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Improvement in racial disparity among patients undergoing panniculectomy after bariatric surgery

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ABSTRACT

Background: A disparity exists in patients receiving panniculectomies. We evaluated this disparity and assessed if it persists once patients are integrated into the healthcare system through bariatric surgery.
Methods: All patients who received bariatric surgery (n = 2528), panniculectomies (n = 1333) and panniculectomies after bariatric surgery (n = 48) at the University of Pennsylvania between January 1, 2012 and March 1, 2017 were retrospectively identified. Demographic information and post-operative details were collected. Univariate and multivariate analyses were performed.
Results: 43% (n = 1087) of bariatric surgery patients were African-American compared to 25% (n = 339) of all panniculectomy patients and 52% (n = 25) of panniculectomy after bariatric surgery patients. The racial disparity among all patients receiving a panniculectomy was not present in patients receiving bariatric surgery beforehand ($p < 0.001$). The average income of patients receiving a panniculectomy for any etiology ($89,000) was significantly higher ($p < 0.001$) than patients receiving a panniculectomy after bariatric surgery ($71,000). After multivariate analysis, race remained associated with the disparity ($p = 0.046$).
Conclusion: The disparity seen in patients receiving panniculectomies is not present when patients are integrated into the healthcare system through bariatric surgery.

Introduction

Racial disparities are prevalent throughout medicine, including many areas of surgery[1] such as cardiac surgery,[2] surgical oncology,[3] pancreatic surgery,[4] orthopedic surgery,[5] spine surgery,[6] and breast reconstruction surgery.[7] Although bariatric surgery has proven to be a highly successful method of weight loss and an avenue for dramatic improvements in obesity-related comorbidities,[8] it is no different. Several studies have shown that African Americans are less likely to pursue weight loss surgery,[9,10] more likely to develop complications,[11] more likely to suffer in-hospital mortality[12] and on average lose less weight[13] compared to Caucasian patients.

A condition that can cause significant morbidity after bariatric surgery, regardless of race, is the development of loose, overhanging skin, otherwise known as a panniculus. In fact, 96% of gastric bypass patients develop excess skin which can cause multiple issues, including development of intertriginous dermatitis, difficulty participating in sports or other physical activities, and trouble finding clothing that fits appropriately.[14] As the number of patients receiving bariatric surgery has increased from 158,000 in 2011 to 216,000 in 2016, the number of patients suffering from the ailments of a panniculus has increased as well.[15]

Given the aesthetic and functional challenges that can result from excess skin following bariatric surgery, it is not surprising that a large portion of this population desires body contouring. Previous studies have shown that 74–84% of gastric bypass patients desire some type of body contouring procedure.[14,16] Furthermore, Kitzinger et al. have reported that of all the body areas at risk of developing excess skin after massive weight loss surgery, the abdomen is the most frequently desired site for an operation.[17] Despite the desire to undergo such procedures, only 21% of patients ultimately follow through, with the majority (60%) undergoing an abdominoplasty or panniculectomy.[14] Several factors (high cost, insurance status, fear of complications, and availability

Abbreviations: BMI, Body mass index; EMR, Electronic medical record.

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of quality information) have been proposed to describe the large discrepancy between those who desire body contouring after bariatric surgery and those who actually undergo a procedure.

There are significant benefits to receiving body contouring surgery despite these perceived hurdles in access to care. In fact, body contouring surgery has been shown to increase weight loss after bariatric surgery, result in a more durable long-term weight-loss, and improve quality of life.[18–20] With such advantages observed in bariatric patients receiving body contouring surgery, it is essential to determine if the racial disparity that exists in patients receiving bariatric surgery persists in those who go on to receive a panniculectomy after their massive weight loss.

To date, there has been little research into the possible racial disparities which may exist among body contouring patients. As a result, our group aimed first to determine if the known disparity seen in patients receiving bariatric surgery endured in those patients that went on to receive a panniculectomy and second to ascertain if these findings were consistent with patients receiving a panniculectomy for any etiology.

