

# Surgical Management of Gynecomastia: Subcutaneous Mastectomy and Liposuction

Dae Hwa Kim<sup>1</sup> · Il Hwan Byun<sup>1</sup> · Won Jai Lee<sup>1</sup> · Dong Kyun Rah<sup>1</sup> ·  
Ji Ye Kim<sup>2</sup> · Dong Won Lee<sup>1</sup> 



Received: 25 July 2016 / Accepted: 13 September 2016 / Published online: 27 September 2016  
© Springer Science+Business Media New York and International Society of Aesthetic Plastic Surgery 2016

## Abstract

**Background** The treatment of gynecomastia depends on multiple factors, and the best modality is controversial. In this study, we aimed to determine the best management approach by comparing outcomes of two groups of patients with gynecomastia who received subcutaneous mastectomy combined with liposuction and liposuction only.

**Methods** We conducted a retrospective analysis of 64 patients who underwent surgery for gynecomastia. We divided the patients into two groups: group A, patients who underwent liposuction only; and group B, patients who underwent liposuction and subcutaneous mastectomy. The serial photographs of all patients were clinically evaluated with respect to size, shape, scarring, and overall outcome by three plastic surgeons, and patient satisfaction was surveyed with regard to palpable lumps, size, shape, scarring, and overall outcome.

**Results** Of the 64 subjects, 16 received liposuction only, and 48 received the combination procedure. A total of 125 breasts were involved. The doctors' scores for size and overall outcome were significantly better in the combination group, whereas scarring was better in the liposuction-only group. Similarly, patient satisfaction regarding size was significantly higher in the combination group, and

satisfaction regarding scarring was significantly higher in the liposuction-only group. The scores for scarring in the combination treatment group were acceptable.

**Conclusion** Our study shows that combination treatment with liposuction and subcutaneous mastectomy results in satisfactory outcomes, including the extent of scarring. We conclude that this combination treatment should be recommended as the standard surgical treatment for gynecomastia and can provide excellent results in cases where glandular tissue needs to be removed.

**Level of Evidence V** This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors [www.springer.com/00266](http://www.springer.com/00266).

**Keywords** Gynecomastia · Subcutaneous mastectomy · Liposuction

## Introduction

Gynecomastia is a benign abnormal enlargement of the male breast due to proliferation of glandular tissue, which presents as a rubbery or firm mass extending concentrically from the nipple. It is the most common benign condition of the male breast and is estimated to affect about 40–65 % of males [1, 2]. Gynecomastia has several causes, including an imbalance in the testosterone-to-estrogen ratio in male breast tissue [2]. The primary mechanisms include decreased androgen production, increased estrogen production, and increased availability of estrogen precursors for peripheral conversion to estrogen [3]. The most common cause is physiologic gynecomastia, which occurs mainly during the adolescent period. Although 85–90 % of

---

D. H. Kim and I. H. Byun contributed equally.

✉ Dong Won Lee  
xyphoss@yuhs.ac

<sup>1</sup> Department of Plastic and Reconstructive Surgery, Institute for Human Tissue Restoration, Yonsei University College of Medicine, 50 Yonsei-ro, Seodaemun-gu, Seoul 120-752, Korea

<sup>2</sup> Department of Plastic and Reconstructive Surgery, Yonsei University Wonju College of Medicine, Wonju, Korea

**Table 1** Classification of gynecomastia [9]

Grade I	Small breast enlargement with localized button of tissue around the areola
Grade II	Moderate breast enlargement exceeding areolar boundaries, with edges that are indistinct from the chest
Grade III	Moderate breast enlargement exceeding areolar boundaries, with edges that are distinct from the chest, and with skin redundancy present
Grade IV	Marked breast enlargement with skin redundancy and feminization of the breast

pubertal gynecomastia regresses within 6 months–2 years, in the remaining cases, gynecomastia persists into adulthood [4]. The condition may develop as a result of obesity, cancer, or consumption of estrogens, anabolic steroids, or H2 blockers such as cimetidine [5].

