



The Effect of Suction-Assisted Liposuction on Reduction of Diameter of Nipple-Areola Complex Among Patients with Simon Grade IIb and III Gynecomastia

Seckin Aydin Savas¹

Received: 21 October 2021 / Accepted: 24 December 2021
© Association of Surgeons of India 2022

Abstract

Gynecomastia is a condition in which the gland and fat tissue enlarge in the breasts of men. High-grade gynecomastia (Simon grades IIb and III) is associated with an enlarged nipple-areola complex. In this study, 21 patients with grade IIb and 9 patients with grade III who underwent suction-assisted liposuction between September 2018 and January 2020 were included. The historical patient records including physical examination, Simon grade of gynecomastia, horizontal diameter of nipple-areola complex, age, and pre-operative–post-operative photos were analyzed. The median of the horizontal diameter of nipple-areola complex was 3.7 cm in the pre-operative measurement, and the post-operative horizontal diameters varied from 2.6 to 3.1 cm, 3 months after surgery. The pre-operative and post-operative horizontal diameters of nipple-areola complex were compared using the Mann–Whitney test which revealed that the diameters significantly decreased after the operation. It can be concluded that suction-assisted liposuction provides a sufficient reduction concerning the diameter of nipple-areola complex without scar formation.

Keywords Simon classification · Grades of gynecomastia · Suction-assisted liposuction · Diameter of Nipple-Areola complex

Introduction

Gynecomastia is the most common breast condition related to gland and fat tissue enlargement in the breasts of men [1, 2]. There are numerous clinical classifications of gynecomastia. However, the most commonly used is the Simon classification which divides gynecomastia into four grades according to the volume of the breast and the redundancy of the skin [2–4] (Table 1). High-grade gynecomastia (Simon grades IIb and III) is associated with excess skin conditions [3].

The approach of high-grade gynecomastia was initiated from performing breast amputation with free nipple areolar grafting and continued with the technique of nipple-areola complex (NAC) on a de-epitelized flap over the years [3]. In

the following years, scar-less techniques such as subcutaneous mastectomy through an intra-areolar incision and single-stage subcutaneous mastectomy with circumareolar concentric skin were described. In this respect, a circumareolar excision allows a scar without an extra-areolar zone. However, the main disadvantage of these techniques is the scar formation in cases with grade IIb and III gynecomastia [3, 5–7]. In the past few years, suction-assisted or ultrasound-assisted lipectomy and direct excision with periareolar incision in a single stage were performed in severe gynecomastia (Simon grades IIb and III) [3, 5, 7–9]. There are many articles mentioning that combined approaches provide better results in the related literature [10, 11], which state that recurrent gynecomastia was observed if the breast disc was not completely removed. There is a tendency towards the choice of a less invasive and effortless treatment method in spite of an increasing number of techniques in gynecomastia treatment [2, 5].

High-grade gynecomastia is characterized by enlarged NAC [3, 12]. Periareolar incision is often used to correct the diameter and deformities of the NAC, while the nipple-areola diameter is reduced by removing the excess skin [13].

✉ Seckin Aydin Savas
dr.saydin@hotmail.com; seckin.aydin@alanya.edu.tr

¹ Department of Plastic, Reconstructive and Aesthetic Surgery, Faculty of Medicine, Alanya Alaaddin Keykubat University, Alanya, Antalya, Turkey

Table 1 Simon classification of gynecomastia with four grades

Grade	Description
Grade I	Small enlargement, no skin excess
Grade IIa	Moderate enlargement, no skin excess
Grade IIb	Moderate enlargement with extra skin
Grade III	Marked enlargement with extra skin

However, when skin excision is preferred to excess skin, the final results would be unaesthetic due to chest scars. This study revealed the success of suction-assisted liposuction (SAL) in reducing the diameter of NAC in young patients with grade IIb and III gynecomastia without any additional excision.

Patients and Methods

The study protocol was approved by the ethics committee of Faculty of Medicine. A total number of 30 patients undergone SAL from September 2018 to January 2020 with grade IIb and III gynecomastia and without skin and breast tissue excisions. The cases were classified based on the identification criteria described in Simon classification (Table 1). Power analysis was performed based on [14]. The result of power analysis showed that our sample size was sufficient. Bariatric patients and patients with BMI above 30 kg/m² were not included in this study. All patients were referred from general surgery after the exclusion of malignancy, hypogonadism, and other hormonal diseases. The historical patient records including physical examination, Simon grade of gynecomastia, diameter of NAC, and age were collected and analyzed. Pre-operative and post-operative photos were also examined.