Methods

Data source and patient selection

After receiving approval from the University of Pennsylvania institutional review board (Protocol #827195), we retrospectively queried the electronic medical record (EMR) for three different patient populations. First, all patients with a body mass index (BMI) $\geq 40\ kg/m^2$ within the health system between January 1, 2012 and March 1, 2017 were identified as a surrogate for patients eligible to receive bariatric surgery. Second, all patients who actually did undergo bariatric surgery during this time period were also identified. Demographic information (race, age, BMI, gender, and zip code) and post-operative details were collected. Of these patients, those that had at least one year of follow-up and went on to receive panniculectomy were isolated. The third group identified were those that received a panniculectomy for any etiology during the above time period. Identical demographic and post-operative details were collected for this group as well.

The primary outcomes of interest were the differences in race and average income of patients receiving a panniculectomy for any etiology compared to patients receiving a panniculectomy after bariatric surgery. Average income was calculated by matching the zip code of each individual patient to a corresponding zip code tabulation area from which average income was calculated based on data from the United States Census Bureau.[21] A secondary outcome was the difference in gender between these patient populations.

Statistical analysis

Univariate statistical analysis included Fisher's exact and chi-square tests for categorical variables and Mann-Whitney and Students T-tests for continuous variables. Multivariable logistic regression was used to assess if race or average income were independently associated with the disparity seen between patients receiving a panniculectomy for any etiology and those receiving a panniculectomy after bariatric surgery. All tests were two-sided and a p-value less than 0.05 was used to determine statistical significance. All statistical analyses were performed using StataCorp. 2017. *Stata Statistical Software: Release 15*. College Station, TX: StataCorp LLC.

Results

2528 patients received bariatric surgery during our study period. Of those, 36% (n = 911) had at least one year of follow-up and 48 of these patients went on to receive a panniculectomy. These two populations were then compared to all patients that received a panniculectomy for any etiology (n = 1354) based on gender, age, BMI, race, and average income (Table 1).

Racial disparity

Patients with a BMI ≥40 in the healthcare system were identified (n = 91,403) in order to determine the approximate number of patients that would be eligible for bariatric surgery. 42% (n = 38,389) of these patients were African-American which was similar to the percentage of patients (43%, n = 1087) who actually received bariatric surgery during our study period. However, only 25% (n = 339) of all panniculectomy patients were African-American. This racial disparity is not observed when patients receive a panniculectomy after bariatric surgery (52%, n = 25) are isolated ($p < 0.001$) (Fig. 1).

Influence of gender

Women made up the majority of patients receiving bariatric surgery, all panniculectomies, and panniculectomy after bariatric surgery regardless of race (Fig. 2). However, when women were assessed individually by the type of procedure performed, a racial disparity was evident. 48% (n = 968) of female patients receiving bariatric surgery (n = 2016) were African-American, which is in stark contrast to 27% (n = 293) of patients receiving a panniculectomy for any etiology (n = 1086). This racial disparity was not evident in females that received bariatric surgery and then received a panniculectomy ($p < 0.001$) (Fig. 3a).

Table 1
Demographics of patients receiving bariatric surgery, panniculectomy for any etiology, and panniculectomy after bariatric surgery.

