

Assessing Cosmetic Surgery Safety: The Evolving Data

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The good physician treats the disease, but the great physician treats the patient who has the disease

—Sir William Osler, MD

First, do no harm! We all learn that on the first day of medical school. The Hippocratic Oath that each of us takes when we obtain our medical degrees is the basis of who we are and what we, as patient protectors and caring compassionate physicians, stand for. As a board-certified plastic surgeon (R.J.R.), who has trained hundreds of residents and fellows, one must always ask, “How can we keep plastic surgery, especially the elective aspect of plastic surgery, safe?” We continue to hear that one procedure may be riskier than another (ie, abdominoplasty versus Brazilian butt lift [BBL]), but what do the data say? And how do these aforementioned procedures compare to facelifts, rhinoplasty, and other combined procedures?

Ensuring the safety of cosmetic surgery is necessary for its successful and continued practice. The most recent statistics from the American Society of Plastic Surgeons report that 1.8 million cosmetic surgical procedures were performed by board-certified plastic surgeons in the United States in 2018.¹ The 5 most commonly performed procedures included breast augmentation, liposuction, rhinoplasty, blepharoplasty, and abdominoplasty. While buttock augmentation with autologous fat grafting was not among the top procedures, its practice increased by 16% compared with the prior year.¹ **Table 1** compares the complication rates of these procedures.

In the literature, the mortality rates of various procedures have fluctuated and evolved over time. However, as the procedures become more established and the educational training advances, the studies become more accurate. Therefore, it is critical to evaluate the 3 key factors:

1. The quality of the study (ie, level 1-3, prospective versus retrospective, survey versus data collection etc.).
2. The uniformity of the training and the proficiency of the surgeon(s).
3. The specific technology used.

For example, a 2001 survey study with a response rate of 53% reported a mortality rate of 1:3,281 when lipoplasty

was combined with abdominoplasty.⁸ Survey studies tend to have inherent biases such as a recall bias, participation bias, or subject bias. More accurate was a study by Keyes et al² in 2017 that analyzed data over a 10-year period from the American Association for Accreditation of Ambulatory Surgery Facilities to evaluate safe surgical practices in their accredited facilities. They reported a VTE-related mortality rate between 1:10,082 and 1:13,126.

Overall, outpatient surgery has been studied extensively and is safe. The rate of operative mortality associated with anesthesia and surgery in the outpatient setting (either in the operating room [OR] or in the postanesthesia care unit) has been estimated to be 0.25 to 0.50 per 100,000 outpatient procedures.⁹ In addition, cosmetic surgeries performed in a hospital, ambulatory surgery center, or office-based surgical suite are all safe. **Table 2** compares cosmetic surgery complication rates by facility.

Buttock augmentation with fat grafting (BBL) in the United States has been increasing at a dramatic rate in recent years. In 2018, there was a 15.8% increase when compared with 2017 and a 61.1% increase when compared with 2014.¹⁰ With the rise in popularity of this procedure, so too has there been a rise in concern over the safety of this procedure. In 2015, a group from Mexico and Colombia reported 14 intraoperative deaths during lipoinjection and 8 perioperative deaths.¹¹ In 2017, Mofid et al¹² reported a risk of mortality from gluteal fat grafting between 1:2,351 and 1:6,214 after surveying 4,843 plastic surgeons worldwide. This report, which used a retrospective, anonymous surgeon survey, had only a 14% response rate.¹³ In May 2019, a new survey was sent to members of the American Society for Aesthetic Plastic Surgery and the International Society of Aesthetic Plastic Surgery. The survey asked about fat embolisms and deaths associated with gluteal fat grafting in the past 24 months (the time since safety recommendations were established, including the strong recommendation that all BBLs are done using only subcutaneous fat augmentation only) (Luis Rios Jr, MD, personal communication). This survey showed a mortality rate of 1:14,921, which means it is now statistically safer than an abdominoplasty.²

Similarly, when liposuction was introduced in the United States in the 1980s, there was a comparable concern for patient safety with higher than acceptable mortality rates. These high mortality rates were often due

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Table 1. Complication and Mortality Rates of Cosmetic Surgery

Cosmetic Procedure	Minor Complications		Major Complications	
	Hematoma, %	Infection, %	VTE, %	Mortality
Abdominoplasty ²	2	2–7	0.4	1:13,000
Buttock augmentation (fat grafting) ³	NR	NR	NR	1:20,000
Liposuction ⁴	0.15	0.10	<0.1	1.3:50,000
Face ⁵	1.5	0.3	<0.1	NR
Breast ^{6,7}	1.5	1.1	<0.1	NR

NR, not recorded.