There are different approaches to measure/evaluate the diameters of NAC [12, 15, 16]. In this study, the horizontal diameter across the middle of NAC was measured using an easy-to-apply method in accordance with the related literature [14, 17]. The horizontal diameters were measured pre-operatively and 3 months post-operatively by using an

anthropometric caliper at room temperature, and the chest was exposed for 1 min before the measurement. The measurements were taken while the patient was standing in a fully upright position, since a proper positioning is an important factor for a reasonable comparison of the pre-operative and post-operative diameters (Fig. 1).

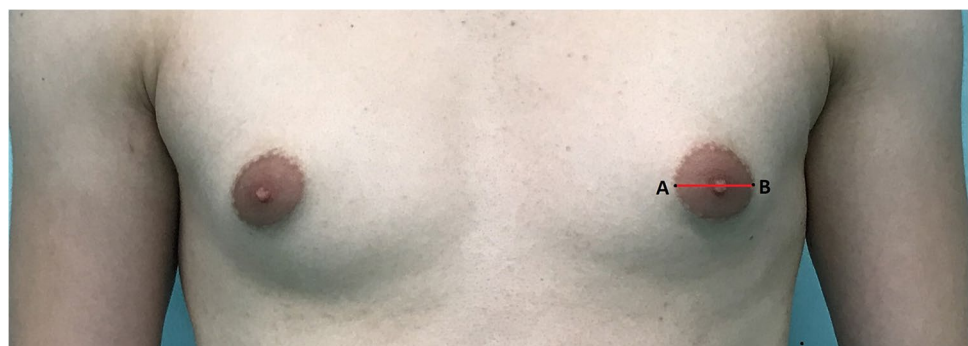
Surgical Technique

Pre-operative marking was performed along the infra-mammary fold (IMF) by making a circle including the entire breast. All the operations were performed under general anesthesia. A tumescent solution was prepared with 1:200 000 epinephrines and infused to the marked area after antibiotic prophylaxis. The amount of the tumescent solution infused was determined according to the breast size and its fatty tissue. A small stab incision was made under the IMF. A blunt-tip cannula was used for dissection and aspiration. Separation of the skin from the underlying tissue was done carefully by a cannula, and IMF was undermined and disrupted. The remaining tissue was left thicker in the upper lateral pectoral region compared to the other areas. SAL was initiated from the deepest layers towards the superficial layers and performed to the deepest layers by a 5-mm-diameter cannula, and a 4-mm-diameter cannula was used for the superficial layer. Our approach to the fibrotic mammary disc was to apply a gentle pressure to the breast disc held between the fingers and thumb of surgeon and then perform forceful passes with a sharp-tip cannula. This approach was adopted to obtain a satisfactory result. The pinch test was used to check the remaining tissue and symmetry of both breasts. The incisions were closed primarily, and compressive dressing was put on and repeated in the following 4 weeks.

Results

The average age of the 30 patients of this study with high-grade (Simon grade IIb and III) gynecomastia was 26 (ranging from 18 to 46 years). One of the patients had unilateral

Fig. 1 Illustration of measurement of horizontal diameter of nipple-areola complex (NAC) (horizontal diameter: red line across the middle of the NAC from A point to B point)



gynecomastia and 29 of them were treated bilaterally. On the other hand, 9 patients had gynecomastia Simon grade III (30%), and 21 patients had gynecomastia Simon grade IIb (70%).

The horizontal diameter of NAC was evaluated pre-operatively and post-operatively. The means of pre-operative and post-operative diameters for each Simon grade are summarized in Table 2. The horizontal diameter of NAC varying from 2.6 to 3.1 cm was taken as the optimum value range in accordance with the related literature [14, 15, 17]. The median of the horizontal diameter of NAC was 3.7 cm in the pre-operative measurement. All the post-operative horizontal diameters of NAC were determined to vary from 2.6 to 3.1 cm, 3 months after surgery. The pre-operative and post-operative horizontal diameters of NAC were compared using the Mann–Whitney test which revealed that the horizontal diameters of NAC significantly decreased after the operation ($p=0.00$) (Fig. 2).

