

Laser-Assisted Breast Reduction: A Safe and Effective Alternative. A Study of 367 Patients

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Background: Although several studies have been published documenting the safety of laser-assisted breast reduction, they have involved only small numbers of patients.

Objective: The authors conducted a retrospective chart review of a series of 367 consecutive patients who underwent inferior pedicle laser-assisted breast reduction surgery at a single outpatient facility from 1995 through 2004.

Methods: All patients received appropriate preoperative intravenous antibiotics and had sequential compression devices placed on their lower extremities before induction of anesthesia. Pedicle deepithelialization was performed using a carbon dioxide laser in continuous mode. Following deepithelialization, an inferior pedicle Wise-pattern breast reduction was performed in standard fashion. In approximately 20% of cases, breast reduction was combined with lipoplasty, facial aesthetic surgery, or abdominoplasty. Minor complications assessed included seroma, hematoma, infection, dog-ear, and incisional wound breakdown. Major complications were defined as >25% nipple/areola necrosis, blood transfusion, deep vein thrombosis, pulmonary embolus, myocardial infarction, or death.

Results: No major complications were noted in our series. Two patients with infections required short-term hospitalization for administration of intravenous antibiotics. A total of 47 minor complications occurred in 42 patients (11%), including 36 incisional wound breakdowns, 6 infections, 3 hematomas, 1 seroma, and 1 dog-ear revision. The incisional breakdowns included 25 minor T-zone wounds, 2 nipple-areolar complex wounds, and 9 wounds of the vertical and transverse incisions. No inclusion cysts were noted in any patients.

Conclusions: Complication rates for our series of patients who underwent laser-assisted breast reduction surgery were consistent with those reported for non-laser-assisted procedures. These results, combined with the benefits and efficient operating time afforded by laser deepithelialization, indicate that laser-assisted breast reduction surgery can provide an alternative to standard methods of deepithelialization for those surgeons with access to a carbon dioxide laser. (Aesthetic Surg J 2006;26:432–439.)

The use of a carbon dioxide laser for pedicle deepithelialization in breast reduction surgery has previously been described as an alternative approach to this procedure.¹⁻⁵ Benefits include efficient and bloodless deepithelialization, consistent preservation of the subdermal vascular plexus, and a reliable and firm dermal leash that protects the pedicle and the nipple/areola blood supply.^{1-3,6} Additionally, effective deepithelialization with the laser does not require taut immobilization of the breast tissue, which can be difficult to attain in large breasts with poor elasticity.¹

Prior studies¹⁻³ have used relatively small numbers of patients (fewer than 50) to demonstrate that the safety of laser-assisted breast reduction is consistent with the safety of breast reduction surgery using standard techniques.

This study of 367 patients (731 breasts) represents a much larger and updated examination of the laser-assisted breast reduction technique, and provides a further comparison of the safety of this procedure versus non-laser breast reduction safety standards set in the literature.

Methods

The data collected represent a retrospective chart review of 367 consecutive inferior pedicle laser-assisted breast reduction procedures performed at a single outpatient facility by the senior surgeon (WGS) over a 10-year period (1995 through 2004). Minor complications assessed included seromas, hematomas, infections, dog-ears requiring revision, and incisional wound breakdowns. Major complications evaluated included nipple/areola

necrosis, need for blood transfusion, deep vein thrombosis, pulmonary embolus, myocardial infarction, and death. Hypertrophic or aesthetically suboptimal scar formation was not specifically included as a complication in this study. When complications such as dehiscence or infection resulted in a hypertrophic scar, the morbidity was defined by the inciting complication rather than the scar itself.

All patients were given an appropriate dose of preoperative intravenous antibiotics. Prior to induction of anesthesia, all patients had sequential compression devices placed on their lower extremities. No Foley catheters were used in any patients. A mixture of 250 cc normal saline, 30 cc 2% plain lidocaine, and 1 cc epinephrine was prepared, and approximately half of this mixture was injected in each breast, carefully avoiding the central breast tissue and the blood supply to the inferior pedicle.

The Sharplan 150XJ carbon dioxide laser (Lumenis Inc., Santa Clara, CA), with a 200-mm hand piece, 6-mm scan size, and 120-W power,⁴ was used for pedicle deepithelialization in each case. A continuous mode was used for maximum precision. The continuous mode essentially produces a solid laser beam that can be drawn across the skin like a pen, allowing accurate continuous deepithelialization around the areolas while avoiding multiple laser “spots.” Proper laser precautions were taken in each case, including use of laser goggles, wet towels around the surgical site, and a high-powered smoke evacuator.

