

Liposuction Breast Reduction: A Prospective Trial in African American Women

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Background: Recently published case reports and outcome studies support the use of liposuction alone as an effective technique for ameliorating symptoms of breast hypertrophy. This study is the first prospective trial to examine the effectiveness of liposuction breast reduction as a primary modality of breast reduction. In addition, this study examines the role that liposuction breast reduction can play in the treatment of African American women, given the known scarring difficulties that darker skinned patients can encounter with traditional breast reduction surgery.

Methods: Twenty African American women were recruited through newspaper and Internet advertisements. Patients aged 20 to 60 years were serially accepted to the study. Patients with a chief complaint of breast ptosis were excluded. No other exclusion criteria were used. Previously validated questionnaire instruments were used preoperatively and postoperatively to measure breast-related symptoms, general patient health perception, bodily pain, and self-esteem. Comorbid conditions, demographics, financial status, prior treatments, and smoking history were also documented.

Results: Seventeen patients completed the preoperative and postoperative questionnaires. An average of 1075 cc of tissue was removed per breast during liposuction breast reduction surgery. Postoperative assessment showed a significant decrease in breast-related symptoms, a significant decrease in patient pain, and a significant improvement in overall patient health perception.

Conclusions: Liposuction breast reduction is a useful breast reduction modality in the properly selected patient. African American women, who may traditionally forego breast reduction surgery because of scarring, are excellent candidates for this type of reduction procedure. (*Plast. Reconstr. Surg.* 119: 1, 2007.)

The number of breast reduction procedures performed in the United States continues to rise. In 1997, 47,874 women underwent breast reduction surgery, whereas in 2004 that number increased to 144,374.¹ Patients seek medical attention for large breasts because of a constellation of issues such as neck, back, and shoulder pain; intertrigo; postural imbalances; and difficulty with social situations and the purchase of clothes. The health burden from these and other symptoms of breast hypertrophy has been well documented.² Likewise, the effective-

ness of surgical treatment has been demonstrated, and the ineffectiveness of most conservative treatments has also been proven.³

The introduction of modern liposuction techniques in the 1980s provided a new option in breast reduction surgery. Although liposuction was immediately used as a tool in cases of gynecomastia,^{4,5} its use in female breast reduction cases took several more years to be recognized.⁶ Early reports on liposuction breast reduction stressed a limited role and advocated its use only in cases of mild hypertrophy with no significant ptosis.^{6,7} More recent reports⁸ and large case series⁹ have shown, however, that liposuction breast reduction may be useful in more patients than previously thought, and a recent outcome study demonstrated that liposuction breast reduction was a useful modality when applied to the proper patients.¹⁰ These studies have confirmed that some women desire an operation to treat their primary

From *Image Plastic Surgery; Cosmedical Plastic Surgery; the Department of Mathematics, New Jersey Institute of Technology; and K5 Analytic LLC.*

Received for publication September 2, 2005; accepted December 29, 2005.

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DOI: 10.1097/01.prs.0000246715.97310.3e

problem, breast hypertrophy, and are willing to forego treatment of their secondary breast ptosis. These reports also infer that many women may avoid traditional breast reduction surgery because of the inherent permanent scars, invasive nature of the procedure, and recovery time required. In practice, the authors have found that many women, especially older patients, desire to relieve themselves of breast hypertrophy symptoms and are happy to continue to wear a bra for their ptosis issues. Similarly, many younger patients are content to reduce their bra size by a limited amount, provided that they do not encounter noticeable breast scarring.

Despite the recent increased use of liposuction breast reduction, no prospective studies exist to confirm its efficacy. The authors therefore conducted a prospective study of liposuction breast reduction to better understand the utility of this surgical method. In addition, although previous studies^{3,10} have shown the effectiveness of traditional and liposuction breast reduction, both study populations were predominantly Caucasian. It was the authors' opinion that the liposuction breast reduction method held special promise in patients of darker skin with greater scarring issues. These patients, however, were not routinely encountered for demographic, economic, and attitudinal reasons. Discussions with African American liposuction breast reduction patients revealed a common fear of breast reduction procedures based on the experiences of other women who encountered severe breast scarring. This fear of breast surgery scarring has been previously documented, and techniques to limit scarring in breast operations have been published.¹¹ Based on these facts, the authors chose to prospectively investigate liposuction breast reduction in African American patients and use this information to gauge the effectiveness of the procedure and its utility in the more scar-prone African American population.