The post-operative complications of gynecomastia surgery such as hematoma, seroma, infection, hypoesthesia, pain, contour deformity, and breast asymmetry were not observed during the follow-up periods. The inadequate removal of the glandular tissue, which is the most common

late complication, was not observed in any of the patients as well as the redundant skin problems (Fig. 3). In fact, NAC necrosis was not observed apart from the slight buttonhole deformity of a patient who did not express any complaints related to this problem.

Discussion

The goals of gynecomastia treatment are (a) correcting the breast contour by reducing excess fat tissue, (b) removing the palpable fibrotic breast disc, and (c) skin tightening and reduction of diameter of the NAC [18]. There are several studies stating that liposuction is useful for removing fat tissue but not sufficient for removing fibro-fatty glandular tissue alone, and so that a combined treatment should be performed with excision for fibro-fatty tissue [19–21]. However, it has been previously reported in the literature that fibro-fatty glandular tissue was effectively removed by using arthroscopic cartilage shaver, sharp-ended cannula, and microdebrider [22, 23]. We observed that the fibrotic breast disc required forceful passes and a sharp-tip cannula to obtain a satisfactory result without excision.

High grades of gynecomastia are associated not only with breast enlargement, but also with excess skin. Therefore, it is generally believed that liposuction-assisted gynecomastia management does not provide an adequate correction, and skin excision is required in cases with grade IIb and III gynecomastia. Some studies pointed out the skin retraction effect of ultrasonic-assisted liposuction (UAL) [14, 18], whereas SAL was previously reported to improve the skin tightening following gynecomastia as UAL [23]. This study reflected that the SAL promoted contraction and the smooth occurrence of the re-draping of the skin with the consequent absence of sagging during the post-operative period and it

Table 2 The mean of pre-operative and post-operative diameters of nipple-areola complex for each Simon grade (SD, standard deviation)

Simon classification	Pre-operative diameter of nipple-areola complex (cm) (mean ± SD)		Post-operative diameter of nipple-areola complex (cm) (mean ± SD)	
	Right	Left	Right	Left
IIb (21 patients)	3.70 ± 0.48	3.68 ± 0.47	2.89 ± 0.15	2.87 ± 0.13
III (9 patients)	4.46 ± 0.80	4.40 ± 0.74	2.93 ± 0.09	2.90 ± 0.12

Fig. 2 The statistical graphics of pre-operative (preop) and post-operative (postop) diameters of nipple-areola complex (NAC) (point estimate for $\eta_1 - \eta_2$ is -0.9000; 95.0% CI for $\eta_1 - \eta_2$ is (-1.1000, -0.7000); $W = 1916.0$; test of $\eta_1 = \eta_2$ vs $\eta_1 < \eta_2$ is significant at 0.0000; the test is significant at 0.0000)

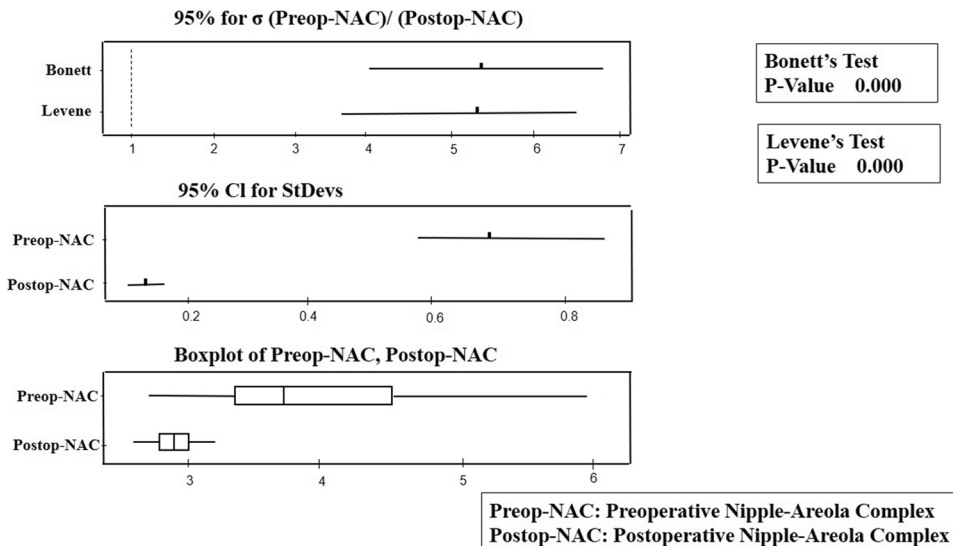


Fig. 3 Pre-operative–post-operative anterior, lateral, and anterolateral views of case 27



keeps on improving with time. The satisfactory results in this study can be attributed to the performance of the liposuction close to the subdermal layer on the superficial plane and wear of an effective compression garment for 4 weeks in order to provide skin re-draping.