Table 2. Cosmetic Surgery Complication Rates by Facility

Facility Type	Minor Complications		Major Complications	
	Hematoma, %	Infection, %	VTE, %	Mortality, %
Hospital ⁶	1.0	0.6	0.1	0.0015
ASC ⁶	1.0	0.5	0.1	0.0015
OBSS ⁶	0.6	0.3	0.1	NR

VTE, Venous Thromboembolism; ACS, Ambulatory Surgery Center; OBSS, Office-Based Surgical Suite; NR, not recorded.

to massive blood loss in high volume liposuction with a prolonged operative time, thromboembolism, pulmonary edema, and abdominal/viscus perforation.^{4,14} These deaths prompted the formation of a task force by the American Society of Plastic Surgeons. The fluid status of patients was mismanaged, resulting in both under- and over-resuscitation. With the advent of the superwet technique over tumescent liposuction, and proper training of board-certified plastic surgeons, the mortality rate dropped drastically, and liposuction is now considered one of the safest cosmetic procedures performed.¹⁴

Any major complication or mortality in cosmetic surgery deserves further evaluation. All measures should be made to identify risk factors and safe techniques and technology. The current reported mortality rate for buttock augmentation is 1:20,117, which is significantly lower than what was reported by the initial Aesthetic Surgery Education and Research Foundation study.³ This lower mortality rate, as with previous new techniques, is likely due to better educational venues and safer injection techniques, as well as a more accurate method of assessing the true mortality rate. A continued effort to produce quality peer-reviewed clinical and basic science and anatomical research along with technical improvements will serve to advance safety in cosmetic surgery.

What have we learned from past and current lessons of cosmetic surgery safety with new techniques and technologies? We know that we must do the following:

1. Conduct proper basic science and anatomical research to assure that new techniques and/or technologies are safe and reproducible.
2. Develop specific training modules to properly train both residents and established board-certified plastic surgeons. Ideally, a combination of hands-on cadaver dissection laboratories, live interactive surgery, and didactics should be used. Training must be done by those with expertise in the new technique or technology.
3. Mandate this type of training either in an approved plastic surgery residency or in post-graduate educational courses, similar to what has been done for laser training and other new techniques and technologies.

4. Be safe, always! Be rational! Above all, put patient’s safety first, both in and out of the OR!
5. Do not operate on patients who smoke, as they have a higher complication risk in all aspects of surgery.
6. Avoid complex combination procedures that exceed 6 hours, as this will increase your risk of complications.
7. Be forthright and honest in telling your patients what you can and cannot do and inform them of the inherent risks of each specific plastic surgery procedure.
8. Always strive to deliver the best and safest care in and out of the OR and never leave the OR until the patient looks as good as they can within the best of your abilities.

What do we tell our patients and the public?

1. Cosmetic surgery, and elective surgery in general, is safe when performed in an accredited facility by properly trained board-certified plastic surgeons.
2. The mortality rate for outpatient surgery is 0.25–0.50 per 100,000 procedures.⁹
3. The mortality rate today for liposuction is 1.3:50,000.⁴
4. The mortality rate for abdominoplasty is 1:10–13,000.²
5. The mortality rate for BBL is 1:15–20,000.³

What do we tell our patients and the public about being safe and making the correct choices?

1. See a board-certified plastic surgeon who has been trained in the specific technique or technology desired.
2. Ensure anesthesia is administered by a Certified Registered Nurse Anesthetist (CRNA) or a board-certified anesthesiologist.
3. Check to see that the OR facility is an accredited operating facility.
4. Research your surgeon’s, anesthesiologist’s, and the support staff’s experience, credentials, and expertise.
5. Quit smoking or vaping NOW.

As a specialty, what we must do to maintain a high standard of patient safety?

1. Vow to consistently train our residents, fellows, and practicing plastic surgeons to be safe and competent throughout their careers.

2. Always put good judgment and patient safety first over financial gain.
3. Be a great physician first, and then be a plastic surgeon.
4. Only operate on healthy patients who do not smoke.
5. Become a board-certified plastic surgeon and stay up to date with new techniques and technologies.
6. Remember that patient safety is first and foremost.

Just because you can, doesn't mean you should!

—Sherrilyn Kenyon

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