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Nipple/Infra-Mammary Fold Distance: An Indicator for Aesthetic Outcome in Reduction Mammaplasty

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Abstract

Background: Reduction mammaplasty became one of the most common performed procedures by plastic surgeons. Despite the diversity of the techniques that can be utilized to achieve aesthetically pleasant results, the final outcome not usually depends only on the shape but also on the quality of life following the surgery.

Objective: High lighting the importence of N/IMF distance to assess the results of outcome of breast reduction.

Material and Methods: N/IMF distance was determined according to Tibbetts criteria; the distance is proportional to breast width (0.6 the width, not more than 10cm). The distance was measured on maximally stretched skin in inferior pedicle flap reduction and mastopexy procedures, while the distance was measured in relaxed standing position in superior or supero-medial pedicle flaps reductions, in order to anticipate the amount of lower pole stretch following the surgery.

Results: One hundred fifty eligible participants who underwent reduction mammaplasty were included in our study. Only 132 participants (88%) had completed the subjective questionnaire as well as completed the objective assessment as well. The patient's subjective satisfaction was good in 63.3% of patients. Regarding the objective assessment both breasts were symmetrical in 75.3%, perfect size to torso in 68% of patients & well contoured in 69.3% of patients.

Conclusion: The proportions between the N/IMF distance and the patient's breast measurements and topography have great necessity to patient satisfaction and should be taken into consideration when planning a reduction mammaplasty.

Key Words: *Breast reduction – Mammaplasty – Infra-mammary.*

Ethical Committee: This study had been approved by ethical committee of Faculty of Medicine, Beni Suef University (approval number FMBSUREC/03092023/; 3rd of September 2023.

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Introduction

Nowadays, Reduction mammaplasty became one of the most commonly performed procedure by plastic surgeons. Despite the diversity of the techniques that can be utilized to achieve aesthetically pleasant results, the final outcome not usually depends only on the shape but also on the quality of life following the surgery **[1]**. From the patient's perspective, Health-related quality of life outcome studies had reported that patients who had a successful surgery showed reduced musculoskeletal pain as well as improvements in physical, sexual, and psychosocial well-being **[2]**. Whereas, the aesthetic outcome is a quiet different term which denotes a procedure with resultant beautiful breast that keep a long-term aesthetic outcome, which can be assessed both subjectively and with some objective criteria **[3]**. The Lower pole appearance is an integral part of reduction mammaplasty or mastopexy outcome. The of Nipple/infra-mammary fold (N/IMF) distance represent a good indicator of proper measurements of lower pole skin excess preoperatively and postoperatively is represent a good indicator for lower breast pole aesthetics.

In the current study, we aim at highlighting the importance of N/IMF distance as an indicator for objective aesthetic assessment of the resultant breast following reduction mammaplasty, through comparing the patient satisfaction rates with the panel judgement of N/IMF distance adequacy.

Material and Methods

This study had been approved by ethical committee of Faculty of Medicine, Beni Suif University (approval number FMBSUREC/03092023/ el noamani). Women aged 18 years and older with breast hypertrophy or breast ptosis who were eli-

gible for bilateral breast reduction surgery between March 2018 and February 2021 in both Department of Plastic Surgery Cairo University & Department of Plastic Surgery, Beni Suef University were included in this correlative descriptive survey. Women who were unable to complete their written questionnaires postoperatively or refused to participate in objective panel opinion, were excluded from the study. Patients with BMI higher than 30, active smokers, patients on systemic cortiosteroids, uncontrolled diabetes, and previous breast surgery were also excluded. Written informed consents were obtained routinely for all patients.

Pre-operative markings:

Essential lines were drawn; midline, inframammary fold, breast upper border (take off) line, vertical and transverse meridian were drawn. (Fig. 1).

Measurements were taken suprasternal notch/nipple "SSN/N", upper border/Nipple, Nipple/IMF, breast width. Nipple point was then determined in relation to breast upper border or Pitangue's point. Eventually, the decision was made to do either reduction mammoplasty or mastopexy upon breast parenchymal adequacy; in other word parenchymal excision or parenchymal redistribution. For all patients' wise pattern skin excision technique was used. Superior, supero-medial, superior, medial, or inferior pedicle was used according to nipple transposition distance. The skin closure was the classic inverted T pattern for all patients.