For a man, the development of feminized breasts may cause significant emotional distress and embarrassment; thus, proper treatment crucially affects quality of life and self-confidence. The choice of treatment for gynecomastia is affected not only by the underlying cause, but also by symptoms such as severity of pain, tenderness, palpability, and emotional distress due to appearance. When symptoms are severe or spontaneous regression does not occur, surgical intervention is required. This involves removal of glandular and fat tissue via various incisions. Some surgeons report that liposuction can be a substitute for direct excision regardless of the grade of gynecomastia, whereas others believe that liposuction cannot completely remove the glandular tissue [6–8]. Although whether one technique is superior to the other is still controversial, surgeons supporting the removal of glandular tissue by liposuction recommend it as a less invasive surgery with minimal scarring, and surgeons supporting conventional subcutaneous mastectomy claim that complete surgical excision of the glandular tissue is essential to cure gynecomastia.

In this study, we divided patients into two groups according to the surgical modality, which was based on the classification of gynecomastia. We compared outcomes between groups and suggested the proper management depending on the severity of gynecomastia.

## Materials and Methods

### Patients

We conducted a retrospective analysis of 64 patients diagnosed with gynecomastia who underwent surgery between January 2009 and May 2015. Their average age was  $23.8 \pm 5.8$  years old. Sixty-one patients underwent bilateral surgery, and three underwent unilateral surgery. The examinations for all patients included careful history taking, physical examination, and laboratory tests to identify any underlying pathologic conditions such as

hypogonadism, hyperthyroidism, or Klinefelter's syndrome. We also performed ultrasound preoperatively for the differential diagnosis of pseudogynecomastia and estimated the amount of glandular tissue to remove. Sixty-two patients had gynecomastia that had developed in adolescence and persisted in the absence of any underlying medical condition. Two patients had Klinefelter's syndrome. The average body mass index of the patients was  $26.5 \pm 3.3$  kg/m<sup>2</sup>. Preoperative grading was based on the criteria of the American Society of Plastic Surgeons® (Table 1) [9]. We classified the subjects as 4 pseudogynecomastias, 22 grade I gynecomastias, 22 grade II gynecomastias, 12 grade III gynecomastias, and 4 grade IV gynecomastias. Our work was carried out in accordance with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards, and written consent was obtained for each patient.

### Surgical Procedure

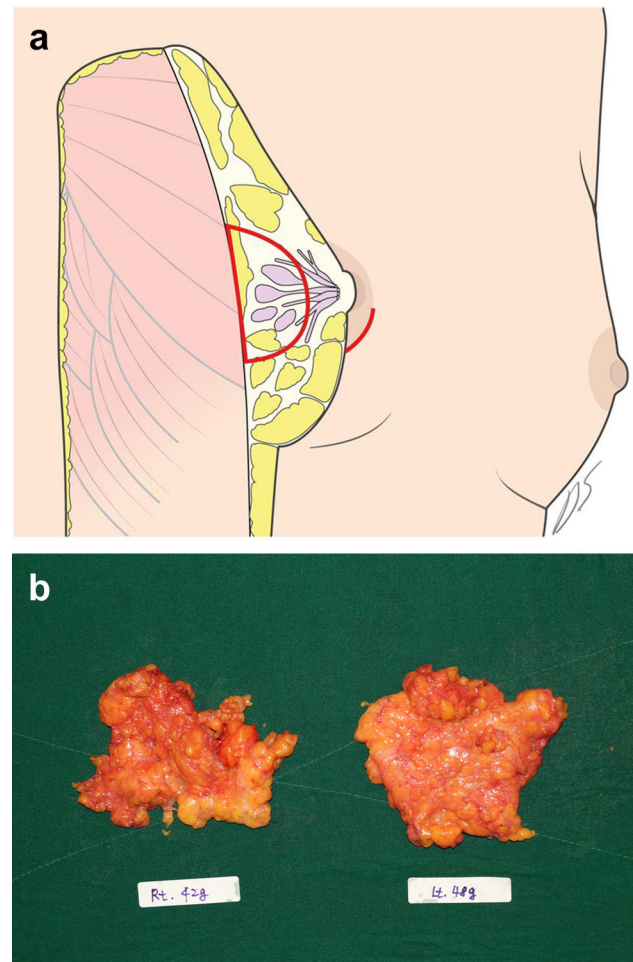
Based on the preoperative classification and ultrasound evaluation, patients with pseudogynecomastia, grade I gynecomastia, or grade II gynecomastia with minimal glandular component received liposuction only. Patients of grade I or II gynecomastia with palpable glandular tissue received power-assisted liposuction and subcutaneous mastectomy. Patients with grade III or IV gynecomastia received ultrasound-assisted liposuction and subcutaneous mastectomy, because ultrasound-assisted liposuction aids in skin retraction during the postoperative healing period when performed in the appropriate subdermal plane. Additional procedures such as a mastopexy were performed only in grade IV gynecomastia cases with excessive skin redundancy and breast ptosis.