The surgeon performed laser deepithelialization of the 10-cm-wide inferior pedicle unassisted, using the dominant hand to wield the laser and the non-dominant hand to manipulate the breast. As the laser was systematically

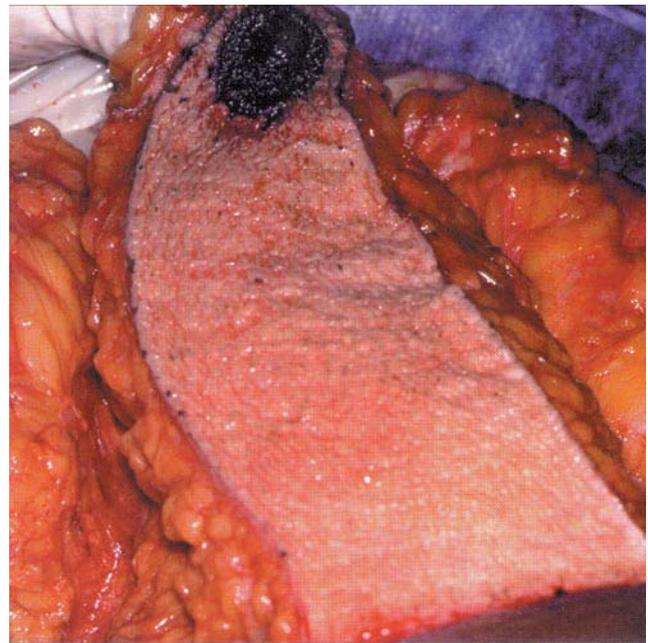


Figure 1. Deepithelialized breast pedicle.

moved around the pedicle epidermis, approximately 30% overlap of the 6-mm laser beam was maintained over previously treated areas to avoid gaps of untreated epidermis (Figure 1). A gap of non-lasered skin was left between the pedicle and the vertical breast incision markings. This skin was excised during the breast reduction in the standard fashion. Once the pedicle was deepithelialized, the patient was prepped and draped in standard fashion, and a routine inferior pedicle, Wise-pattern breast reduction was performed.⁷ Drains were

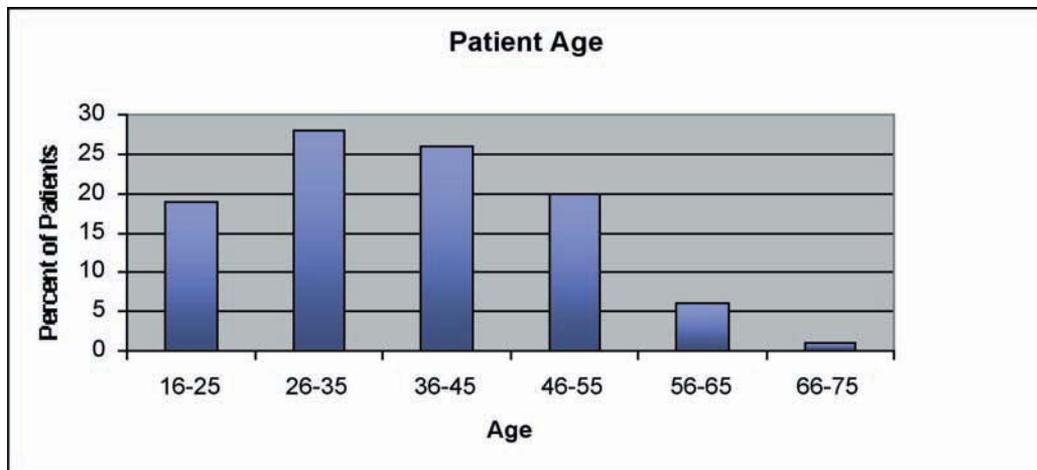


Figure 2. Patient age ranges.

