OPEN

PRS GLOBAL OPEN

ORIGINAL ARTICLE
Cosmetic

Comparing Body Contouring Surgery Outcomes Inpatient Versus Outpatient in an Appalachian Tristate Population

Gerard V. Giangrosso, MD
Armein Rahimpour, MD
Abigail Murphy, MD
Peter D. Ray, MD
David A. Denning, MD, FACS
Rahman G. Barry, MD

Background: Body contouring surgery is becoming increasingly popular. Many patients desire aesthetic improvement, but many also desire functional improvement after significant weight loss. Furthermore, there are few studies which analyze whether these patients need to be admitted postoperatively. We seek to evaluate whether outpatient surgery for body contouring surgery has any impact on outcomes and readmission rates in an Appalachian population.

Methods: The authors performed a retrospective chart review of 370 patients from January 2010 to December 2023 age 18 years and older who underwent body contouring surgery at an Appalachian tertiary academic center. It was first noted what surgery the patient underwent and whether the patient was admitted postoperatively. Then, outcomes and complications within 90 days were noted. These included unexpected admission/readmission, infection, seroma/hematoma formation, wound separation, incision necrosis, venous thromboembolism, and mortality. We also examined rates of unexpected reoperation 1 year postoperatively. Statistical analysis was then performed.

Results: There were 264 remaining patients who underwent outpatient surgery and 90 patients who underwent inpatient surgery. In regard to infection, seroma/hematoma formation, wound separation, incision necrosis, venous thromboembolism, and mortality, there was no statistical difference between inpatient or outpatient surgery. There was a statistically significant decreased risk in readmission for breast reduction when performed outpatient (odds ratio = 0.0519, $P = 0.004$) and a decreased rate of reoperation after bilateral breast augmentation (odds ratio 0.0417, $P = 0.0453$).

Conclusions: Outpatient body contouring surgery is a safe and effective option for those in rural Appalachia and should be considered whenever possible. *(Plast Reconstr Surg Glob Open 2025;13:e6621; doi: 10.1097/GOX.0000000000006621; Published online 17 March 2025.)*

INTRODUCTION

Body contouring surgery is becoming increasing popular. Many patients desire aesthetic improvement, but many also desire functional improvement after significant weight loss. One study by Paul et al[1] showed that body contouring surgery resulted in statistically significant improvement in body appearance and overall body image. There is little doubt that these procedures improve the lives of many patients. However, there are few studies which analyze whether these patients need to be admitted postoperatively.

Historically, patients were admitted after body contouring surgery, and this was done for a variety of reasons. Many physicians desired adequate pain control in patients who, in many cases, were private pay. Because of this private pay status, there was a desire to make their experience as comfortable and painless as possible. While inpatient, physicians can use a variety of pain medications and treatments not available in an outpatient setting. Another reason is to monitor for positioning and activity compliance postoperatively. For example, it is easier to encourage postabdominoplasty patients to remain in beach-chair

From the Department of Surgery, Marshall University Joan C. Edwards School of Medicine, Huntington, WV.

Received for publication July 15, 2024; accepted January 29, 2025.

Presented at the American Society of Plastic Surgeons Meeting, September 2024.

DOI: 10.1097/GOX.0000000000006621

Disclosure statements are at the end of this article, following the correspondence information.

position while in the hospital as opposed to outpatient. Finally, patients were often admitted due to the hemodynamic shifts that could occur after these long, extensive contouring procedures. Should they become unstable, patients already inpatient would be easier to evaluate and treat rather than coming back from home.

Rural Appalachia is an incredibly special part of the country. What these patients experience in their day-to-day lives is extremely different from the rest of the country. Many of our patients live in the mountains several hours away from any urban area. In some situations, they must drive down the mountain just to get cell service. Rural Appalachia is also one of the most obese parts of the country, with 44% of adults classified as obese.[2] The average body mass index for our part of Appalachia is 32 kg/m^2. In addition, nearly 24% of the population smokes, 30% have hypertension, and 10.6% have diabetes.[3,4] American Society of Anesthesiologists classification tends to be predominantly stage II or III. Despite being classically seen as a medically underserved area, those in West Virginia were just as likely to get bariatric surgery as those in urban areas.[5] However, West Virginia remains one of the poorest states in the country. Thus, it is often the goal of providers in this state to perform medically necessary procedures with as little charge to the patient as possible. A great way to reduce cost is to perform procedures outpatient, when possible, but only as long as it does not increase poor outcomes to patients. The primary objective of this project is to evaluate whether outpatient body contouring surgery has any impact on outcomes and readmission rates in an Appalachian population.