	Bariatric Surgery (n = 2528)	Panniculectomy (n = 1354)	Panniculectomy After Bariatric Surgery (n = 48)
Gender (n,%)			
Females	2015 (79.7%)	1086 (80.2%)	38 (79.2%)
Males	513 (20.3%)	268 (19.8%)	10 (20.8%)
Average Age (years)	44	49.5	43.4
Average BMI (kg/m^2)	46.2	29.9	49.0
Race/Ethnicity (n,%)			
African-American	1095 (43.3%)	342 (25.3%)	25 (52.1%)
Asian	7 (0.3%)	29 (2.1%)	1 (2.1%)
Caucasian	1301 (51.5%)	850 (62.8%)	22 (45.8%)
Hispanic	60 (2.4%)	49 (3.6%)	–
Other	2 (0.1%)	32 (2.4%)	–
Unknown	63 (2.5%)	52 (3.8%)	–
Average Income ($)	76,456	88,543	71,476

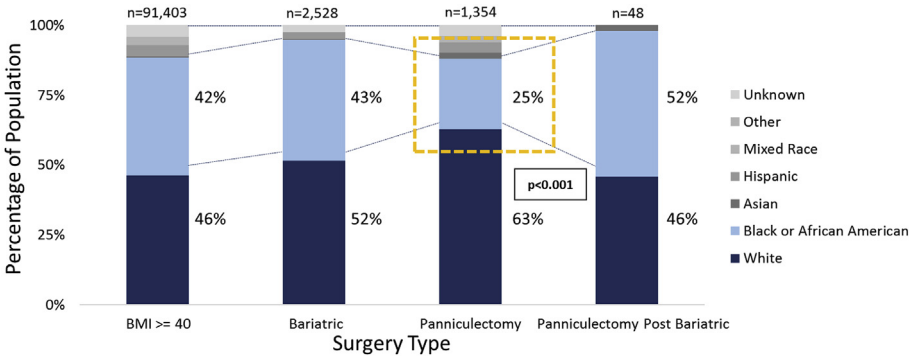

Fig. 1. Breakdown of race by surgery type.

Although males were consistently underrepresented across these three procedures, African-Americans consistently made up approximately 20% of each group. This indicates that although African-American males are underrepresented among patients receiving a panniculectomy for any etiology, this underrepresentation persists even when males receive bariatric surgery beforehand ($p = 0.939$) (Fig. 3b).

Income disparity

The average income as determined by the zip code tabulation area of patients receiving a panniculectomy for any etiology ($89,000) was significantly higher when compared to patients who received bariatric surgery and then a panniculectomy ($71,000) ($p = 0.006$) (Fig. 4). After further analysis through a multivariable logistic regression model using income and race as covariates, income was no longer statistically significant ($p = 0.117$), but race remained as a disparate feature in patients who receive panniculectomy for any etiology when compared to patients that received a panniculectomy after bariatric surgery ($p = 0.046$).

Discussion

Racial disparities within the United States health care system are pervasive and persistent. Identification and characterization of these surgical disparities are imperative, but developing interventions to correct these disparities are equally important. Due to the multi-faceted causes of inequalities in healthcare, it is often difficult to determine the most effective interventions to pursue. Prior studies have shown that involvement at the patient level,[22] provider level,[23] or community level[24] can be used to affect change. The focus of these interventions varies depending on underlying health literacy, access to care, patient education and provider knowledge. Determining which of these variables to converge upon requires significant time and resources, and is likely a reason why there is a paucity of literature on this topic. An alternative solution to this problem may be to identify a subset of patients in which the studied disparities do not exist and then determine what distinguishes this subset from the larger disparate population.

We identified such a subset while studying patients receiving panniculectomies within our health system. Although a surgical disparity was detected among patients receiving a panniculectomy for any etiology, this disparity was not observed in the subset of patients who had already undergone bariatric surgery prior to their panniculectomy. After univariate analyses, race and income status were both associated with this surgical disparity, but after multivariate analysis only race remained as an independent predictor for receiving a panniculectomy at a lower rate.