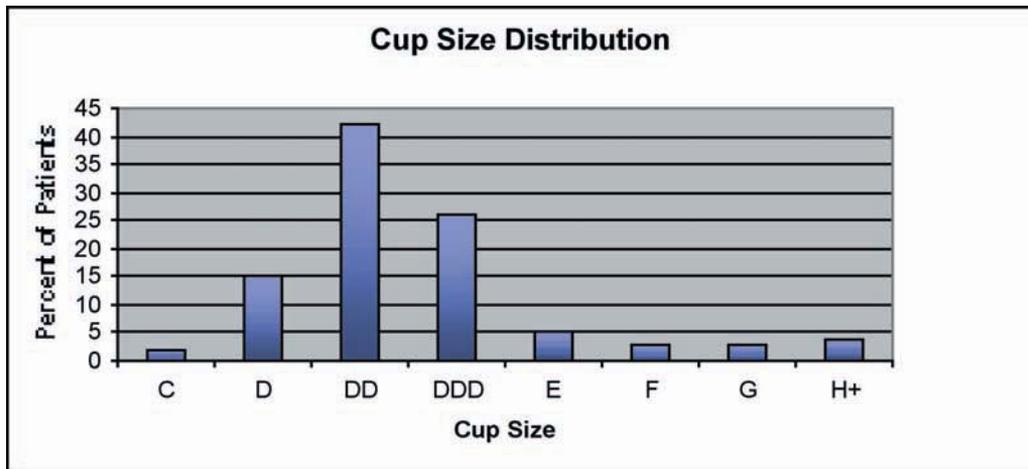


Figure 3. Breast cup size distribution.

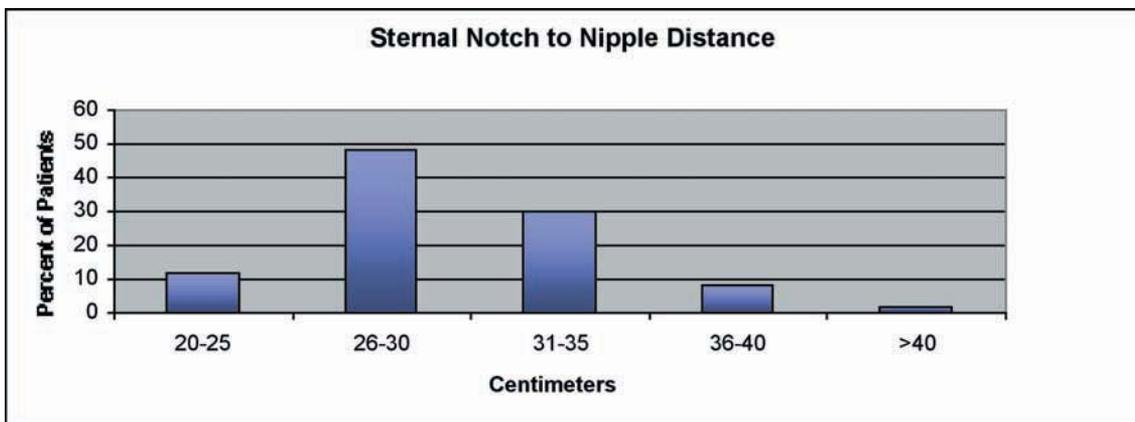


Figure 4. Sternal notch-to-nipple distances.

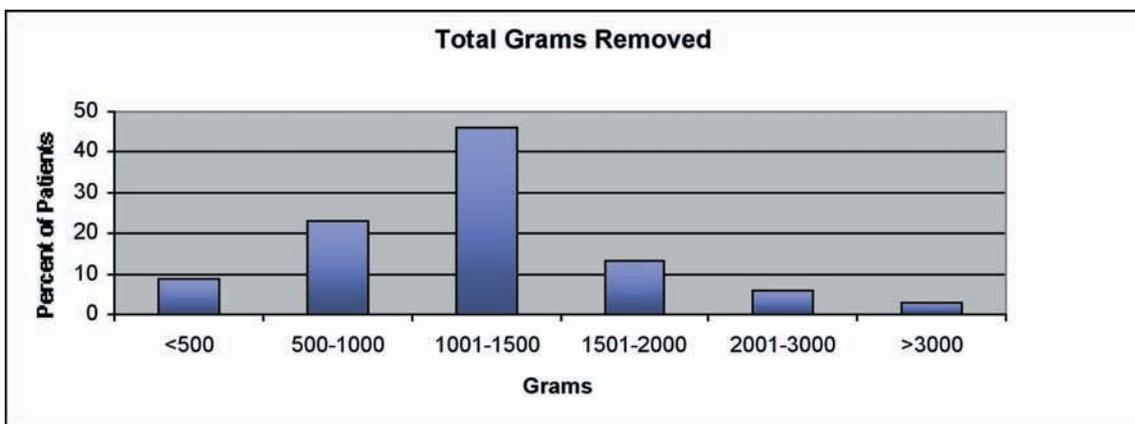


Figure 5. Breast resection weight ranges.

