

Inferior Pole Length and Long-term Aesthetic Outcome after Superior and Inferior Pedicled Reduction Mammoplasty

Sarah Zehm · Petra Puelzl · Gottfried Wechselberger ·
Hanno Ulmer · Hildegunde Piza-Katzer



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Abstract

Background Long-term aesthetic results after reduction mammoplasty remain an important issue for evaluating the success of different techniques. Superior pedicled techniques are reported to maintain a better breast projection with less bottoming-out of the inferior mammary pole than inferior pedicled techniques.

Methods The outcomes of 18 patients who had undergone the superior pedicled technique described by Pitanguy and 16 patients operated on using the inferior pedicled technique by Robbins were compared.

Results The mean follow-up period was 49 months in the Pitanguy group and 35 months in the Robbins group. The distance between the inframammary crease and the inferior margin of the nipple–areola complex (NAC) showed a

mean elongation of 3.3 cm (80.5 %) after the superior pedicled Pitanguy technique and 3.9 cm (92.9 %) after the inferior pedicled Robbins technique ($p = 0.077$). Using postoperative photographs, the overall aesthetic result after Pitanguy's technique was judged significantly better than the result after Robbins' technique ($p = 0.002$).

Conclusions Distinct postoperative elongation of the inferior mammary pole length must be considered in the preoperative marking for inferior and superior pedicled reduction mammoplasty. Guide values for the elongation can be used for planning unilateral adjustment reduction mammoplasty. To avoid bottoming-out of the inferior mammary pole, the NAC should be located at the level of the inframammary crease and the distance between the inframammary crease and the inferior border of the NAC should not exceed 4–4.5 cm. The definite position of the NAC should be decided after final shaping of the reduced breast toward the end of the operation.

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Keywords Reduction mammoplasty · Inferior and superior pedicled · Bottoming-out

Sarah Zehm and Petra Pülzl contributed equally to this work.

S. Zehm (✉)
Department of Vascular Surgery, Innsbruck University Hospital,
Anichstraße 35, 6020 Innsbruck, Austria
e-mail: sarah.zehm@gmail.com

P. Puelzl
Department of Plastic and Reconstructive Surgery, Innsbruck
University Hospital, Anichstraße 35, 6020 Innsbruck, Austria

G. Wechselberger
Department of Plastic and Reconstructive Surgery, Barmherzige
Brüder Hospital, Kajetanerplatz 1, 5010 Salzburg, Austria

H. Ulmer
Department of Medical Statistics, Informatics, and Health
Economics, Innsbruck Medical University, Schöpfstraße 41,
6020 Innsbruck, Austria

H. Piza-Katzer
Kalamanstraße 41, 1130 Wien, Austria

The concept of reduction mammoplasty presented by Biesenberger in 1928 is still valid. In addition to the quality of the immediate outcome, the essential criteria for evaluating the operational result include the stability of the new mammary shape in the postoperative course. Postoperative bottoming-out of the inferior mammary pole with upward rotation of the nipple–areola complex (NAC) is a common

problem. The inferior pedicled technique in particular has this result [3, 11]. In contrast, the superior pedicled technique may help prevent the descent of breast tissue in the postoperative course [1, 9, 16].

In 1967, Pitanguy [9] expressed his objective to counteract the process of bottoming-out of the inferior mammary pole in the postoperative course by means of a new mammoplasty technique. The breast parenchyma in the cranial area is preserved and not dissociated from the skin. This method should provide fullness to the upper mammary pole and a stable postoperative position for the NAC. The Robbins procedure [12] is preferred for reducing ptotic breasts with a long distance between the suprasternal notch and the nipple, because in such cases tissue can be cranialized more easily and tension and distortion of the pedicle and the NAC can be avoided. Inferior pedicled reduction mammoplasty is often touted as a safe method with regard to preservation of the nerve and blood supply of the NAC and lactation [2, 3, 6, 8, 12–14, 18].

Regarding the process of postoperative bottoming-out, few reports comparing different surgical techniques, including objective measurement criteria, were found. Small et al. [15] described the measurement of changes in volumetric distribution and bottoming-out by means of three-dimensional photography after medial pedicled reduction mammoplasty. Between the early (60–120 days) and late (400–500 days) postoperative measurements, the amount of breast tissue in the upper mammary pole and the anterior–posterior breast projection significantly decreased and the inferior pole length significantly increased. Our aim was to compare the long-term results of a superior and an inferior pedicled technique, with special attention to objectifying the postoperative elongation of the inferior mammary pole (bottoming-out).