PATIENTS AND METHODS

Newspaper and Internet advertisements were placed to recruit African American patients for a prospective study in liposuction breast reduction. Patients were required to be African American women between the ages of 20 and 60 years with a minimum D cup bra size. Patients were asked whether their chief breast complaint was breast size/weight related or ptosis related. Those patients answering "ptosis" were excluded from the study. Patients listing both size/weight and ptosis, or size/weight alone were included. Patients were required to live in the New Jersey metropolitan area to allow

for follow-up. Patients were recruited for the study on a first-come basis with a target enrollment of 20 based on budgetary constraints. No exclusion criteria were implemented and no patients were excluded that met the inclusion criteria above.

No fees were paid to the participants. No charge was billed to the patients for the surgery (pro bono). The patients did pay for outpatient surgery center operating room and anesthesia fees (\$1900). Insurance participation was not required and insurance carriers were not billed.

Evaluation protocols were studied and a recent set of validated instruments^{2,12-15} were chosen based on their acceptance in the literature.^{2,3} These instruments gave insight into the patient's breast-related symptoms, pain status, general quality of life, and general self-esteem. Each patient acted as their own control.

Patients were required to preoperatively complete a multipart questionnaire that was identical to that used in previously published studies.^{2,3} This questionnaire contained selected portions of the instruments cited above (Breast-Related Symptoms Questionnaire, EuroQol, McGill Pain Questionnaire, SF-36, and Multidimensional Body-Self Relations Questionnaire). Patients were then required to complete the same questionnaire postoperatively. In addition to the instruments cited above, data on patient demographics, physical complaints, previous breast hypertrophy treatment modalities, insurance coverage, and smoking history were collected. Patients were also questioned on the presence or absence of 12 comorbid conditions (asthma, chronic obstructive pulmonary disease, arthritis/rheumatism, hypertension, angina, congestive heart failure, stroke, cancer, diabetes, chronic back trouble, lupus, and scleroderma). Measurements of nipple/sternal and inframammary crease/nipple distances were taken and operative data were collected and tabulated. Preoperative mammograms were ordered according to national guidelines, and preoperative tests were ordered as needed.

All patients underwent liposuction breast reduction by the first author (M.J.M.) in the same outpatient facility. Liposuction products were allowed to settle for 30 minutes before measurement and were sent for histologic examination in all cases. Volumes reported in this study represent fat only and exclude fluid removed during liposuction. Ultrasonic liposuction was not used in any case. A 4-mm liposuction cannula was used in all cases, with a 6-mm cannula used initially in several of the larger reduction cases. All patients were dressed in a surgical bra and compressive binder

and were sent home the same day. Patients were seen the day after surgery and then 1 month, 3 months, and 6 months after the procedure.

Primary statistical analysis of the questionnaire was performed with paired *t* tests assuming normal distribution to screen for statistical significance, followed by signed rank tests on all questions to allow for nonparametric distributions; *p* values quoted are for signed rank testing. The scoring and standardization techniques often reported and used with many of the instruments used in this study were not performed. Rank test in place of standardized scoring was chosen to give the most powerful statistical results given the limited sample size and the fact that each patient was used as their own control, with no comparisons made with historical or other groups.

RESULTS

Twenty-four patients were approved for the study in a rolling fashion, and the first 20 to schedule surgery constituted the study population. Twenty patients completed the preoperative survey and underwent surgery. Seventeen patients completed the postoperative questionnaire, yielding a completion rate of 85 percent. Follow-up ranged from 7 to 19 months, with an average of 12 months.

Demographics

Patient age ranged from 20 to 54 years, with a mean of 34 years (Table 1). Patient weight ranged from 140 to 280 lb, with a mean of 186 lb. Patient height ranged from 4 feet 10 inches to 5 feet 11 inches, with a mean of 5 feet 4 inches. Body mass index calculated on these parameters yielded a range of 24 to 40, with a mean of 32.