Takeaways

Question: Does outpatient surgery for body contouring surgery have any impact on outcomes and readmission rates in an Appalachian population?

Findings: In this retrospective chart review of 370 patients, we found that there was no statistical difference in regards to infection, seroma/hematoma formation, wound separation, incision necrosis, venous thrombotic events, or mortality. There was a statistically significant decreased risk in readmission for breast reduction when performed outpatient and a decreased rate of reoperation after bilateral breast augmentation.

Meaning: Outpatient body contouring surgery is a safe and effective option for those in rural Appalachia and should be considered whenever possible.

METHODS

Approval was first achieved from the Marshall University Joan C. Edwards School of Medicine institutional review board, approval ID (2115410-1). The authors then performed a retrospective chart review of 370 patients from January 2010 to December 2023 age 18 years and older who underwent body contouring surgery at an Appalachian tertiary academic center and its ambulatory surgery center. This academic center and ambulatory surgery center treat patients from the tristate area of western West Virginia, eastern Kentucky, and southern Ohio. The patients were collected from the 6 board-certified plastic surgeons who were a part of our program over the past thirteen years, two of whom are authors of this article. Procedures considered "body contouring" included abdominoplasty, brachioplasty, breast augmentation, breast reduction, mastopexy, breast reconstruction, panniculectomy, and/or combinations of these procedures. A list of these patients was acquired using the hospital database via International Classification of Diseases codes and then deidentified using arbitrarily generated identifying numbers. These identifiers were then accumulated and placed into a unifying document on Microsoft Excel (Microsoft Corp., Redmond, WA).

The chart review was then performed. First, it was noted what surgery the patient underwent and whether the patient was admitted postoperatively. Then, outcomes and complications within 90 days were recorded. These included unexpected admission/readmission, infection, seroma/hematoma formation, wound separation, venous thromboembolism (VTE), and mortality. We also examined rates of unexpected reoperation 1 year postoperatively.

The protocol for admitting patients after these body contouring procedures was based on the individual practice protocol of each surgeon. The criteria differed for each surgeon due to the different training each surgeon achieved. Length of time under anesthesia and/or combination of body contouring procedures increased the likelihood of admission when considering each patient's comorbidities. However, no surgeon had strict criteria for admission based on the procedure performed. Patients were also admitted if they lived several hours away or if they would have had a difficult time returning to the hospital should an immediate complication occur. Thus, the decision to admit after surgery was individualized based on the entire picture of the patient.

At the end of the chart review, the total number of each surgery performed was evaluated. Of the 370 total people who underwent body contouring surgery, 16 patients underwent surgery that did not have a corresponding procedure in the opposite group (outpatient surgery with no corresponding inpatient surgery or vice versa). As such, these patients were removed. There were 264 remaining patients who underwent outpatient surgery and 90 who underwent inpatient surgery between 6 different providers. Statistical significance was defined as a P value less than 0.05. Statistical analysis was then performed to find odds ratios, a post hoc power analysis, and a multivariable logistic regression analysis to further evaluate our data. The mode fitness was assessed via Hosmer–Lemeshow tests. All statistical analyses were performed using R version 4.1.2 (R Foundation for Statistical Computing, Vienna, Austria).