Patients and Methods

We compared long-term aesthetic outcomes of bilateral reduction mammoplasty via our two most commonly performed techniques during a period of 4 years. Twenty patients underwent the superior pedicled technique described by Pitanguy, and 20 patients underwent the inferior pedicled technique by Robbins. They were selected according to the inclusion criteria: bilateral reduction mammoplasty, age ≥ 20 and ≤ 45 at the time of the operation, resection weight ≥ 150 and $\leq 1,000$ g, and complete photodocumentation [9, 12]. Two patients in the Pitanguy group and four patients in the Robbins group were lost to follow-up.

All patients were marked preoperatively in an upright position. The suprasternal notch, the midsternal line, and the midclavicular line crossing the nipple were marked. On

this line, the future position of the nipple was planned at the level of the inframammary crease at a distance from the suprasternal notch suitable to the patient's size.

In contrast to the original description of the Robbins technique, we did not use a keyhole pattern for the preoperative marking of the NAC. For both techniques the preoperative marking was performed as follows: From the point of the future nipple position, two lines were drawn at an angle of 90° for normal skin or 100° in case of flaccid skin [10]. The length of the lines was 8–9 cm, i.e., 4 cm for the diameter of the NAC and 4–5 cm for the distance between the inframammary crease and inferior border of the areola. From the end points of these lines, the lateral and medial borders for the resection were marked toward the inframammary line after their assessment by lateralization and medialization of the breast tissue. For both techniques, after bilateral resection and shaping of the remaining breast tissue the definite position of the NAC was decided on at a distance of 4–5 cm from the inframammary crease, comparing one side with the other.

Our study was designed as a retrospective follow-up examination. Intra- and postoperative distances between the inframammary crease and the inferior margin of the NAC were measured bilaterally and values were compared between the Pitanguy group and the Robbins group. In addition, the pre- and postoperative distances between the suprasternal notch and nipple were measured bilaterally. Two independent surgeons evaluated the postoperative photographs blinded to the technique used. The overall aesthetic result of the operation, the shape and symmetry of the breasts and the NACs, and the position of the NAC on the breast were evaluated. The parameters were categorized as “very good,” “good,” “fair,” or “unsatisfactory.”

The patients' satisfaction with the aesthetic result was investigated by means of an anonymous questionnaire. Their satisfaction with the overall aesthetic result, the shape and symmetry of the breasts and the NACs, and the position of the NAC on the breast was categorized as “most satisfied,” “satisfied,” “not very satisfied,” or “very dissatisfied.”

Complications and revision rates of both groups were investigated.

Statistical analysis was performed using SPSS (SPSS, Inc., Chicago, IL, USA) by means of the *t*-test for continuous variables and by the χ^2 test for categorical variables. *P* values less than 0.05 were considered significant.

Results

The patients' mean age at the time of the operation was 34 years in both groups. The resection weight ranged from 180 to 994 g. The mean resection weight in the Pitanguy group was 454 g and that in the Robbins group was 518 g.

Table 1 Patient characteristics

	Pitanguy (<i>n</i> = 18)	Robbins (<i>n</i> = 16)
Age (years)	34 (7)	34 (6)
Resection weight (g)	454 (151)	518 (199)
BMI (kg/m ²)	23.6 (2.3)	25.6 (3.7)
Follow-up (months)	49 (7)	35 (6)
Postoperative loss of body weight (kg)	1.6 (2.4)	2.2 (3.8)
Postoperative increase in body weight (kg)	3.3 (4.5)	1.1 (1.9)
Smokers (<i>n</i>)	1	6
Surgically relevant prior diseases	0	0

Values are mean (standard deviation)

BMI body mass index, *n* number of patients

The patients' average preoperative body mass index (BMI) was 23.6 in the Pitanguy group and 25.6 in the Robbins group. There was no statistically significant difference concerning the resection weight and the BMI between the two groups. The mean follow-up period was 49 months in the Pitanguy group and 35 months in the Robbins group (Table 1).

The mean inpatient stay was 4 days in both groups. Complications included delayed healing, superficial wound infection, hypertrophic scarring, and dog-ears. There was no case of hematoma or NAC necrosis. Five patients of the Pitanguy group and two of the Robbins group underwent revision surgery for dog-ears and scar revision (Table 2).