Grade IIb and III gynecomastia are characterized by an enlarged nipple-areola complex [3, 12] and its reduction is one of the major concerns of aesthetic appearance sought after gynecomastia surgery. It is generally accepted that peri-areolar incisions and skin excision procedures are required to reduce the diameter of the NAC [3, 13]. However, some researchers [14] reported that the UAL reduced the horizontal diameter of the NAC due to the effect of skin tightening without excision [8]. The optimal horizontal diameter of the NAC in male patients is stated to range from 2.6 to 3.1 cm in the related literature [3, 13–15, 17]. Similarly, the skin

tightening of NAC was achieved in this study and the reduction of the horizontal diameter of the NAC was provided by the SAL, and thus, no surgical intervention was required separately for reducing the size of NAC. This significant reduction and the post-operative horizontal diameters of the NAC were in agreement with the optimal values reported in the earlier literature. There are some discrepancies among existing literature data about the association between the volume of breast tissue removed by liposuction and the reduction in NAC size. According to [14], there was a significant correlation between the liposuction volume and areolar retraction. However, a research group [18] reported the inconsistent liposuction volumes in their study. Therefore, we did not measure this volume and add any observation in this study. The skin retraction and the reduction of the horizontal diameter of the NAC were achieved with SAL which is more

cost-effective and more accessible than the UAL. Briefly, the skin tightening and the reduction of the horizontal diameter of the NAC were provided by the SAL. In other words, this study revealed that, if a suction-assisted liposuction was performed without any direct excision, an inadequate tissue removal was not observed in any of our patients, and, thus, no secondary operation was needed.

Conclusions

Objective assessment and benefits in gynecomastia surgery are not well described in literature. This study using liposuction and pre- and post-objective assessment of reduction in the nipple-areola complex diameter has shown a statistically significant improvement.

Acknowledgements The author would like to thank Prof. Dr. S. Kapur for improving the English text.

Author Contribution SAS carried out the conceptualization and design of the study as well as the original drafting and editing of the manuscript. SAS carried out the data curation, formal analysis, and supervision. The author reviewed the manuscript carefully.

Declarations

Conflict of Interest The author declares no competing interests.