Preoperatively, the areas of fat and glandular tissue were marked with the patient in a standing position (Fig. 1a). All procedures were performed under general anesthesia with the patients placed in the supine position. The combined procedures of subcutaneous mastectomy and liposuction were performed with an inferior periareolar incision around one-third to one-half of the circumference of the areola (Fig. 1b). Liposuction only was performed with single puncture incision in the subareolar area. When mastopexy was necessary, a circumareolar incision was made.



**Fig. 1** Surgical design and operation procedure. **a** Preoperatively, the areas of fat and glandular tissue were marked with the patient in a standing position. **b** The periareolar incision around one-third of the circumference of the areola in a patient undergoing combination treatment consisting of subcutaneous mastectomy and liposuction

After a tumescent solution was infiltrated into the breast, power-assisted or ultrasound-assisted liposuction was performed along the preoperatively marked area. In subcutaneous mastectomy, the entire glandular tissue was excised except a disk of tissue beneath the areola to prevent a sunken



**Fig. 2** Schematic design and specimen. **a** The resection range of glandular tissue with a periareolar incision. **b** Glandular tissue removed by subcutaneous mastectomy

areola and preserve nipple sensation (Fig. 2a, b). A negative drain was inserted through the subareolar incision in each breast, and then the incision was meticulously repaired. Compression dressing was applied postoperatively.

### Assessment

Standardized photographs were taken preoperatively, immediately after the operation, and during the follow-up period (3 and 6 months). We divided the patients into two groups: group A consisted of patients who underwent liposuction only; group B consisted of patients who underwent liposuction and subcutaneous mastectomy.

The serial photographs of all patients were clinically evaluated by three plastic surgeons who were not involved in the operations. Separate analyses were performed for each breast of a subject. The aesthetic aspects evaluated by the plastic surgeons included (1) size, (2) shape, (3) scarring, and (4) overall outcome. They were assessed using the following

**Table 2** Characteristics of gynecomastia patients in both treatment groups

	Group A (liposuction only)	Group B (liposuction + subcutaneous mastectomy)
Patients (breasts)	16 (31)	48 (94)
Diagnosis, patients (breasts)		
Pseudogynecomastia	4 (8)	0 (0)
Grade I gynecomastia	7 (13)	15 (28)
Grade II gynecomastia	4 (8)	18 (36)
Grade III gynecomastia	1 (2)	11 (22)
Grade IV gynecomastia	0 (0)	4 (8)
Body mass index, kg/m <sup>2</sup>	25.4 ± 3.1	25.7 ± 3.7
Fat tissue removed by liposuction, cc/each breast	235.0 ± 122.4	169.5 ± 109.8
Glandular tissue removed by mastectomy, g/each breast	–	40.9 ± 38.2
Follow-up period, months	23.8 ± 10.3	33.1 ± 16.7