Patients were all African American women, although one patient did list her heritage as Hispanic based on her mother's background. Seven patients had Blue Cross/Blue Shield insurance, two patients had health maintenance organization coverage, three had Medicaid, and five had no insurance coverage at all. Of the insured patients, one knew that their company would cover a breast reduction procedure, whereas the other 11 had never moved forward on the issue before contemplating liposuction breast reduction. The majority of patients reported an annual income of \$50,000 to \$75,000 and had one dependent. All patients were high school graduates. Eleven patients were college graduates.

Comorbid Conditions

One patient reported a history of asthma, one patient had a history of arthritis, and three pa-

tients reported chronic lower back trouble. Three patients were smokers who all smoked less than one-half pack of cigarettes per day.

Nonsurgical Therapy

Before surgical intervention, all patients had attempted nonsurgical therapies to alleviate their breast symptoms (Fig. 1). Four patients tried physical therapy, with temporary relief. Nine patients used strengthening exercises, with five gaining some temporary relief and one noting some permanent benefit. Stretching was used by 14 patients, with 10 noting temporary relief. Four patients used postural training, with three gaining temporary relief. Relaxation was used by 12 patients, with nine having temporary benefits. Custom bras were used by nine patients, with seven gaining temporary relief and one noting some permanent relief. Exercise temporarily helped four of the 12 patients who tried it, back braces temporarily helped five of the five that tried them, and heat application temporarily helped all 10 of the 10 that tried it. Hydrotherapy also helped all eight patients who used it, with one noting some permanent benefit. Chiropractic care temporarily helped all 10 of the patients who tried it, with one noting some permanent benefit. Weight loss temporarily helped four of the 13 that tried it, whereas three noted no benefit, four noted some permanent relief, and one noted full relief of pain. Eight patients had regularly used over-the-counter medications, most commonly a nonsteroidal anti-inflammatory oral medication.

Surgical Data

All patients underwent liposuction breast reduction under intravenous sedation or laryngeal mask anesthesia. A wet tumescent technique composed of 1 liter of normal saline with 1 cc of 1:1000 epinephrine and 10 cc of 1% lidocaine was used. A planned 1:1 ratio of solution to extraction was used, and the amount of solution added ranged from 750 to 2500 cc per breast. An average of 1075 cc of fatty tissue was removed per breast (range, 400 to 2025 cc). Experiments performed in tandem with this study have shown that 1000 cc of settled lipoaspirate corresponds to approximately 800 g of breast tissue.¹⁶ The average operative time was 57 minutes (Table 1).

Physical Measurements

All patients demonstrated a significant change in both nipple to sternal notch distance and nipple to inframammary fold distance (*p* < 0.0001). Pre-

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Table 1. Demographics and Surgical Outcomes

Patient	Age (yr)	Height (inches)	Weight (lb)	Bra Cup Size	Nipple to Sternal Distance (mm)				Inframammary Fold to Nipple Distance (mm)				Fat (cc)	Operative Time* (min)	Follow-Up (mo)	Satisfaction Score†	
					Left		Right		Left		Right						
					Before	After	Before	After	Before	After	Before	After					
1	30	67	190	44DDD	38	32	38	31	17	13	17	12	1300	1300	55	8	5
2	37	70	280	46E	45	40	45	39.5	23	21	23	21	1900	1900	70	12	4
3	32	67	180	38DD	32	28	29.5	27	17	13	17	13	400	400	47	10	5
4	36	59	145	34FF	35	31	34	30.5	18	10.5	17	10.5	600	600	60	9	5
5	30	61	165	38DDD	30	29	32.5	29	16	13	16	13	850	750	60	9	4
6	52	58	190	42DD	33.5	29.5	33.5	28	17	14	17	14.5	1200	1200	50	10	5
7	33	64	185	40DDD	33	29	33	29	18	14	18	14	1500	1500	60	10	4
8	37	64	190	40DD	34	32	34	32	14	12	15	13	800	800	50	10	4
9	25	65	190	40F	41	35	41	35	22	16	22	16	1800	1800	90	16	5
10	38	65	149	38DDD	29	25	29.5	26	16.5	12.5	16	12	550	550	40	13	5
11	25	61	140	38DD	29	25	29	25	16	13	17.5	14	825	800	60	12	5
12	46	62	167	DD	30	28	31	28	15	13	16	13	1100	800	60	14	5
13	32	63	205	38G	33	30.5	32	30	17	14	16	13	1000	800	50	14	5
14	20	64	165	36DDD	28	24	28	24	15	13	15	13	825	825	50	14	5
15	29	71	230	38E	38	32	39	33.5	21	16	21	16	2100	2000	90	13	5
16	37	63	165	38DD	33	29	34	29	13	10	14	10	900	900	40	18	5
17	31	63	220	42E	36	32	35	32.5	14	12	15	12	1000	1000	35	18	5
Mean	34	64	186	DDD	34	30	34	30	17	14	17	14	1097	1054	57	12	4.8

