marking improves NAC perfusion and also diminishes the risk of anesthesia or hyperesthesia.

With this procedure, we obtained a percentage of partial necrosis of the NAC of 2.7% without total necrosis in 1200 patients treated, which is attributed to the wide pedicle, with a width that varies between 12 and 18 cm, making it a randomized flap with a width:length

ratio of 2:1 or 1:1, making it supremely safe and with little chance of suffering, always leaving a thickness between 1.5 and 3 cm so as not to hinder the ascent of the NAC. This is another advantage of our technique compared with classic breast reduction techniques, in which the NAC necrosis was reported to be 6% using a superior pedicle.[34]

CONCLUSIONS

The technique of superior pedicle inverted T-reduction mammoplasty with a shortened horizontal scar stands out for its efficiency, reproducibility, and ease of execution. It consistently gives natural and long-lasting aesthetic results, maintaining a low complication rate, even in cases of gigantomastia, involving NAC ascents of up to 22 cm.

The dynamic marking of the patient makes this technique versatile, making it suitable for different types of breasts, and there are no rigid or strict markings. Upper pole fullness, short scars, and a pleasing breast shape contribute to a high level of patient satisfaction.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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