N/IMF distance was determined according to Tibbetts criteria; the distance is proportional to breast width (0.6 the width, not more than 10cm). The distance was measured on maximally stretched skin in inferior pedicle flap reduction and mastopexy procedures, while the distance was measured in relaxed standing position in superior or supero-medial pedicle flaps reductions, in order to anticipate the amount of lower pole stretch following the surgery. Intra-operatively, the surgical technique and weight of tissue resected from each breast was documented. Surgeries were done by the junior authors in each university.

Post-operative assessment:

1 year postoperatively, Results were assessed subjectively by using a printed questionnaire that included questions about patients' satisfaction; physically, mentally, sexually together with their satisfaction regarding breast size, shape, symmetry, contour and nipple location. Each question is marked from one (the worst) till ten (the best). The question of our questionner was mainly based on those of "The breast Q" questioner proposed by Coriddi et al. **[2]**.

Regarding Objective assessment, preoperative and postoperative photographs were used and assessed blindly by the senior authors; each of the two senior professors assess the results of the of the opposite team in a single blinded way. Commenting also on breast size, shape, symmetry, contour and nipple location. Each question is marked from one (the worst) till ten (the best). Meanwhile N/IMF distance was measured clinically in relation to breast proportions (width and height). Both subjective and objective scores were compared the N/IMF distance postoperatively as an indicator for evaluation of the aesthetic outcome. Also, a comprehensive "complications assessment checklist" was completed by the surgeon to compare the rate of complication in comparison to the final aesthetic outcome.

Results of the objective assessment & subjective questionnaire collected from the patients are reported with descriptive statistics, however no statistical tests were needed.

Results

Between March 2018 and February 2021, 150 were eligible for the study but only 132 completed the assessment and were involved in the study. Patients' ages ranged between 18 to 55 years (the median was 32 years), and the mean body mass index was 30.1±5.7 SD kg/m^2. The mean total weight of breast tissue resected at surgery was 1298.7±824.7g. The supero-medial pedicle reduction was the most commonly used pedicle in 70% of patients, while the superior pedicle reduction was the least to be used in only 10% of patients. (Figs. 2-5) Table (1).

The patient's subjective satisfaction about their reduction regarding physical, psychological, sexual, and shape improvement was assessed by a direct questionnaire as shown in Table (2).

Patients' objective assessment was done by the senior authors. The results are shown in Table (3).

The objective assessment curve was applied to the curve of objective assessment regarding one item; N/IMF distance and was shown in Fig. (6).

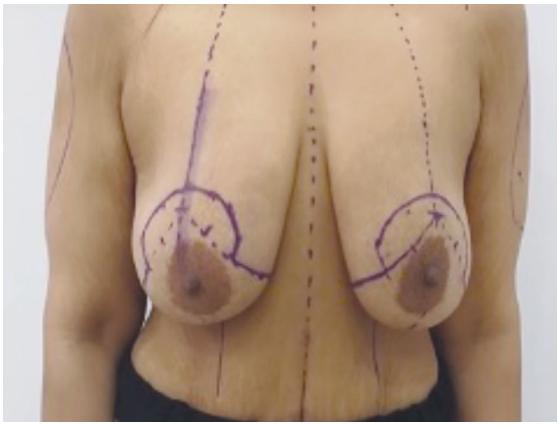

Fig. (1): Preoperative marking of patient underwent mastopexy.