*Time of actual surgery excluding anesthesia, preparation, and so forth.

†Response to the statement "I am happy with the medical care provided" as follows: 1 = not at all; 2 = a little; 3 = some; 4 = quite a bit; and 5 = very much.

Effects and Efficacy of Nonsurgical Therapy

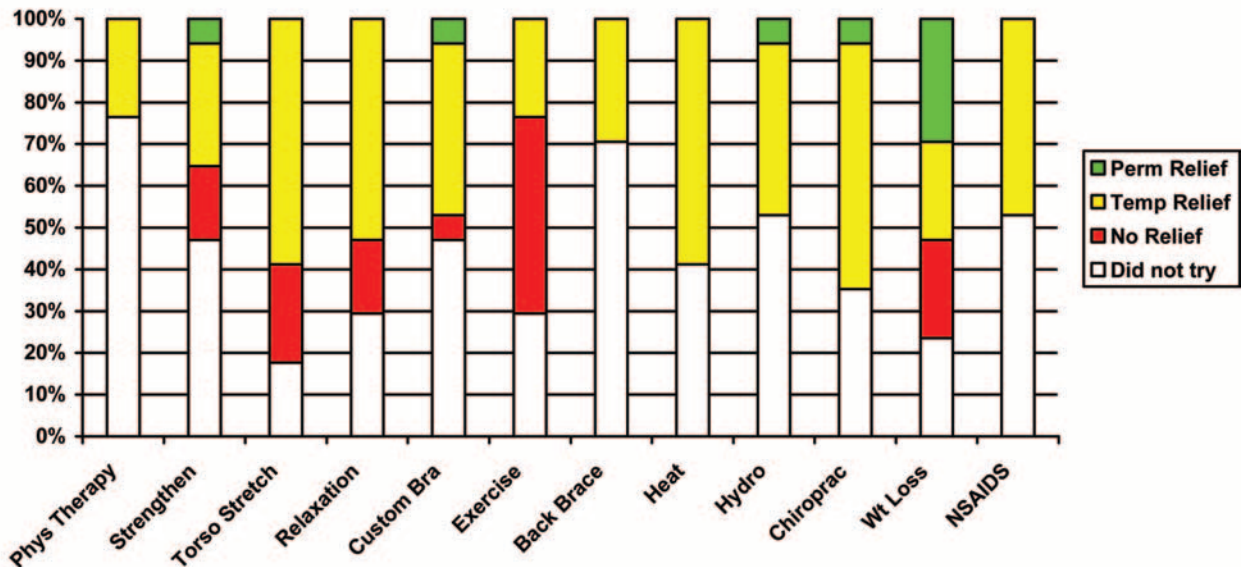


Fig. 1. Effects and efficacy of nonsurgical therapy.

operative patient measurements demonstrated an average nipple to sternal notch distance of 34 cm (range, 28 to 45 cm), with a postoperative distance of 30 cm (range, 24 to 40 cm; mean decrease, 4.0 cm). Preoperative inframammary crease to nipple distance was 17 cm and decreased postoperatively to 13.5 cm, a mean reduction of 3.5 cm (Table 1).

Complications

There were no major or minor complications in this group of 17 patients. No patients suffered any hypertrophic scarring or keloid formation at the cannula insertion site. No histologic abnormalities were found in the specimens sent for pathologic examination.

Outcome Measures

Breast-Related Symptoms

Twelve of the 13 individual parameters questioned (Table 2) demonstrated a significant improvement after surgery ($p < 0.02$). The only question that did not demonstrate a significant improvement was question 12 regarding hand pain, which failed to gain statistical significance because it was the least reported complaint preoperatively, with over 50 percent of patients noting that it was never an issue. When the Breast-Related Symptom section was examined as a group, the statistical significance was obviously increased, with a value of $p < 0.001$.