**Table 3** Evaluated outcomes for all patients in both treatment groups

	Group A (liposuction only)	Group B (liposuction + subcutaneous mastectomy)	<i>p</i> value
Surgeons' evaluation score (1–5)			
Overall size	3.20 ± 1.21	4.06 ± 0.63	<0.001
Shape	3.57 ± 1.05	3.72 ± 0.77	0.205
Scarring	4.52 ± 0.56	4.08 ± 0.58	<0.001
Overall outcome	3.67 ± 0.84	4.01 ± 0.51	<0.001
Patient satisfaction score (VAS, 1–10)			
Palpable lump	7.87 ± 1.80	8.06 ± 1.81	0.607
Overall size	6.74 ± 1.67	7.52 ± 1.62	0.023
Shape	6.61 ± 1.75	6.90 ± 2.05	0.479
Scarring	9.32 ± 0.91	8.10 ± 1.42	<0.001
Overall outcome	7.39 ± 1.48	7.57 ± 1.66	0.576

VAS visual analogue scale

grading scale: 1, poor; 2, fair; 3, good; 4, very good; and 5, excellent. Furthermore, all patients completed a satisfaction survey to assess (1) palpable lump, (2) size, (3) shape, (4) scarring, and (5) overall outcome of the surgery using a visual analogue scale of 1–10: 1–2 is poor, 3–4 is fair, 5–6 is good, 7–8 is very good, and 9–10 is excellent.

To analyze the outcomes of the two groups, the surgeon evaluations and patient satisfaction survey results were compared by independent samples *t* test. The significance level was set at  $p < 0.05$ .

## Results

Of the 64 subjects, 16 received liposuction only, and 48 received both liposuction and subcutaneous mastectomy (total of 125 breasts). Of the patients who received both subcutaneous mastectomy and liposuction, 15 had grade I gynecomastia, 18 had grade II gynecomastia, 11 had grade

III gynecomastia, and 4 had grade IV gynecomastia. Only one patient with grade IV gynecomastia underwent peri-areolar doughnut mastopexy combined with ultrasound-assisted liposuction and subcutaneous mastectomy. Of the patients who received liposuction only, 4 had pseudogynecomastia, 7 had grade I gynecomastia, 4 had grade II gynecomastia, and 1 had grade III gynecomastia. No patients with grade IV gynecomastia were treated with liposuction only. The mean follow-up period was  $30.9 \pm 13.7$  months. The mean volume of fat tissue removed from each breast with liposuction was 235.0 cc (range 100–550 cc) in group A and 169.5 cc (range 50–375 cc) in group B. The mean volume of glandular tissue removed with mastectomy was 40.9 g (range 2–155 g) (Table 2).

Regarding the surgeons' evaluations of patients in group A, who received liposuction only, the average scores were 3.20 for overall size, 3.57 for shape, 4.52 for scarring, and 3.67 out of 5 for overall outcome. The scores for patients in group B, who underwent both liposuction and mastectomy,



**Fig. 3** An 18-year-old male patient with grade I gynecomastia. **a** Preoperative view. **b** Postoperative 6-month view of the patient after treatment with power-assisted liposuction and subcutaneous mastectomy