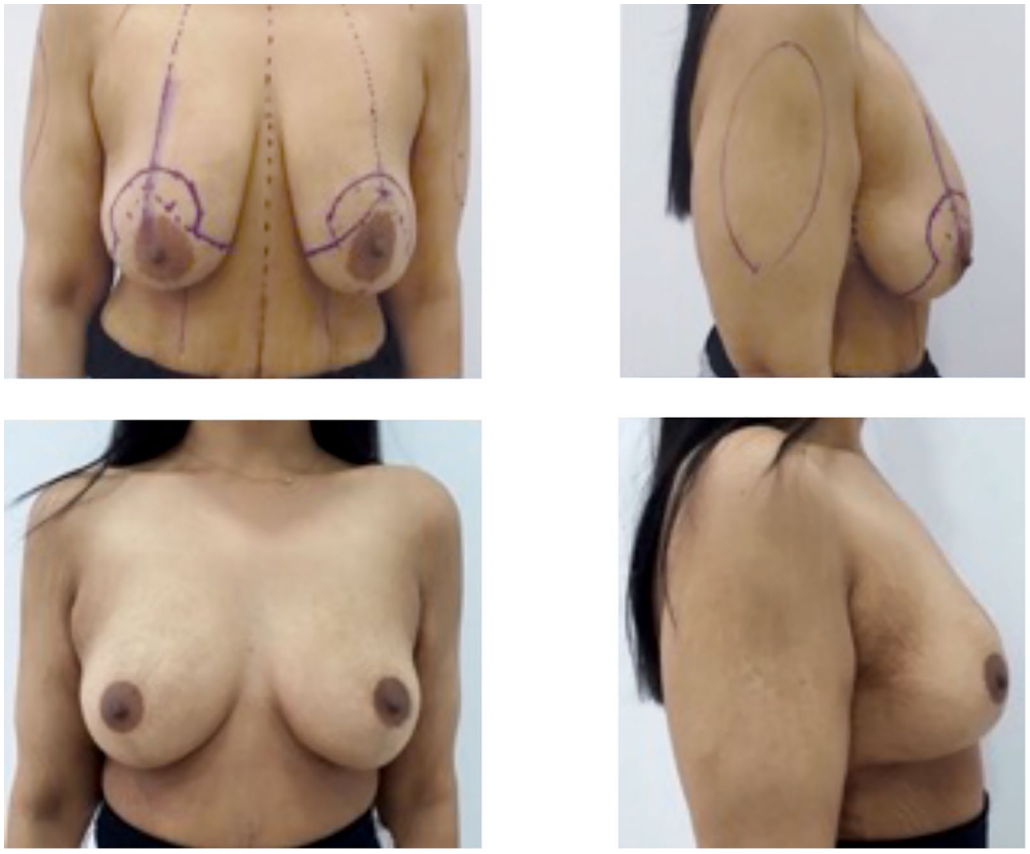

Fig. (2): Bilateral reduction mammaplasty using the superior pedicle and inverted T skin closure pattern.

Fig. (3): Bilateral reduction mammaplasty using the supero-medial pedicle and inverted T skin closure pattern.

Fig. (4): Bilateral reduction mammaplasty using an inferior pedicle and inverted T skin closure pattern.

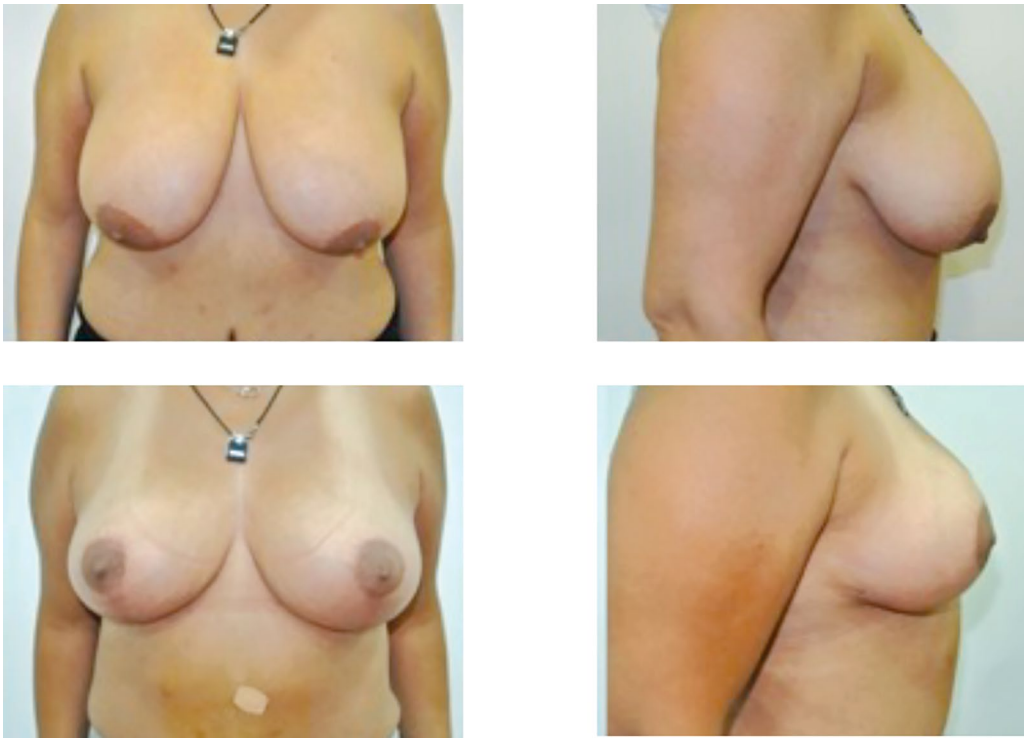

Fig. (5): Bilateral reduction mammaplasty using superior pedicle for NAC and central pedicle for auto-augmentation. Inverted T skin closure pattern.