RESULTS

There were 264 remaining patients who underwent outpatient body contouring surgery and 90 who underwent inpatient surgery eligible for analysis. Demographics are described in Table 1. The total number of procedures performed and the complications are documented in

Table 1. Demographics

	Outpatient	Inpatient
Sex		
Male	17	7
Female	262	83
Age, y		
Average	41 ± 14	51 ± 15
18–40	140	22
41–60	107	43
61–80	32	25
Race and ethnicity		
White	257	90
Black/African American	15	0
Hispanic	2	0
Asian	0	0
Multiple	4	0
Declined to answer	1	0

Tables 2 and 3. Odds ratios (ORs) were performed of the 5 most common procedures, with the exposure as outpatient surgery. The remaining procedures were not compared due to lack of enough patients to perform adequate analysis.

In regard to the complications of the most common body contouring procedures at our institution, there was no statistical difference between these complications when comparing inpatient and outpatient surgery. To be specific, infection, seroma/hematoma formation, incision necrosis, wound separation, and mortality showed no difference between the 2 groups. There was, however, a statistically significant decreased risk of readmission within 90 days for breast reduction when performed outpatient (OR = 0.0519, $P = 0.004$). A post hoc power analysis was performed with an α value of 0.05, resulting in a power of 94.6%. There was also a reduced risk of unexpected surgery 1 year postoperatively in bilateral breast augmentation when performed outpatient (OR = 0.0417, $P = 0.0453$). A post hoc power analysis was again performed with an α value of 0.05, resulting in a power of 64.4%. Neither inpatient surgery nor outpatient surgery had any VTE events that occurred 90 days postoperatively. There was only 1 mortality, which occurred after a panniculectomy, and a cause of death was not immediately identified. A summary of all comparisons and ORs is documented in Table 4. A multivariable logistic regression model was performed, and the results are summarized in Table 5. The model was well calibrated (Hosmer–Lemeshow test; $P = 0.95$).

DISCUSSION

Outpatient body contouring surgery is a great option for patients and hospitals alike. Costs to the patient are reduced by not being admitted to the hospital, and from a hospital standpoint, an outpatient surgery allows for more judicial use of inpatient beds. In rural Appalachia, these are both aspects of medicine that must be accounted for, but not at the expense of poor outcomes.

In our study, 264 patients underwent outpatient body contouring surgery, whereas 90 were admitted postoperatively. There were no differences seen in postoperative infection, seroma/hematoma formation, incision necrosis, wound separation, or mortality in 90 days. However, there was a statistically significant decrease in readmission within 90 days if bilateral breast reduction was performed outpatient. There was also a statistically significant decreased in unexpected operations 1 year postoperative in bilateral breast augmentation when performed outpatient.

In our search of the literature, there were only a few studies that evaluated whether outpatient body contouring is safe and effective. Buchanan evaluated the safety of outpatient lower body lifting after massive weight loss. They found that there was a significant difference in reoperation rate in lower body lifts when performed outpatient, as outpatient surgery had 0 patients who needed reoperation as opposed to 6 patients who underwent inpatient procedures.[6] Swanson[7] performed a retrospective study of 40

Table 2. Outpatient Surgery and Outcomes

	Total	Needing Readmission	Separation	Infection	Flap Ischemia/ Necrosis	Seroma/ Hematoma	Mortality	Surgery
Abdominoplasty	14	0	1	1	0	1	0	1
Abdominoplasty with bilateral thighplasty	1	0	0	0	0	0	0	0
Bilateral brachioplasty	3	0	1	1	0	0	0	0
Bilateral breast augmentation	50	0	3	0	0	1	0	2
Bilateral breast augmentation with abdominoplasty	6	1	2	1	0	0	0	2
Bilateral breast reconstruction	9	1	1	2	1	0	0	4
Bilateral breast reduction	145	2	31	13	2	7	0	11
Bilateral breast reduction with abdominoplasty	1	0	0	0	0	0	0	0
Bilateral mastopexy	11	0	1	0	0	0	0	0
Left breast reconstruction, right breast reduction	4	0	1	0	0	0	0	0
Panniculectomy with abdominoplasty	8	1	2	0	0	1	0	0
Right breast mastopexy	4	0	0	0	0	0	0	0
Right breast reconstruction	3	0	1	0	0	0	0	1
Right breast reduction	5	0	0	0	0	1	0	0