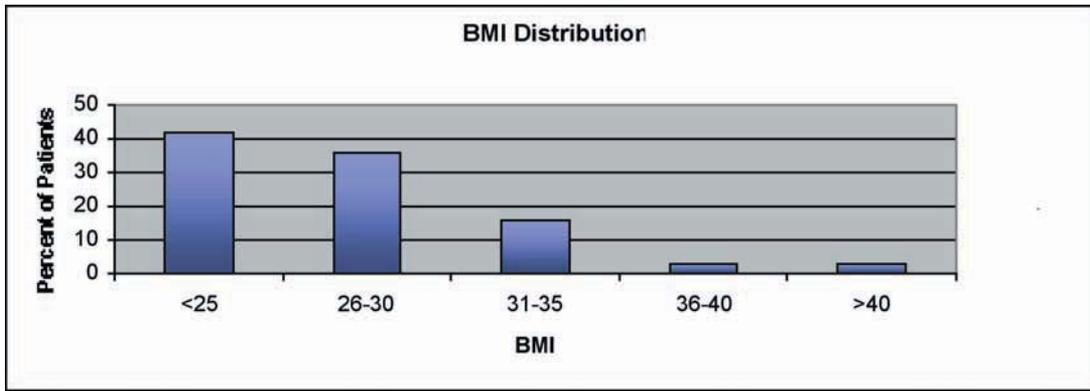


Figure 6. BMI distribution.

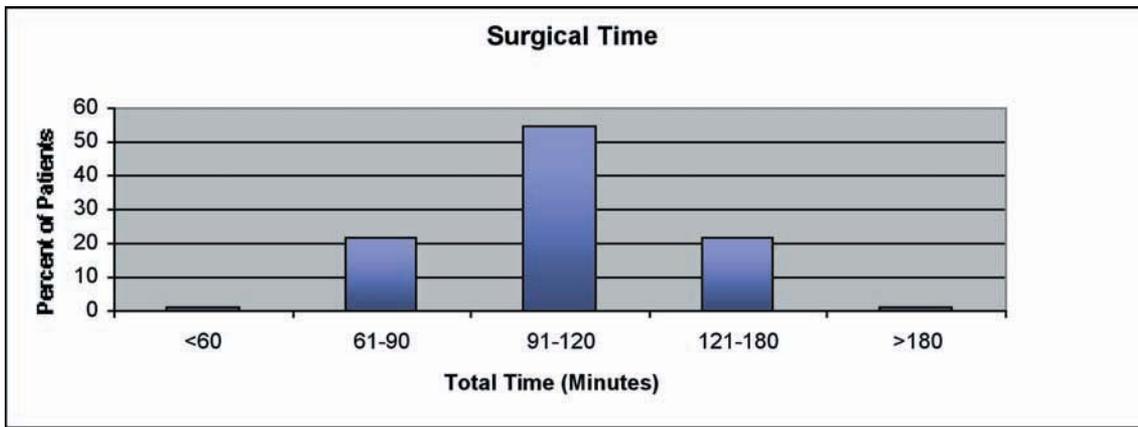


Figure 7. Duration of surgery ranges.

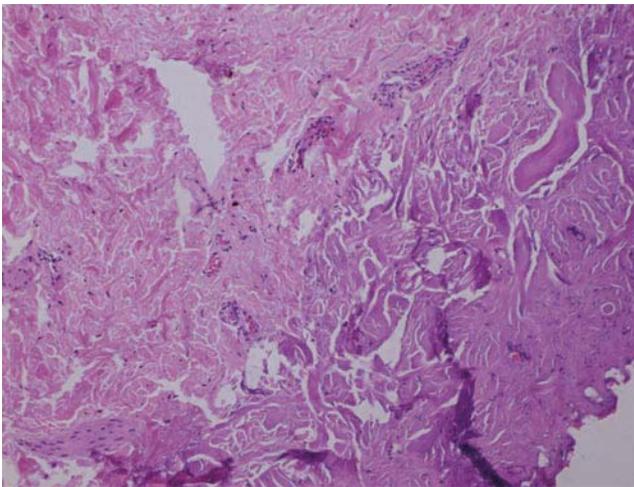


Figure 8. H&E stain of deepithelialized pedicle tissue (×40).

placed in each case, and all patients ambulated within 1 hour of awakening from anesthesia. Patients were generally transferred to an aftercare facility, ambulated intermittently, and maintained on oral pain medication.

Although most patients underwent breast reduction only, approximately 20% of cases were combined with lipoplasty, facial aesthetic surgery, and/or abdominal aesthetic surgery. As evidenced in an earlier study by Stevens et al,⁸ combined aesthetic cases do not significantly affect complication rates.