All mammoplasties were bilateral, therefore mammary measurements were analyzed on a per-breast basis (Pitanguy, *n* = 36; Robbins, *n* = 32). The average preoperative sternal notch-to-nipple distance was 28.3 cm (SD = 2.4) in the Pitanguy group and 31.8 cm (SD = 3.7) in the Robbins group. The postoperative mean values were 23 cm (SD = 1.7) after the Pitanguy technique and 22.8 cm (SD = 1.7) after the Robbins technique. The preoperative

Table 2 Complications and revision rate

	Pitanguy (<i>n</i> = 18)	Robbins (<i>n</i> = 16)
Delayed wound healing	4	3
Superficial wound infection	1	1
Scar revision	4	2 ^a
Dog-ears	3	2
Dog-ear revision	1	1 ^a
Overall revision rate	5	2
Hematoma	0	0
NAC necrosis	0	0

n number of patients, NAC nipple–areola complex

^a One patient underwent scar revision and dog-ear revision

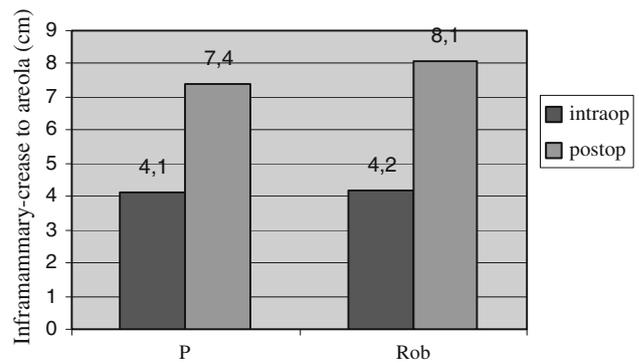


Fig. 1 Mean values of intraoperative (*intraop*) and postoperative (*postop*) distances between inframammary crease and inferior margin of the nipple–areola complex (NAC) depending on the operative technique. *P* Pitanguy, *Rob* Robbins

right and left sternal notch-to-nipple distances, which are indicative of breast symmetry, showed an average difference of 1.1 cm (SD = 0.8) in the Pitanguy group and 1.2 cm (SD = 0.7) in the Robbins group. After reduction mammoplasty, the difference was reduced to an average of 0.3 cm (SD = 0.4) with the Pitanguy technique and 0.5 cm (SD = 0.4) with the Robbins technique.

The mean preoperative distance between the inframammary crease and inferior border of the NAC (inferior pole length) was approximately equal in both groups (Pitanguy, 10.7 cm; Robbins, 10.9 cm). For both groups the NAC was placed at a distance of 4–5 cm from the inframammary crease, resulting in a mean distance of 4.1 cm after the Pitanguy technique and 4.2 cm after the Robbins technique. Comparing the intraoperative and postoperative distances between the inframammary crease and the inferior margin of the NAC, a mean increase of 3.3 cm (SD = 1.5) after Pitanguy's technique and of 3.9 cm (SD = 1.2) after Robbins' technique was observed ($p = 0.077$) (Fig. 1). This corresponds to an average elongation of 80.5 % (Pitanguy) and 92.9 % (Robbins) in

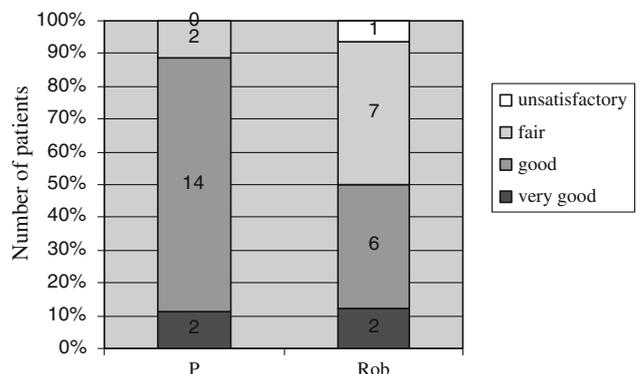


Fig. 2 Surgeons' evaluation of the aesthetic overall result depending on the operative technique. *P* Pitanguy, *Rob* Robbins

Fig. 3 Surgeons' evaluation of breast and NAC shape and symmetry, and of the position of the NAC on the breast depending on the operative technique. *P* Pitanguy, *Rob* Robbins