References

- Vandeven HA, Pensler JM (2020) Gynecomastia. In: StatPearls. StatPearls Publishing, Treasure Island (FL)
- Fagerlund A, Lewin R, Rufolo G, Elander A, Santanelli di Pompeo F, Selvaggi G (2015) Gynecomastia: a systematic review. *J Plast Surg Hand Surg* 49(6):311–318. <https://doi.org/10.3109/2000656X.2015.1053398>
- Sarkar A, Bain J, Bhattacharya D, Sawarappa R, Munian K, Dutt G et al (2014) Role of combined circumareolar skin excision and liposuction in management of high grade gynecomastia. *J Cutan Aesthet Surg* 7(2):112–116. <https://doi.org/10.4103/0974-2077.138354>
- Rohrich RJ, Ha RY, Kenkel JM, Adams WP (2003) Classification and management of gynecomastia: defining the role of ultrasound-assisted liposuction. *Plast Reconstr Surg* 111(2):909–925. <https://doi.org/10.1097/01.prs.0000042146.40379.25>
- Brown RH, Chang DK, Siy R, Friedman J (2015) Trends in the surgical correction of gynecomastia. *Semin Plastic Surg* 29:122–130
- Webster JP (1946) Mastectomy for gynecomastia through a semicircular intra-areolar incision. *Ann Surg* 124(3):557
- Taheri AR, Farahvash MR, Fathi HR, Ghanbarzadeh K, Faridniya B (2016) The satisfaction rate among patients and surgeons after periareolar surgical approach to gynecomastia along with liposuction. *World J Plastic Surg* 5(3):287
- Schroeder L, Rudlowski C, Walgenbach-Bruenagel G, Leutner C, Kuhn W, Walgenbach KJ (2015) Surgical strategies in the treatment of gynecomastia grade I-II: the combination of liposuction and subcutaneous mastectomy provides excellent patient outcome and satisfaction. *Breast Care* 10(3):184–188. <https://doi.org/10.1159/000381152>
- El-Sabbagh AH (2016) Combined approach for gynecomastia. *GMS Interdiscipl Plastic Reconstruct Surg DGPW* 5. <https://doi.org/10.3205/iprs000089>
- Scuderi N, Dessy LA, Tempesta M, Bistoni G, Mazzocchi M (2010) Combined use of power-assisted liposuction and trans-areolar incision for gynecomastia treatment. *J Plastic Reconstruct Aesthet Surg* 63(1):93–95. <https://doi.org/10.1016/j.bjps.2009.01.025>
- Hammond DC, Arnold JF, Simon AM, Capraro PA (2003) Combined use of ultrasonic liposuction with the pull-through technique for the treatment of gynecomastia. *Plast Reconstr Surg* 112(3):891–895. <https://doi.org/10.1097/01.PRS.0000072254.75067.F7>
- Tanini S, Russo GL (2018) Shape, position and dimension of the nipple areola complex in the ideal male chest: a quick and simple operating room technique. *Aesthet Plast Surg* 42(4):951–957. <https://doi.org/10.1007/s00266-018-1131-0>
- Godwin Y (2012) Gynecomastia: considerations and challenges in treating male patients with varying body habitus. *Europ J Plastic Surg* 35(1):55–64. <https://doi.org/10.1007/s00238-011-0582-1>
- Keskin M, Sutcu M, Hanci M, Cigsar B (2017) Reduction of the areolar diameter after ultrasound-assisted liposuction for gynecomastia. *Ann Plast Surg* 79(2):135–138. <https://doi.org/10.1097/SAP.0000000000000994>
- Kasai S, Shimizu Y, Nagasao T, Ohnishi F, Minabe T, Momosawa A et al (2015) An anatomic study of nipple position and areola size in Asian men. *Aesthet Surg J* 35(2):20–27. <https://doi.org/10.1093/asj/sju023>
- Shulman O, Badani E, Wolf Y, Hauben DJ (2001) Appropriate location of the nipple-areola complex in males. *Plast Reconstr Surg* 108(2):348–351
- Yue D, Cooper LR, Kerstein R, Charman SC, Kang NV (2018) Defining normal parameters for the male nipple-areola complex: a prospective observational study and recommendations for placement on the chest wall. *Aesthet Surg J* 38(7):742–748. <https://doi.org/10.1093/asj/sjx245>
- Pfeiler PP, Luketina R, Dastagir K, Vogt PM, Mett TR, Kaltenborn A et al (2021) Expected reduction of the nipple-areolar complex over time after treatment of gynecomastia with ultrasound-assisted liposuction mastectomy compared to subcutaneous mastectomy alone. *Aesthet Plast Surg* 45(2):431–437. <https://doi.org/10.1007/s00266-020-02029-x>
- Singamsetty R, Rout SK, Giri SK, Panda R, Behera KK, Sable, MN (2021) Aesthetic outcome of gynecomastia management with conventional liposuction and cross-chest liposuction: a prospective comparative study. *Aesthet Plastic Surg* 1-8. <https://doi.org/10.1007/s00266-021-02611-x>
- Esme DL, Beekman WH, Hage JJ, Nipshagen MD (2007) Combined use of ultrasonic-assisted liposuction and semicircular periareolar incision for the treatment of gynecomastia. *Ann Plast Surg* 59(6):629–634. <https://doi.org/10.1097/SAP.0b013e318038f762>
- Prasetyono TOH, Budhipramono AG, Andromeda, I (2021) Liposuction assisted gynecomastia surgery with minimal periareolar incision: a systematic review. *Aesthetic Plastic Surgery* 1-9. <https://doi.org/10.1007/s00266-021-02520-z>
- Sim N, Tan G, Tan BK, Goh T (2020) Review of the microdebrider excision and liposuction technique (MELT) for the treatment of gynecomastia. *J Plast Reconstr Aesthet Surg* 73(2):303–312. <https://doi.org/10.1016/j.bjps.2019.09.003>
- Özalp B, Berköz Ö, Aydınol M (2018) Is the transposition of the nipple-areolar complex necessary in Simon grade 2b gynecomastia operations using suction-assisted liposuction. *J Plast Surg Hand Surg* 52(1):7–13. <https://doi.org/10.1080/2000656X.2017.1313260>

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.