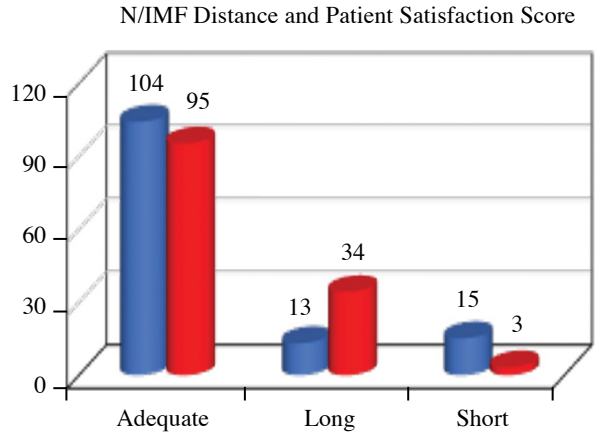

Fig. (6): Two graphs of comparison between patient satisfaction and assessment by N/IMF distance. Refer to patient satisfaction. Refer to N/IMF distance assessment. This shows high correlation between patient satisfaction and N/IMF distance.

Table (1): Patients and Methods.

Patients	No	%
No	132	88%
Smoking Status:		
Non	95	63.3%
Current	0	0
Ex <12mo	12	8%
Ex >12mo	25	16.7%
Bra cup size:		
C	12	8%
D	64	42.7%
DD	50	33.3%
>DD	6	4%
Breast Width	11±1.6 cm	
Breast Height	12±1.4 cm	
NAC carrying flap:		
Supero-medial	92	61.3%
Superior	14	9.3%
Inferior	26	17.3%
Complications:		
Scar Problems	10	6.7%
NAC Suffer	3	2%
Surgical site	6	4%
Infection		
Hematoma	5	3.3%
VTE	1	0.6%

Table (2): The patient's subjective satisfaction about their reduction regarding physical, psychological, sexual, and shape improvement was assessed by a direct questionnaire.

Patient satisfaction score	No	%
1-3	3	2
4-6	34	22.7
7-8	29	19.3
9-10	66	44

Table (3): Patients' objective assessment was done by the senior authors.

Panel judgement	No	%
Symmetry:	113	75.3
Symmetrical	19	12.7
Asymmetrical		
Size to torso:		
Ideal	102	68
Large	18	12
Small	12	8
Contour:		
Well contoured	104	69.3
Not well contoured	28	18.7
Nipple Location:*		
Ideal	98	65.3
High	13	8.7
Low	19	12.7
Medial	14	9.3
Lateral	18	12
N/IMF distance:		
Adequate	104	69.3
Long	13	8.7
Short	15	10

*The nipple mal-location cases may be mixed of high lateral, high medial, low lateral, and low medial. That is why the No of cases are not going with the total number.

Discussion

Assessment of the results of reduction mammoplasty is an assessment of all aspects of this surgical procedure; appropriate patient selection, planning, markings, and the surgical technique.

Based on the fact that there is great variation in breast volumes and shapes, there is no stand-alone technique that can be used for all patients, however, there must be a strategy that should be fulfilled while planning. The primary surgical objectives remain to safely move a sensate vascularized intact nipple-areola complex while creating a stable, aesthetically pleasing, and durable breast shape with minimal resultant scars **[4]**.

Parenchymal excess resection is another step that should be well planned to attain ideal size and symmetry. Skin excess analysis proved to be a great challenge that must be well calculated so that the location of the final scar will be determined either circum-areolar, circum-vertical, L-shaped, or anchor type [5].

The Lower pole appearance is an integral part of reduction mammaplasty outcome. The N/IMF distance is an indicator of proper measurements of skin excess and hence skin reduction pattern [6].