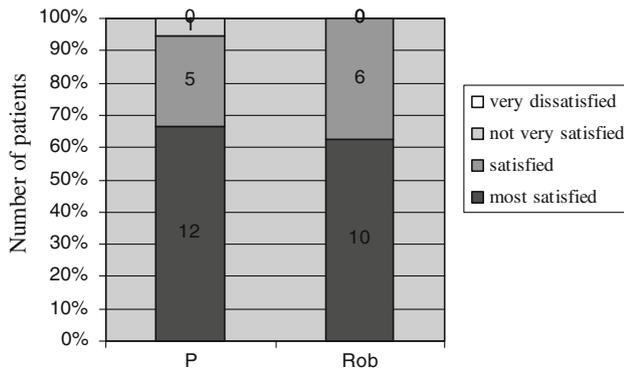
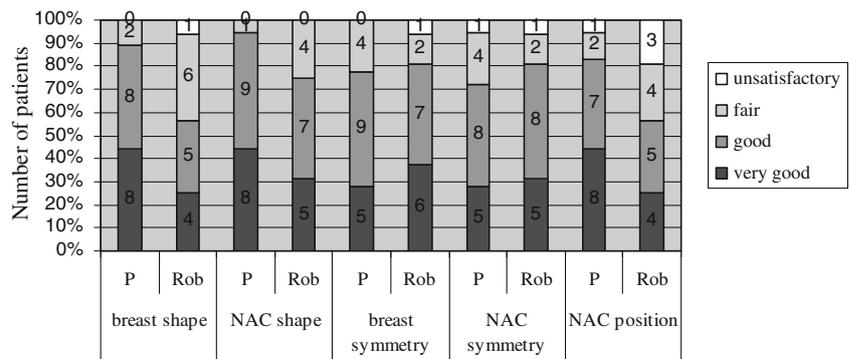


Fig. 4 Patients' assessment of the aesthetic overall result depending on the operative technique. *P* Pitanguy, *Rob* Robbins

the postoperative course. Seventeen of 18 patients after Pitanguy's technique and 15 of 16 patients after Robbins' technique had bra cup sizes of B or C. One patient in each group had size D after reduction mammoplasty.

The surgeons' evaluation of postoperative photographs found the overall aesthetic result in the Pitanguy group significantly much better than in the Robbins group ($p = 0.002$). The outcome of 16 patients of the Pitanguy group and 8 patients of the Robbins group was classified as "very good" or "good" (Fig. 2). For details of the surgeons' evaluation of breast and NAC shape and symmetry and of the position of the NAC on the breast for both groups, see Fig. 3.

Patient satisfaction was high in both groups. Seventeen patients who had the Pitanguy technique and all 16 patients reduced by the Robbins technique were "most satisfied" or "satisfied" with the overall aesthetic result ($p = 0.627$) (Fig. 4). For a detailed description of the patients' satisfaction rate concerning breast and NAC shape and symmetry and the position of the NAC on the breast, see Fig. 5.

Discussion

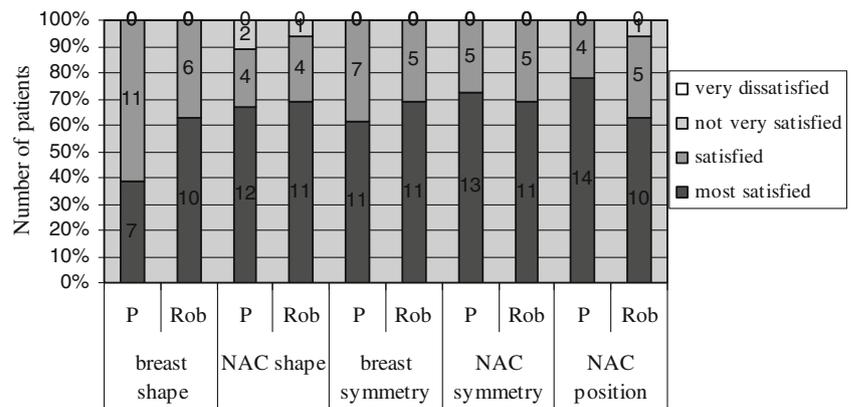
After the mean follow-up of 49 months after the superior pedicled Pitanguy technique, we found a mean elongation

of 80.5 % of the intraoperatively assessed distance between the inframammary crease and inferior border of the NAC. The Robbins group showed an elongation of 92.9 % after a mean follow-up of 35 months. Resection weight and BMI were comparable in both groups and we found a tendentially significant ($p = 0.077$) greater elongation after reduction mammoplasty by the Robbins method. Although follow-up examination of the Pitanguy group was performed later, this group showed less elongation of the distance between the inframammary crease and the NAC. Perhaps with equal follow-up periods for superior and inferior pedicled techniques a greater difference in postoperative elongation of the inferior mammary pole would be seen. Furthermore, the postoperative increase in body weight was 3.3 kg after Pitanguy's technique compared with 1.1 kg after Robbins' technique. Nevertheless, the distance between the inframammary crease and inferior margin of the NAC remained more stable after Pitanguy's procedure.