Results

Three hundred sixty-seven consecutive cases of laser-assisted, inferior pedicle, Wise-pattern breast reductions were evaluated. Of these patients, 364 underwent bilat-

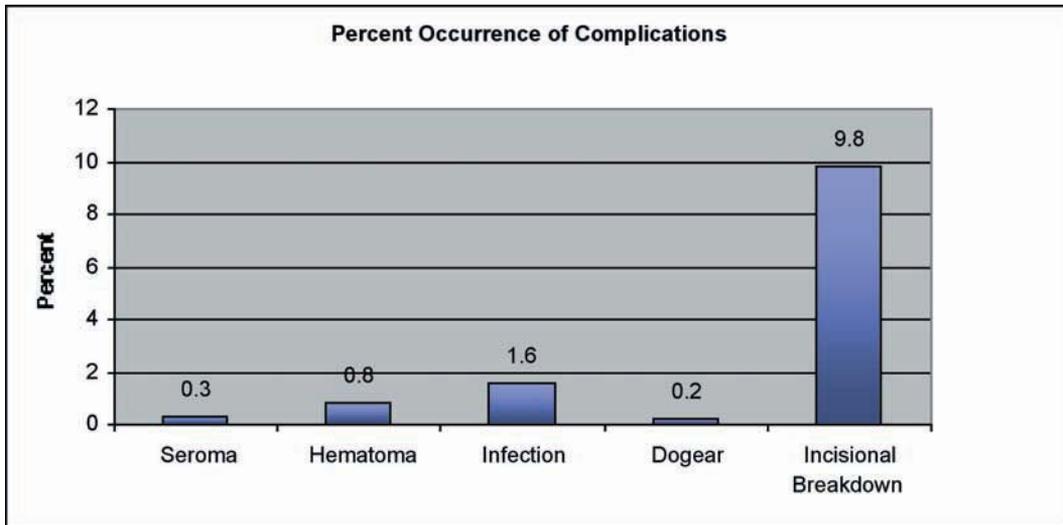


Figure 9. Percent occurrence of complications.