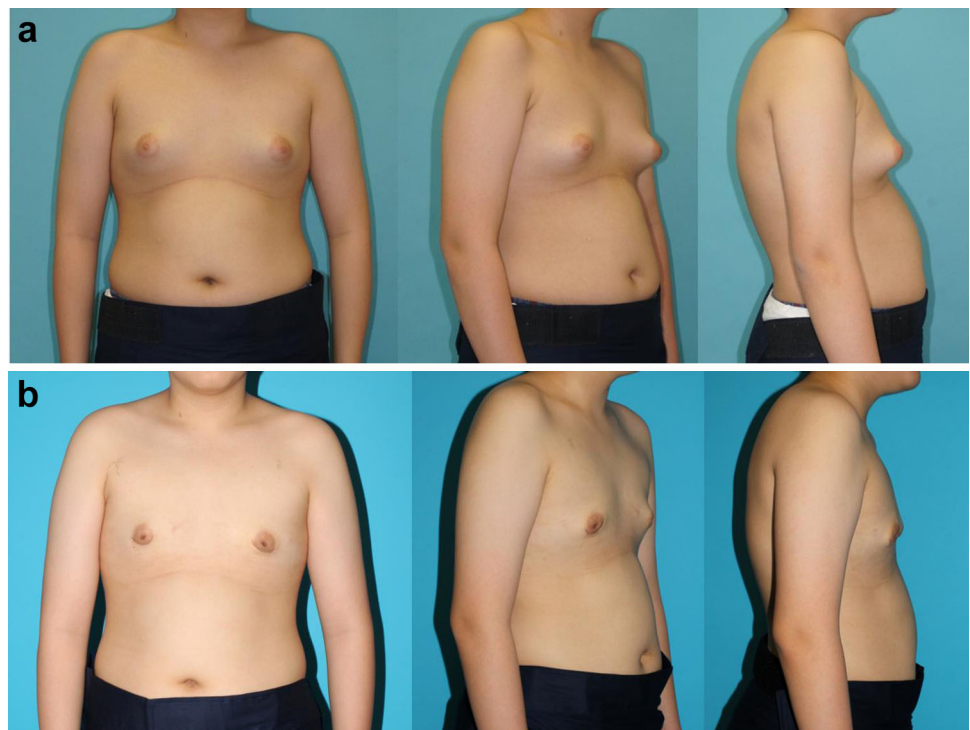
**Fig. 4** A 19-year-old male patient with grade II gynecomastia. **a** Preoperative view. **b** Postoperative 6-month view of the patient after treatment with power-assisted liposuction and subcutaneous mastectomy



were 4.06 for overall size, 3.72 for shape, 4.08 for scarring, and 4.01 for overall outcome. The average score for scarring was significantly higher in group A, and the scores for size and overall outcome were significantly higher in group B (Table 3). Figures 3, 4, and 5 show the postoperative outcomes of several patients who underwent operations for gynecomastia.

When we surveyed the satisfaction levels of patients who underwent liposuction only, the average satisfaction scores were 7.87 for palpable lump, 6.74 for overall size, and 6.61 for shape. The score for satisfaction with respect to scarring was 9.32. The overall satisfaction with the surgery was 7.39 out of 10. The satisfaction levels of the patients who underwent the combination procedure were

**Fig. 5** A 15-year-old male patient with grade III gynecomastia. **a** Preoperative view. **b** Postoperative 3-month view of the patient after treatment with ultrasound-assisted liposuction and subcutaneous mastectomy



**Table 4** Evaluated outcomes for patients with grade I and II gynecomastia in both treatment groups

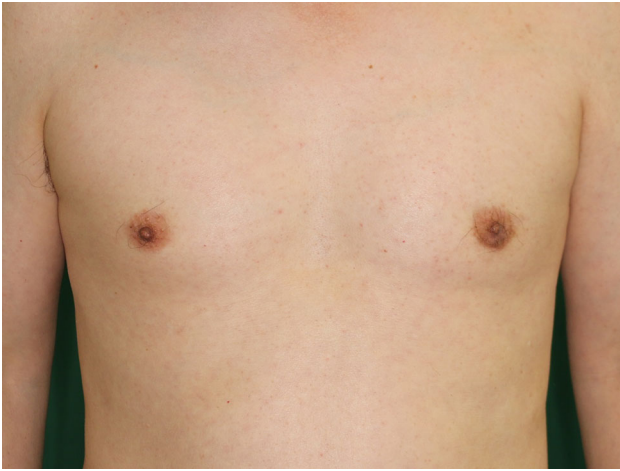
	Group A (liposuction only)	Group B (liposuction + subcutaneous mastectomy)	<i>p</i> value
Surgeons' evaluation score (1–5)			
Overall size	3.10 ± 1.22	4.15 ± 0.56	<0.001
Shape	3.68 ± 1.00	3.86 ± 0.76	0.140
Scarring	4.48 ± 0.56	4.06 ± 0.58	<0.001
Overall outcome	3.71 ± 0.80	4.08 ± 0.54	<0.001
Patient satisfaction score (VAS, 1–10)			
Palpable lump	7.86 ± 1.56	8.25 ± 1.90	0.395
Overall size	6.71 ± 1.45	7.78 ± 1.65	0.010
Shape	6.67 ± 1.56	7.00 ± 2.26	0.571
Scarring	9.33 ± 0.86	8.36 ± 1.41	0.004
Overall outcome	7.43 ± 1.08	7.69 ± 1.78	0.470