Table 3. Inpatient Surgery and Outcomes

	Total	Needing Readmission	Separation	Infection	Flap Ischemia/ Necrosis	Seroma/Hematoma	Mortality	Surgery
Abdominoplasty	8	1	1	0	0	0	0	3
Abdominoplasty with bilateral thighplasty	1	0	0	0	0	1	0	0
Bilateral brachioplasty	1	0	0	0	0	0	0	0
Bilateral breast augmentation	2	0	0	0	0	0	0	1
Bilateral breast augmentation with abdominoplasty	5	0	1	0	0	0	0	0
Bilateral breast reconstruction	9	3	2	4	1	1	0	0
Bilateral breast reduction	33	7	2	2	2	0	0	2
Bilateral breast reduction with abdominoplasty	2	0	0	0	0	0	0	0
Bilateral mastopexy	1	0	0	0	0	0	0	0
Left breast reconstruction, right breast reduction	1	0	0	0	0	0	0	0
Panniculectomy with abdominoplasty	19	1	5	7	2	0	1	1
Right breast mastopexy	1	0	0	0	0	0	0	1
Right breast reconstruction	5	1	0	1	0	1	0	0
Right breast reduction	1	0	0	0	0	1	0	0

patients who underwent outpatient lower body lifting, and only 35% of them experienced complications, indicating that outpatient surgery is safe. Finally, Mast[8] examined the safety of outpatient abdominoplasty and noted no significant difference in complications between his inpatient and outpatient abdominoplasty groups.

Overall, complications are generally rare in body contouring surgery, regardless of whether it is performed outpatient or inpatient, and there have been multiple studies that reinforce this. One study by Egrari[9] evaluated 260 patients who underwent outpatient body contouring surgery only. The most common complication was wound separation (15%), followed by seroma (4.6%), and urinary retention (3.8%).[6] Only 4.2% of patients required reoperation.[9] Another study performed by Spiegelman and Levine[10] evaluated 69 patients who underwent abdominoplasty: 37 were performed inpatient, and 32 were performed outpatient. In the inpatient population, 4 (10.8%) patients and 1 (3.1%) outpatient had wound infections. Their most common complication was seroma formation, seen in 7 (18.9%) patients who had inpatient surgery and 8 (25%) patients whose procedures were performed outpatient. They also found no correlation between complications in outpatient versus inpatient surgery.[10] Fischer et al[11] noted that there were only minor wound complications in 6.8% of 1797 patients who underwent body contouring surgery. Wes et al[12] reviewed the National Surgical Quality Improvement Program database from 2005 to 2012 and found that only 0.56% of patients experienced VTE. Finally, Winocour et al[13] showed relatively low complication rates, but they did show that combination cases of body contouring surgery increased complication rates, especially when abdominoplasty was combined with other procedures.

In our study, we had similar rates of complications to these studies. The only slight difference was an increased rate of incision separation seen in our outpatient breast reduction population. Compared with the study by Egrari, we had 21% of our outpatient breast reduction with some degree of separation. The risk factors for wound separation are well known, including diabetes, peripheral arterial disease, malnutrition, smoking, and obesity. In Appalachia, rates for all these comorbidities are higher than those of the rest of the country and could explain the increase in separation in our population. Despite this, the rates of the other complications are also similar. We believe that these comorbidities can also explain why we have decreased rates of readmission after outpatient breast reduction and decreased reoperation rates in outpatient breast augmentation. Our surgeons know how prevalent these comorbidities are in our area and did not operate on patients who had significant comorbidities. As such, in our population, it seems that outpatient body contouring surgery is a safe option and should be performed whenever possible.

There was one limitation for this study: our study lacks a large sample size. Rural Appalachia is a relatively poor part of the country. As such, most of the people cannot afford to have body contouring surgery for any reason, cosmetic or functional. It is also difficult to have plastic surgeons come to our part of the country, as a lack of potential patients makes it difficult to entice surgeons to come here. Both facts have resulted in a relatively small sample size for us to evaluate.