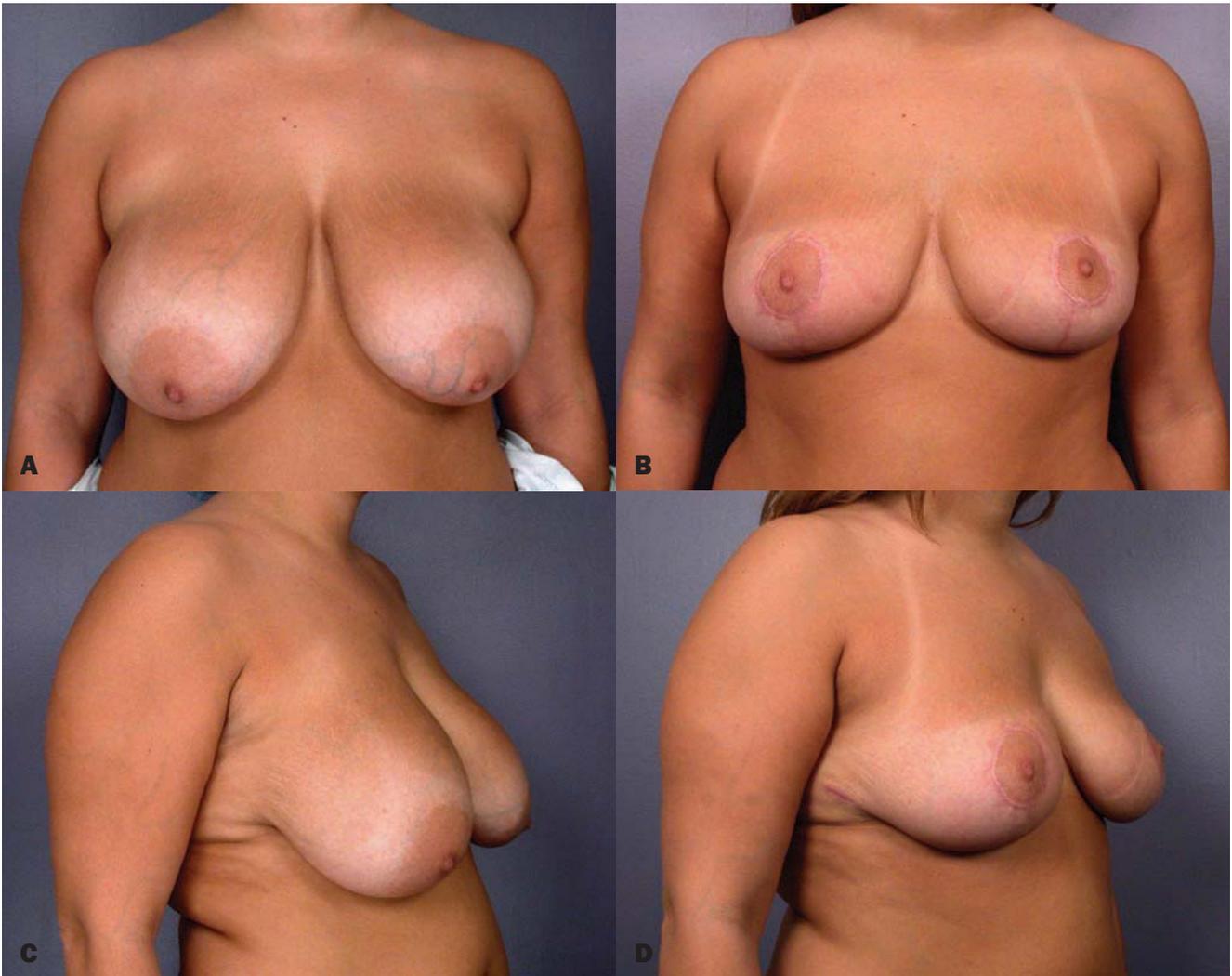


Figure 10. **A, C**, Preoperative views of a 26-year-old woman. **B, D**, Postoperative views 5 months after laser-assisted breast reduction with removal of 455 g from the right breast and 485 g from the left breast.