In current retrospective study, a group of patients was chosen to compare the patient satisfaction rate with the panel judgement of N/IMF distance adequacy. It is a trial to highlight this distance as a parameter of good design of the reduction mammaplasty skin cut technique.

While planning for N/IMF distance, nipple should be the upper most point which represent the center of breast cone as well as the most projecting point. Its site is the most important issue to be considered while designing the dimensions of the breast following surgery.

Locating the future nipple point while planning reduction or mastopexy was traditionally designed in relation to many off-breast points; SSN or mid-arm [5]. Foot print concept has changed this design preferring to refer nipple point to a point on the breast, leaving other points only for symmetry. [8]. Tibbets had approved using Pitangue's point locating the nipple in relation to IMF [9]. Findly criticizes using IMF as a land mark for nipple location. She believes that IMF is a good guideline for understanding the existing breast footprint on the chest wall, however the upper breast border is a better landmark for determining the ideal nipple position. She suggested that the new nipple position for most C cup breasts should be about 8 to 10cm below the upper breast border that matches authors preference in the current study [10].

N/IMF distance was classically measured from 8 to 10cm. However, when it is aesthetically measured in an objective way, it has been described in relation to vertical breast height as 55% in Malluche design [11], or it is 0.6 breast width in Tebbets pattern [9].

When Lassus started his vertical technique, he extended the scar caudally to the anterior abdominal wall, then he shifted back to small transverse scar. After then, he modified the vertical scar to avoid its encroachment to the abdomen [12]. Lejour has made many modifications to the vertical scar reduction so as reducing the base of the large breast with a vertical concept [13]. Hidalgo criticized the long lower pole in the vertical scar technique describing it as bottoming of the breast [14]. Tebbets described accurately the two common deformities after reduction mammaplasty as boxing and bottoming [9]. Raafat et al., 2021 completed the definition of boxing vs bottoming as regard their etiology. Glandular causes, envelop causes, together with hammock support to the lower pole were the main possible reasons for lower pole problems after reduction in Rafaat study [15].

Overall patient satisfaction with outcome following surgery was found to be strongly correlated with surgeons' satisfaction. Surgeons' judgement usually come first with the photography of their patients before and after the procedure. Then, objective measurements take place like symmetry, contour, size, nipple location, and N/IMF distance. The N/IMF distance, as the authors believe, is a sensitive indicator the lower pole aesthetics which play a major role of overall aesthetic outcome of the reduction procedure. It starts with the nipple location and ends with the IMF, so it carries three elements of judgement.

N/IMF distance is adynamic parameter that changes with time as well as the technique. Findly claims that superior pedicle flaps pull the IMF caudally while the inferior pedicle flaps lower the IMF by weight [10].

Many trials were done to keep the N/IMF distance stable after the different reduction techniques. Preoperative markings are very important and should be going with breast topography (width or height). Also, stretching the breast while measuring the N/IMF distance is important to anticipate the future wight of the reduced breast over the lower pole envelop. Intraoperatively, restructuring the breast capsule in a hammock pattern was tried. Mesh support of the lower pole is an alternative that may help. Many trials were done to fix the flap especially the inferior one to the pectoral fascia with different success rates [16].

There is no consensus in the literature regarding the correlation between subjective breast evaluation as scored by patients and objective measurements of resultant breasts by the reviewers. The articles focus was targeting the assessment of different techniques of breast reduction regarding skin reduction patterns or flaps carrying NAC. In the current study, breast assessment correlated highly in both subjective evaluations using breast Q and objective evaluation using N/IMF distance.

There was virtually no written information about the artistic aspects of shaping the breast in different reduction procedures. Every surgeon had his or her own tricks for achieving a great result. Mostly, however, a specific surgical method was never taught by their teacher and the long process of trial and error finally got transformed into "experience and mastership." Finally, the best breast reduction is that that surgeon does the best.

One of the main limitations of this study was the short term follow-up, since final breast results are rather not in its final shape and contour. Another limitation of this study was the absence of control group since the main objective of this study was to address the relation between the lower pole aesthetics in comparison to N/IMD in both subjective and objective way.

Conclusion:

The aesthetic outcome of breast reduction different procedures is simply the appearance of the resultant breast with long term outcome. It is usually assessed both subjectively and by some objective criteria. The proportions between the N/IMF distance and the patient's breast measurements and topography have great necessity to patient satisfaction and should be taken into consideration when planning a reduction mammaplasty.

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