VAS visual analogue scale

8.06 for palpable lump, 7.52 for overall size, 6.90 for shape, and 8.10 for scarring. The overall satisfaction was 7.57 out of 10. In both groups, the patients were generally satisfied with their results, because scores higher than seven mean “very good.” Satisfaction regarding size was significantly higher in group B, and satisfaction regarding scarring was significantly higher in group A (Table 3).

Since the baseline characteristics of the two groups were not comparable in terms of preoperative grading, a post hoc analysis of patients with grade I and II gynecomastia was conducted. Similar results were obtained, as shown in Table 4.

Concerning complications, one case of undercorrection was noted in group A, and one case of undercorrection and one case of dimpling deformity were noted in group B. The undercorrected patient in group A underwent an additional combination procedure with liposuction and subcutaneous mastectomy 3 years later. Two years after the re-operation, the patient scored 7 for overall satisfaction. Several patients experienced hypoesthesia immediately after the surgery but recovered without sequela. One patient in group B complained of a hypertrophic scar, but scarring improved after treatment with a local steroid injection.



**Fig. 6** The scar of a 51-year-old male patient who underwent treatment for unilateral grade I gynecomastia with periareolar incisions around one-third of the circumference of the areola. The patient received operation for only left side, and the scar is hardly visible compared to the right side in postoperative 2-year view

## Discussion

When initiating treatment for gynecomastia, it is imperative to thoroughly review the patient's medical history and rule out other causative factors such as hormone-related diseases or medications. It should also be noted that gynecomastia is usually self-limiting and is likely to regress spontaneously. Medical treatments that adjust hormonal imbalance can be effective, especially in the early phase. However, surgical intervention is the standard treatment when it comes to gynecomastia that persists longer than 2 years [5, 10].

The choice of surgical technique depends on the severity of breast enlargement and presence of excess adipose tissue. When gynecomastia includes little glandular tissue, liposuction only would be sufficient to correct the lesion. However, if there is glandular tissue that should be removed, subcutaneous mastectomy is a commonly used technique that involves direct resectioning of the glandular tissue using a periareolar or transareolar approach with or without liposuction. In our study, all outcomes other than scarring were superior in patients who received the combination treatment of subcutaneous mastectomy and liposuction compared to patients who received liposuction only. In particular, the outcomes of overall size and overall satisfaction differed significantly between the two groups. Although the average patient score for scarring was higher in group A, the score for scarring in group B was 8.10, showing acceptable results.

In recent years, a new procedure involving the combination of liposuction and use of a cartilage shaver has been introduced [11–13]. Advocates of this method report that

the postoperative scar can be less obvious using this technique than with previous methods. As our study reveals, however, the combination treatment of conventional mastectomy and liposuction yields satisfying outcomes regarding the degree of postoperative scarring. The scars are longer than is the case with cartilage shaving, which leaves a postoperative scar of less than 10 mm. However, the scar from a subcutaneous mastectomy is barely noticeable because the incision is only about one-third to one-half of the circumference of the nipple-areolar complex, and the scar is placed on the edge of the areola, making it much easier to hide (Fig. 6).

Recently, an increased interest in appearance has motivated patients with low-grade gynecomastia to consider surgical treatment. To achieve a better aesthetic outcome, it is necessary to remove all glandular tissue in the subareolar area. For this purpose, we recommend subcutaneous mastectomy under direct vision instead of a blind procedure with a cartilage shaver or ultrasound-assisted liposuction. In cases of high-grade gynecomastia with larger volumes of glandular tissue, surgical treatment with subcutaneous mastectomy is beneficial.