Before surgery, 47 percent of patients complained of pain all or most of the time in the pain-related questions of the Breast-Related Symptoms Questionnaire. After surgery, the percentage decreased to 6 percent. Similarly, preoperative patients noted an average of 7.7 breast-related complaints that bothered them most or all of the time. This number was reduced to less than 2 after surgery. The Breast-Related Symptom area also questioned patients on their breast and nipple sensation, with no statistically significant changes noted postoperatively.

A separate question in the Breast-Related Symptoms Questionnaire asked: “How bothered are you by your breast-related symptoms?” Patient response to this question showed significant improvement after surgery. On a scale of 1 to 5, with 1 being extremely bothersome, 3 being moderately bothersome, and 5 being not bothersome at all, patients went from a preoperative average of 1.4 to a postoperative average of 3.1 ($p < 0.001$).

SF-36 Health Measurement

The overall score of the SF-36 health survey showed a statistically significant improvement ($p < 0.001$) in patients after surgery. When individual sections were broken out and examined, the trends showed improvement throughout, but the relatively small sample size precluded statistically significant measurement. Despite the sample size, however, the key question, “Compared with 1 year ago, how you

T2

Table 2. Breast-Related Symptoms Questionnaire*

Question	Breast Symptoms		All of the Time	Most of the Time	Some of the Time	A Little of the Time	None of the Time
1	My breast size causes upper back pain	Before	7	6	3	0	1
		After	1	3	3	6	4
2	Because of my breast size, I have difficulty finding bras and clothes to fit	Before	12	4	1	0	0
		After	3	1	4	3	6
3	I have headaches	Before	1	1	11	2	2
		After	0	2	4	6	5
4	I have breast pain	Before	1	4	6	4	2
		After	0	2	1	7	7
5	My breast size causes lower back pain	Before	6	6	3	1	1
		After	0	1	4	4	8
6	Rashes or itching develops under my breasts	Before	5	2	5	2	3
		After	0	1	3	5	8
7	I have painful bra strap grooves	Before	10	4	1	1	1
		After	1	1	4	6	5
8	My breast size makes it difficult for me to participate in sports	Before	10	4	3	0	0
		After	2	3	1	6	5
9	My breast size causes neck pain	Before	7	6	2	1	1
		After	1	1	1	6	6
10	My breast size causes shoulder pain	Before	7	7	2	1	0
		After	1	2	2	8	4
11	I have a hard time running because of my breast size	Before	10	6	0	0	1
		After	3	2	2	5	4
12	Because of my breast size, I have pain in my hands or they feel numb	Before	0	2	5	0	9
		After	0	0	1	3	12
13	My breast size causes me arm pain	Before	1	0	7	2	7
		After	0	0	1	4	11
			Extremely	Quite a bit	Moderately	Slightly	Not at all
14	How bothered are you by your breast-related symptoms?	Before	11	6	0	0	0
		After	3	3	4	4	3

*Data are expressed as number of patients.

would rate your health in general now?” did show a statistically significant improvement ($p < 0.02$).

EuroQol

In a fashion similar to the SF-36, the limited sample size completing the EuroQol health survey precluded statistically significant data despite the overwhelming trend toward improvement after surgery. Despite the limitations of sample size, once again, the key question. “Compared with my general level of health over the past 12 months, my health state today is better/same/worse?” did show a statistically significant improvement ($p < 0.003$).

Multidimensional Body-Self Relations Questionnaire

Three questions in the Multidimensional Body-Self Relations Questionnaire did gain a statistically significant improvement after surgery with values of $p < 0.05$ or less. These were, “I like the way I look without my clothes on,” “I like the way my clothes fit me,” and “How satisfied are you with your upper torso?” The remaining self-esteem questions in the Multidimensional Body-Self Relations Questionnaire did not show a general improvement or degradation.

McGill Pain Questionnaire

The McGill Pain Questionnaire demonstrated a statistically significant decrease in bodily pain scores in each of its present pain intensity questions as analyzed by individual rank testing ($p < 0.05$).