Another aspect of our study could be a limitation or strength depending on one's point of view. All patients were collected retrospectively from the surgical caseload of 6 plastic surgeons. Each of these surgeons trained at different institutions for residency/fellowship and have various years of experience and different practice patterns. The only commonalities among the surgeons included liberal use of Bovie for dissection, very meticulous hemostasis, a total of 2 drains, no Toradol, and no postoperative anticoagulation. Ideally, the complication rates would be evaluated individually for each surgeon to account for these differences. However, there were not enough patients for this to be performed. As such, complications were evaluated across the whole department as they all operated on

Table 4. Comparison of Outcomes: Inpatient vs Outpatient

Surgery	Outpatient (No./Total)	Inpatient (No./Total)	Odds Ratio	Confidence Interval	Sig
Abdominoplasty					
Readmission	0/14	1/8	0.1724	0.0062–4.7683	0.2994
Separation	1/14	1/8	0.5385	0.0290–9.9857	0.6778
Infection	1/14	0/8	1.8889	0.0290–9.9857	0.7068
Incision necrosis	0/14	0/8	0.5862	0.0106–32.3403	0.7941
Seroma/hematoma	1/14	0/8	1.8889	0.0687–51.9206	0.7068
Mortality	0/14	0/8	0.5862	0.0106–32.3403	0.7941
Unexpected surgery	1/14	3/8	0.1282	0.0107–1.5419	0.1055
Bilateral breast augmentation					
Readmission	0/50	0/2	0.0495	0.0008–3.0492	0.1528
Separation	3/50	0/2	0.3684	0.0147–9.2638	0.5439
Infection	0/50	0/2	0.0495	0.0008–3.0492	0.1528
Incision necrosis	0/50	0/2	0.0495	0.0008–3.0492	0.1528
Seroma/hematoma	1/50	0/2	0.1515	0.0048–4.7424	0.2828
Mortality	0/50	0/2	0.0495	0.0008–3.0492	0.1528
Unexpected surgery	2/50	1/2	0.0417	0.0019–0.9360	0.0453
Bilateral breast reduction					
Readmission	2/145	7/33	0.0519	0.0102–0.2641	0.0004
Separation	31/145	2/33	4.2149	0.9556–18.5906	0.0574
Infection	13/145	2/33	1.5265	0.3275–7.1153	0.5902
Incision necrosis	2/145	2/33	0.2168	0.0294–1.5988	0.1337
Seroma/hematoma	7/145	0/33	3.6282	0.2021–65.1215	0.3832
Mortality	0/145	0/33	0.2302	0.0045–11.8144	0.4648
Unexpected surgery	11/145	2/33	1.2724	0.2683–6.0338	0.7616
Bilateral mastopexy					
Readmission	0/11	0/1	0.1304	0.0018–9.3602	0.3502
Separation	1/11	0/1	0.4286	0.0114–16.1499	0.6472
Infection	0/11	0/1	0.1304	0.0018–9.3602	0.3502
Incision necrosis	0/11	0/1	0.1304	0.0018–9.3602	0.3502
Seroma/hematoma	0/11	0/1	0.1304	0.0018–9.3602	0.3502
Mortality	0/11	0/1	0.1304	0.0018–9.3602	0.3502
Unexpected surgery	0/11	0/1	0.1304	0.0018–9.3602	0.3502
Panniculectomy					
Readmission	1/8	1/19	2.5714	0.1406–47.0195	0.5241
Separation	2/8	5/19	0.9333	0.1398–6.2300	0.9432
Infection	0/8	7/19	0.098	0.0049–1.9543	0.1282
Incision necrosis	0/8	2/19	0.4118	0.1777–9.5615	0.5803
Seroma/hematoma	1/8	0/19	7.8	0.2849–213.5196	0.2238
Mortality	0/8	1/19	0.7255	0.0267–19.7113	0.8489
Unexpected surgery	0/8	1/19	0.7255	0.0267–19.7113	0.8489

Table 5. Multivariable Logistic Regression Analysis Examining Factors With Postoperative Complications

Variables	Odds Ratio	95% Confidence Interval	*P*
Outpatient surgery	0.72	0.41–1.27	0.26
Age > 65 y	0.71	0.32–1.60	0.41
Male	1.18	0.47–2.97	0.72
Non-White	1.06	0.40–2.84	0.90

the rural Appalachian population. One could argue that this is a limitation due to the lack of consistency across practices. One could also argue that this is a strength, as the variety of practice patterns makes it more generalizable to even patients outside of Appalachia. Either way, it is an aspect of our study that needs to be noted.