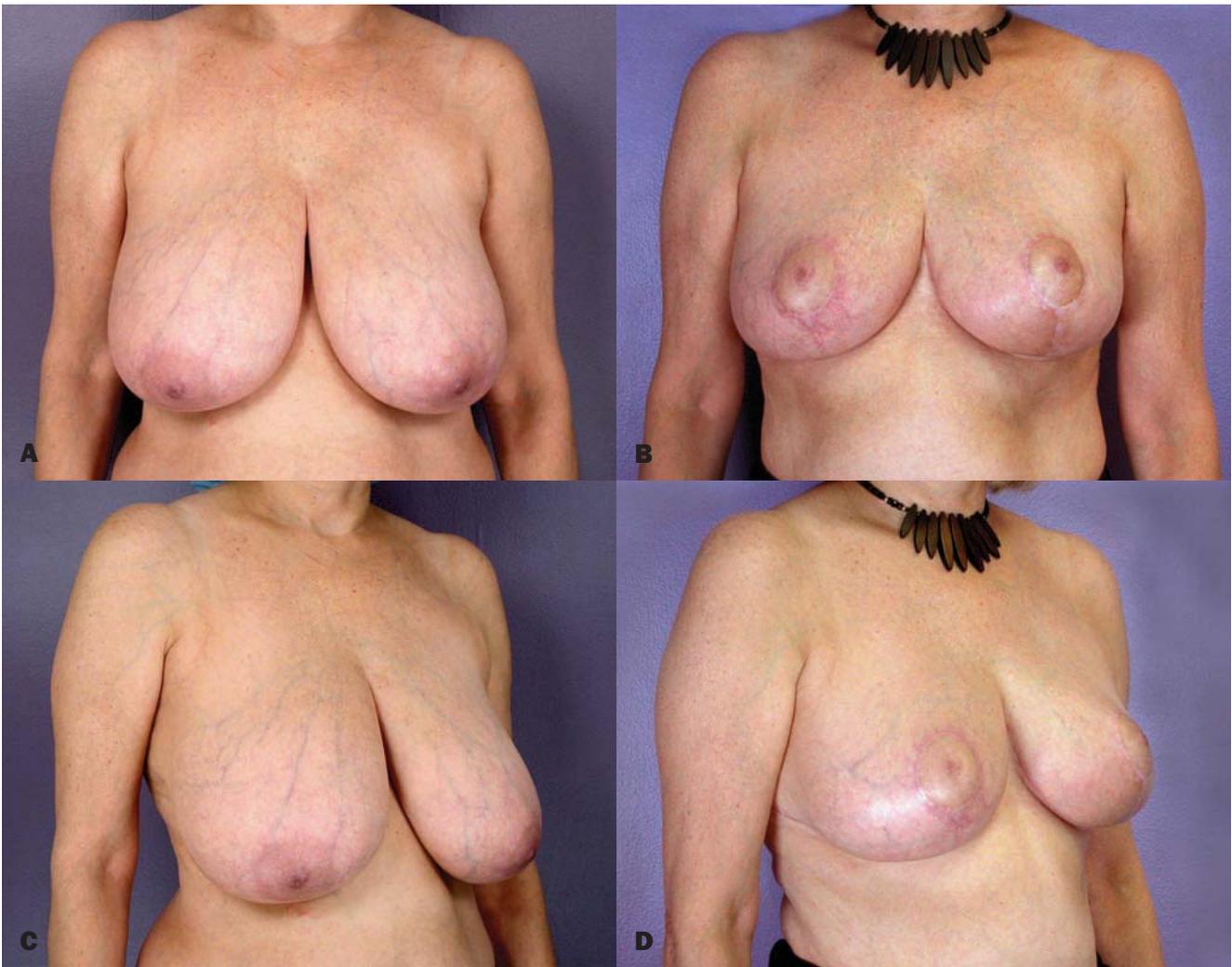


Figure 11. A, C, Preoperative views of a 60-year-old woman. B, D, Postoperative views 6 months after laser-assisted breast reduction with removal of 640 g bilaterally.

eral reductions, and 3 underwent unilateral reductions for correction of severe asymmetry or breast reconstruction. Patient ages ranged from 16 to 73 years, with most patients between 26 and 45 years of age (Figure 2).

The reported preoperative brassiere cup sizes ranged from a 34C to a 38K, with a DD being the most common size (Figure 3). Preoperative sternal notch-to-nipple distances ranged from 22 to 54 cm, with the most common measurement being between 26 and 30 cm (Figure 4). Resected breast specimens (total resection) ranged in weight from 100 to 5295 g, with the most common resection weight between 1 and 1.5 kg (Figure 5). Patients' body mass indices (BMIs) ranged from 17 to 47, with most patients having BMIs of 30 or less (Figure 6).

The average time for laser deepithelialization of the bilateral inferior pedicles was 5 minutes, 30 seconds.

Ninety-nine percent of the laser deepithelializations required less than 10 minutes. Total operative time for the laser-assisted breast reductions, excluding cases that combined additional facial or trunk procedures, was 108 minutes, with a range of 50 to 195 minutes (Figure 7).

To further examine the effects of the laser on the deepithelialized pedicle, a tissue sample was sent for histologic examination by hematoxylin-and-eosin (H&E) staining. Under $\times 40$ magnification, the dermis was noted to be intact, with widely patent dermal arteriolar vessels (Figure 8).

Major complications, defined as more than 25% nipple/areola necrosis, blood transfusion, deep vein thrombosis, pulmonary embolus, myocardial infarction, or death, were not noted in any of the patients. Two patients with infections required short-term hospitalization (1-3 days) for administration of intravenous antibiotics.