DISCUSSION

This prospective study of liposuction breast reduction demonstrates that the liposuction technique can provide significant relief of many breast hypertrophy symptoms. Using accepted examination instruments, significant improvements were demonstrated in breast-related symptoms (Breast-Related Symptoms Questionnaire), overall health measurements (SF-36), and bodily pain perception (McGill Pain Questionnaire). In addition, improving trends and significant improvements in specific areas were noted in quality-of-life (EuroQol) and self-esteem (Multidimensional Body-Self Relations Questionnaire) areas.

One-year surgical follow-up revealed no major or minor complications in these 17 patients. Operative time was relatively short at 57 minutes, and patients noted permanent improvements that they could not attain with nonsurgical therapies.

Patients reported no changes in nipple sensation caused by the operation. All patients obtained measurable elevation of the nipple complex post-operatively, with the average elevation measuring 4 cm. Nipple to inframammary fold distances were likewise decreased. No patients sustained an increase in either measured distance, demonstrating the ability of breast skin to recoil after breast weight is reduced (Figs. 2 through 5).

F5

The fact that liposuction breast reduction can produce measurable and significant improvements in patients with breast hypertrophy should come as no surprise. Previous studies^{3,17,18} have shown that traditional excisional breast reduction provides substantial relief of breast hypertrophy symptoms. Clearly, this relief is attributable to the removal of breast tissue and reduction of breast



Fig. 2. Before and after (6 months) photographs of a 46-year-old woman who had 1100 cc of fat removed from the left breast and 800 cc removed from the right breast.



Fig. 3. Before and after (24 months) photographs of a 29-year-old woman who had 2100 cc of fat removed from the left breast and 2000 cc removed from the right breast.

weight. Liposuction breast reduction, therefore, provides similar symptom relief.

One of the principal concerns voiced by plastic surgeons regarding liposuction breast reduction is that it does not address the patient's ptosis symptoms. As shown in this study, ptosis does improve with liposuction breast reduction; however, it cannot attain the same degree of improvement possible with skin-excising techniques. Despite this limitation, prior studies¹⁰ have demonstrated overwhelming patient satisfaction with liposuction breast reduction. The key to successful patient treatment with liposuction breast reduction is patient selection and education. The key question to ask each patient considering liposuction breast reduction is whether their main complaint is weight related or ptosis related, and liposuction breast reduction should be considered only in those patients where ptosis is not the main issue. No one technique is applicable to all patients and



Fig. 4. Before and after (8 months) photographs of a 37-year-old woman who had 900 cc of fat removed from the left breast and 900 cc removed from the right breast.

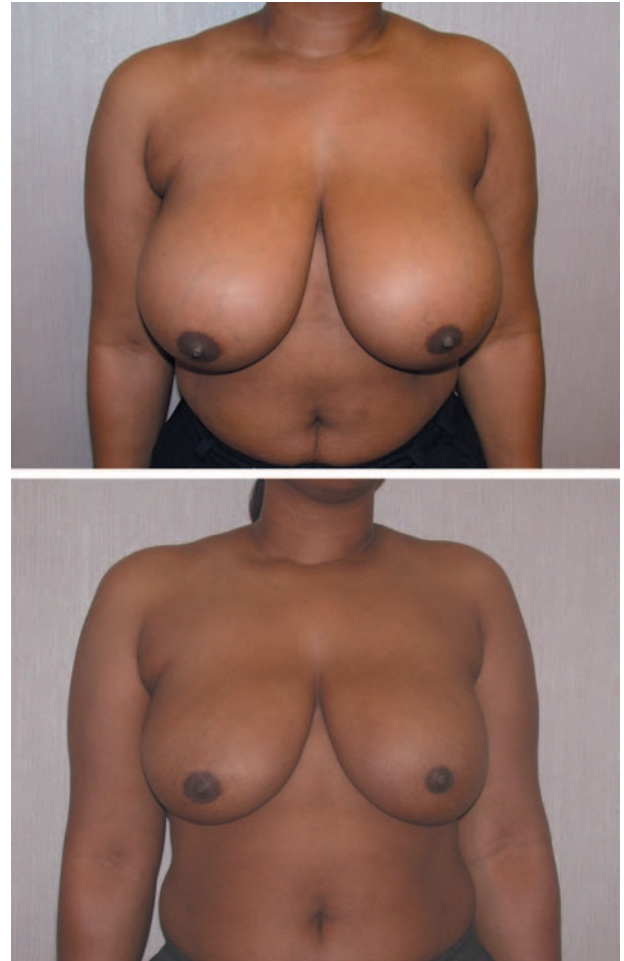


Fig. 5. Before and after (12 months) photographs of a 25-year-old woman who had 825 cc of fat removed from left breast and 800 cc removed from the right breast.