Erdogan et al. [3] described an elongation of the inframammary crease-to-NAC distance of at least 2.5 cm 5 years after surgery in 52 patients operated on by the inferior pedicled technique. Reus and Mathes [11] reported a 48–50 % elongation following inferior pedicled mammoplasty after an average follow-up period of 4.7 years. No increase in the midclavicle-to-nipple distance was seen, showing superior displacement of the NAC. Tairyck et al. [16] compared six different techniques of reduction mammoplasty and did not observe "bottoming-out" of the inferior mammary pole in patients who were operated on by the technique described by Pitanguy after a mean follow-up period of 6 years.

The Pitanguy technique obtains the unit of skin and underlying breast parenchyma by means of mainly corresponding resection lines. This may provide for better long-term stability of the breast form. The Robbins technique interferes with the unit of the anatomic structures to a higher degree but allows for greater variability. The Pitanguy technique also facilitates tension-free elevation of the NAC with a long sternal notch-to-nipple distance and

Fig. 5 Patients' assessment of breast and NAC shape and symmetry, and of the position of the NAC on the breast depending on the operative technique. *P* Pitanguy, *Rob* Robbins



maximal access for tissue resection with high resection weight. Recently, Foustanos et al. [5] presented a modification of the Pitanguy method to allow elevation of the NAC in patients with severe breast ptosis, gigantomastia, or dense breast parenchyma. They dissect the upper mammary pole vertically to the pectoral fascia, elevate and rotate the medial flap 90°, and place the lateral flap below the medial one. In a study of ten patients with a jugulum-to-mammilla distance of >40 cm, Wettstein et al. [19] did not observe NAC necroses after a mean NAC lift of 20 ± 3 cm by means of a superior pedicled technique.

In general, the patients of both groups assessed the aesthetic outcome to be better than the surgeons did. It is remarkable that all the patients in the Robbins group were “very satisfied” or “satisfied” with the overall result while the surgeons classified the outcome as “very good” or “good” in only eight patients in this group. Ferreira [4] and Godwin et al. [7] observed that patients rated the aesthetic outcome higher than surgeons, possibly because they were grateful for their doctors' help.

The overall aesthetic result after Pitanguy's technique was rated significantly better by the surgeons than after the Robbins technique. However, the latter is used to reduce breasts with a long sternal notch-to-nipple distance. It allows good repositioning of the areola without tension or distortion of the pedicle. The average preoperative sternal notch-to-nipple distance was 28.3 cm in the Pitanguy group and 31.8 cm in the Robbins group, while the mean preoperative distance between inframammary crease and NAC was approximately equal in both groups (Pitanguy, 10.7 cm; Robbins, 10.9 cm). The inferior pedicled technique is preferable for young patients because it is very reliable in terms of sensitivity and lactation. According to the literature, this method reduces the risk of damaging the fourth intercostal nerve in the area of the caudal lateral quadrant, which mainly supplies the NAC [17, 18]. Pitanguy also reported very good sensibility and no interference with breast feeding after his superior pedicled mammoplasty in his experience with 317 breasts. He attributed this

result primarily to the complete preservation of the nerves contained in the adipose capsule of the upper mammary pole [9].

The superior pedicled technique seems advantageous for reduction of pseudoptotic breasts with a flat superior mammary pole. Furthermore, it would be preferred for older patients with increased tissue laxity because of better long-term preservation of breast projection.

If the skin is very flaccid, we propose a resection line using an angle of 100° instead of 90° around the NAC to achieve better projection [10]. In general, excessive skin resection disproportionate to the remaining breast volume should be avoided to prevent overexpansion of the skin which promotes descent of the breast parenchyma. To avoid bottoming-out of the inferior mammary pole, the new position of the NAC should be at the level of the inframammary crease and the distance from the inferior border of the nipple to the inframammary fold should not exceed 4–4.5 cm. The definite positioning of the NAC in a slightly downward-facing direction should be done after final shaping of the breast toward the end of the operation.

The process of postoperative bottoming-out must be taken into account in the preoperative planning for both inferior and superior pedicled reduction mammoplasty. We suggest that guide values for postoperative bottoming-out are especially valuable for unilateral breast reduction for which the shape of the contralateral breast and changes in shape after reduction mammoplasty have to be considered.

Conflict of interest The authors have no conflicts of interest to disclose.

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