In the future, studies could also evolve beyond outpatient surgery and evaluate whether outpatient surgery center body contouring operations are safe. Although in theory outpatient hospital surgery and surgery performed at a surgery center are similar, there may be some difference between them. Outpatient surgery centers are meant for high volume, quick cases to make efficient use of operating room time and personnel expense. It is possible that the desire for speed and efficiency may increase complications in body contouring patients. Studies could also be set up as a prospective randomized control trial to evaluate the complications/outcomes between outpatient and inpatient surgery, but this would be difficult to achieve in most institutions. Given that many body contouring procedures are private pay, it could be difficult to convince patients to sign up for a study that may

significantly increase their bill if they are randomized to the inpatient group.

CONCLUSIONS

Our data imply that inpatient body contouring surgery is a safe and effective option, but statistical significance could only be achieved for 2 breast operations. It seems that outpatient procedures for those in rural Appalachia should be considered whenever possible.

Gerard V. Giangrosso, MD
Department of Surgery, Marshall University
1600 Medical Center Drive Suite 2500
Huntington, WV 25701
E-mail: ggiangrosso@gmail.com

DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

REFERENCES

1. Paul MA, Opyrchał J, Knakiewicz M, et al. The long-term effect of body contouring procedures on the quality of life in morbidly obese patients after bariatric surgery. *PLoS One*. 2020;15:e0229138.
2. Wewers ME, Katz M, Fickle D, et al. Risky behaviors among Ohio Appalachian adults. *Prev Chronic Dis*. 2006;3:A127.
3. Herath Bandara SJ, Brown C. An analysis of adult obesity and hypertension in Appalachia. *Glob J Health Sci*. 2013;5:127–138.
4. Centers for Disease Control and Prevention (CDC). Estimated county-level prevalence of diabetes and obesity—United States, 2007. *MMWR Morb Mortal Wkly Rep*. 2009;58:1259–1263.
5. Bergmann KL, Cox SJ, Tabone LE. Influence of a rural environment on patient access and outcomes for bariatric surgery. *Surg Obes Relat Dis*. 2017;13:632–636.
6. Buchanan PJ, Nasajpour H, Mast BA. Safety and efficacy of outpatient lower body lifting. *Ann Plast Surg*. 2013;70:493–496.
7. Swanson E. Near-circumferential lower body lift: a review of 40 outpatient procedures. *Plast Reconstr Surg Glob Open*. 2019;7:e2548.
8. Mast BA. Safety and efficacy of outpatient full abdominoplasty. *Ann Plast Surg*. 2005;54:256–259.
9. Egrari S. Outpatient-based massive weight loss body contouring: a review of 260 consecutive cases. *Aesthet Surg J*. 2012;32:474–483.
10. Spiegelman JI, Levine RH. Abdominoplasty: a comparison of outpatient and inpatient procedures shows that it is a safe and effective procedure for outpatients in an office-based surgery clinic. *Plast Reconstr Surg*. 2006;118:517–522; discussion 523.
11. Fischer JP, Wes AM, Serletti JM, et al. Complications in body contouring procedures: an analysis of 1797 patients from the 2005 to 2010 American College of Surgeons National Surgical Quality Improvement Program Databases. *Plast Reconstr Surg*. 1411;132:1411–1420.
12. Wes AM, Wink JD, Kovach SJ, et al. Venous thromboembolism in body contouring: an analysis of 17,774 patients from the national surgical quality improvement databases. *Plast Reconstr Surg*. 972e;135:972e–980e.
13. Winocour J, Gupta V, Ramirez JR, et al. Abdominoplasty: risk factors, complication rates, and safety of combined procedures. *Plast Reconstr Surg*. 2015;136:597e–606e.