patients must be educated on the advantages and disadvantages of the procedures available to them. Patients whose main complaint is breast ptosis are, by definition, poor candidates for liposuction breast reduction. Women whose complaints are weight-related are excellent candidates in many cases. Even this latter group of patients must understand, however, that the breast gland may be a significant part of their problem and will not be treated by liposuction breast reduction because liposuction can only remove fat, not gland. Thin patients with large breasts are often predominantly glandular and will fail liposuction breast reduction. This study had no exclusion criteria for such patients and could have seen treatment failures if such patients had applied. It is important in daily surgical practice to educate patients on the

limitations of liposuction breast reduction and be prepared to use traditional techniques as needed.

The assessment of patients for liposuction breast reduction is best accomplished by physical examination. Patients over the age of 40 and those with fat elsewhere on their body tend to be good candidates. Many young, thin, patients, however, have had good results with liposuction breast reduction and should not be excluded immediately. Diagnostic studies such as mammography are poor indicators of fatty versus glandular breasts. Magnetic resonance imaging is a good evaluation modality; however, its pricing is prohibitive and its use would not be covered under most insurance plans. Other than the physical predictors mentioned above, the actual surgery tends to be the best assessment of liposuction breast reduction utility. Preoperatively, it is important to discuss that if no fat is found at the time of liposuction breast reduction, traditional surgery can be per-

formed instead, or a refund of the surgical fee can be given and options discussed at a later time. A full description of the evaluation of patients for liposuction breast reduction and the techniques involved in the surgery can be found in several publications.^{7,8,19}

Similarly, examination of Figures 3 and 4 highlights the movement from preoperative gigantomastia to postoperative macromastia. This is a limitation of liposuction breast reduction. Reductions of 2000 cc per breast (Fig. 3) and 900 cc per breast (Fig. 4) were performed, giving each of these patients a satisfactory result based on their questionnaires though still leaving them in a state of macromastia. It is important to educate patients that liposuction breast reduction has its limitations. It can remove only fat and cannot make patients' breasts as small as traditional excisional surgery in some cases. One patient in this study has considered traditional surgery in an effort to attain an even smaller breast size but has refrained from surgery because of the scars. Overall, the balance between scar minimization and increased reduction must be judged in each case.

This study also demonstrates the successful use of liposuction breast reduction in the African American patient, and this success is easily extrapolated to other scar-prone populations. Many women do not seek traditional breast reduction care because of the scars involved. Prior studies have documented this fact,¹⁰ and in this study, 16 of 17 women (94 percent) did not seek treatment from a surgeon before reading about this newer, limited-scar technique.

CONCLUSIONS

This study has demonstrated that liposuction breast reduction is a useful technique in treating breast hypertrophy symptoms. In addition, liposuction breast reduction has been shown to be a useful modality in African American patients who often suffer from scarring issues and therefore tend to avoid breast reduction surgery. Liposuction breast reduction can reduce a large range of breast sizes with good results and can accomplish that goal in a minimal amount of time and with very low morbidity.

Liposuction breast reduction should be considered in women who complain of breast hypertrophy symptoms and are relatively unconcerned with breast ptosis issues. It is an excellent addition to the plastic surgeon's options when dealing with breast surgery and will prove to be surprisingly popular and effective when used on the proper patients.

The next step in studying the utility of liposuction breast reduction is the performance of a prospective, randomized, multicenter trial to compare the overall results of traditional excisional

breast reduction and liposuction breast reduction. The limitations and strengths of liposuction breast reduction need to be clearly identified and publicized so that we can offer our patients the most precise and individually tailored care.

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DISCLOSURES

None of the authors has any financial interest in any product, device, or drug mentioned in this article, nor is there any commercial association that may pose a conflict of interest.

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AUTHOR QUERIES

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AQ1: AUTHOR—Any update?