Our study shows that the combination treatment of subcutaneous mastectomy and liposuction leads to excellent overall outcomes and good results in terms of scarring. One possible limitation of this study is that we did not include patients with glandular tissue who underwent surgical treatment with less invasive procedures such as cartilage shaving. However, we were able to evaluate scarring after combination treatment with liposuction and subcutaneous mastectomy by comparison with patients who underwent liposuction only.

## Conclusion

Surgical correction is considered the gold standard therapy for gynecomastia, and many surgical techniques have been developed. Recent studies have reported various methods such as liposuction only or the combination of liposuction and cartilage shaving. However, our study shows that combination treatment with liposuction and subcutaneous mastectomy brings about satisfactory outcomes, including the extent of scarring. We conclude that gynecomastias that include little glandular tissue can be corrected with liposuction only, but when glandular tissue needs to be removed, combination treatment with liposuction and subcutaneous mastectomy is recommended as the standard surgical treatment for gynecomastia.

**Acknowledgments** This work was supported by the Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education, Science and

Technology (Grant number 2013R1A1A1009764, Lee DW). The authors are grateful to Dong-Su Jang (medical illustrator, Medical Research Support Section, Yonsei University College of Medicine, Seoul, Korea) for his help with the figures.

### Compliance with Ethical Standards

**Conflict of interest** The authors declare that they have no conflict of interest.

**Ethical approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

### References

- Nuttall FQ (1979) Gynecomastia as a physical finding in normal men. *J Clin Endocrinol Metab* 48:338–340
- Niewoehner CB, Nuttall FQ (1984) Gynecomastia in a hospitalized male population. *Am J Med* 77:633–638
- Rocheffort H, Garcia M (1983) The estrogenic and antiestrogenic activities of androgens in female target tissues. *Pharmacol Ther* 23:193–216
- Treves N (1958) Gynecomastia; the origins of mammary swelling in the male: an analysis of 406 patients with breast hypertrophy, 525 with testicular tumors, and 13 with adrenal neoplasms. *Cancer* 11:1083–1102
- Bembo SA, Carlson HE (2004) Gynecomastia: its features, and when and how to treat it. *Cleve Clin J Med* 71:511–517
- Rohrich RJ, Ha RY, Kenkel JM, Adams WP Jr (2003) Classification and management of gynecomastia: defining the role of ultrasound-assisted liposuction. *Plast Reconstr Surg* 111:909–923
- Celebioğlu S, Ertaş NM, Ozdil K, Oktem F (2004) Gynecomastia treatment with subareolar glandular pedicle. *Aesthetic Plast Surg* 28:281–287
- Tashkandi M, Al-Qattan MM, Hassanain JM, Hawary MB, Sultan M (2004) The surgical management of high-grade gynecomastia. *Ann Plast Surg* 53:17–21
- American Society of Plastic Surgeons (2002) ASPS recommended insurance coverage criteria for third-party payers. <http://www.plasticsurgery.org/Documents/medical-professionals/health-policy/insurance/Gynecomastia-Insurance-Coverage.pdf>
- Braunstein GD (2007) Clinical practice. Gynecomastia. *N Engl J Med* 357:1229–1237
- Mentz HA, Ruiz-Razura A, Newall G, Patronella CK, Miniell LA (2007) Correction of gynecomastia through a single puncture incision. *Aesthetic Plast Surg* 31:244–249
- Lee JH, Kim IK, Kim TG, Kim YH (2012) Surgical correction of gynecomastia with minimal scarring. *Aesthetic Plast Surg* 36(6):1302–1306
- Prado AC, Castillo PF (2005) Minimal surgical access to treat gynecomastia with the use of a power-assisted arthroscopic-endoscopic cartilage shaver. *Plast Reconstr Surg* 115:939–942