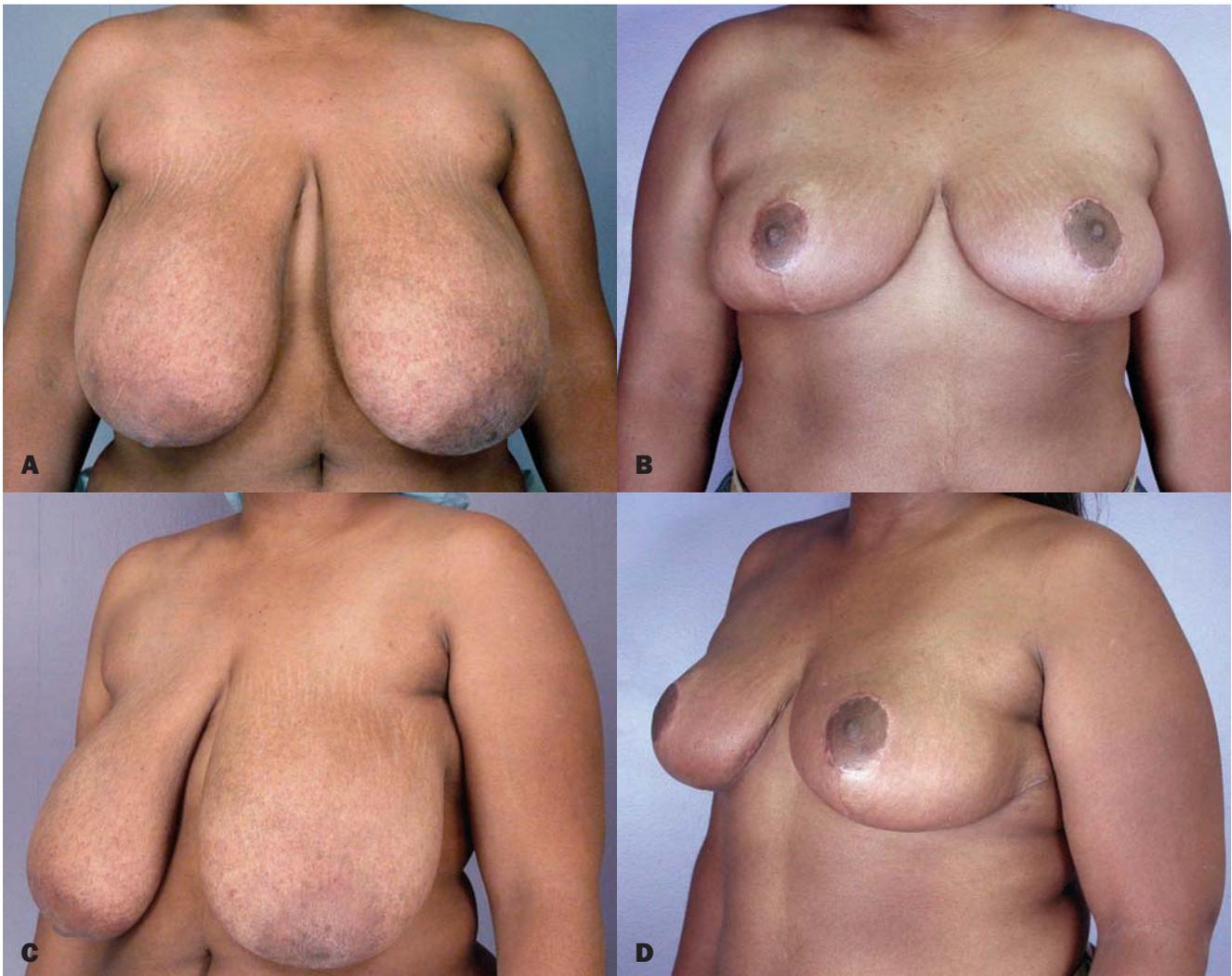


Figure 12. A, C, Preoperative views of a 29-year-old woman. B, D, Postoperative views 6 months after laser-assisted breast reduction with removal of 970 g from the right breast and 1265 g from the left breast.

Of the 367 patients in this study, 47 minor complications occurred in 42 patients, representing a complication rate of 11%. No patients developed inclusion cysts or experienced complications related to incomplete deepithelialization. The full range of complications included 1 seroma, 3 hematomas, 6 infections, 1 patient with dog-ears requiring a revision, and 36 incisional wound breakdowns (Figure 9). The incisional breakdowns, which represented the largest group of complications, were further subdivided into 25 minor T-zone wounds, 2 nipple-areolar complex wounds, and 9 wounds of the vertical and transverse incisions.

Discussion

Laser-assisted breast reduction surgery, while not a widely utilized technique, has a number of traits that make

it a viable alternative to standard scalpel or scissor deepithelialization. As mentioned previously, these traits include essentially bloodless deepithelialization, predictable preservation of the subdermal vascular plexus, a firm dermal leash, and the ability to deepithelialize without the need for assistance or taut immobilization of the breasts.^{1-3,6}

A potential concern with respect to laser deepithelialization is that of residual epidermal elements leading to inclusion cysts. No such cysts were noted in any of the patients in this study. Also of note, no free-nipple graft techniques were needed, even with the largest case that involved a 54-cm sternal notch-to-nipple distance.

With regard to cost, the expense of a carbon dioxide laser is clearly significantly higher than a scalpel blade or scissors. However, many surgeons already possess these lasers for facial skin resurfacing, and could potentially

utilize them (with the appropriate settings) to assist with breast reduction surgery.

This study was undertaken to address the hypothesis that laser-assisted breast reduction results in a complication rate consistent with standard, non-laser-assisted breast reduction. To approach this hypothesis, the rate of complications in our series was assessed and compared to norms in the plastic surgery literature.⁹⁻¹¹ Unfortunately, it is impossible to make an exact comparison between different series, as each study has somewhat different criteria for what is considered a complication. Despite the inherent flaw in comparing different series of breast reductions, the rate of complications in our series (11%) was consistent with complication rates previously reported in three large series in the literature for non-laser-assisted breast reductions (43%, 11.4%, and 10%, respectively).⁹⁻¹¹ Benefits of the procedure include the speed and ease of the deepithelialization process, the reduced blood loss from the pedicle surface, and the aesthetic results (Figures 10-12).

Conclusion

This retrospective review represents the largest evaluation of consecutive laser-assisted breast reductions to date. As evidenced by the short laser times, efficient operative times, and the acceptable complication rate, this variation on classic breast reduction techniques represents a viable alternative to standard methods of deepithelialization, reducing deepithelialization time and providing an aesthetic result. ■

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