The racial disparity observed in our patient population was striking but consistent with previous publications studying panniculectomies.[25,26] Despite this apparent disparity, differences in race have not been the focus of investigations centered around panniculectomy outcomes. In fact, conclusions from these studies may not be appropriate for the entire population due to unaccounted for racial differences. Stapleton et al. recently utilized this same type of thought process to highlight that African-American females receive their diagnosis of breast cancer at an age 20 years younger than Caucasian females on average, yet this has had no impact on current screening guidelines.[27]

Our group felt it was necessary to shed light on this important disparity because of the growing obesity epidemic resulting in more patients developing a panniculus. However, as previously

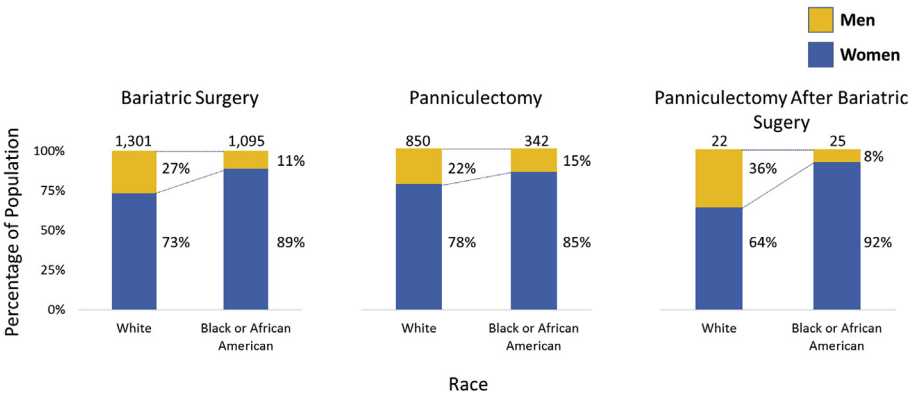

Fig. 2. Gender breakdown by procedure and race.

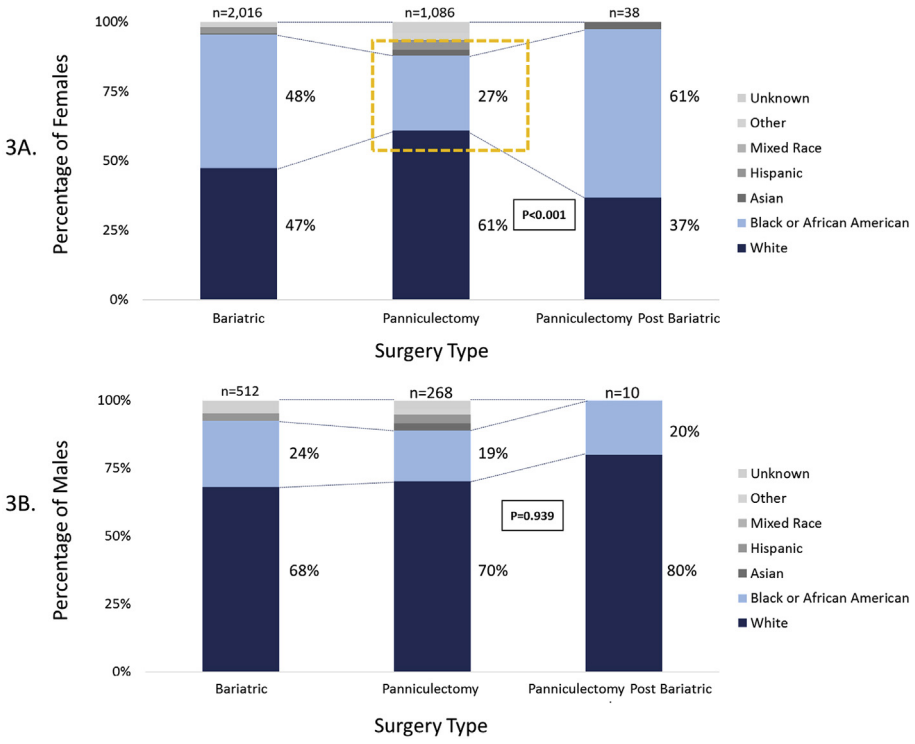

Fig. 3. Breakdown of surgery type by race in A) females and B) males.

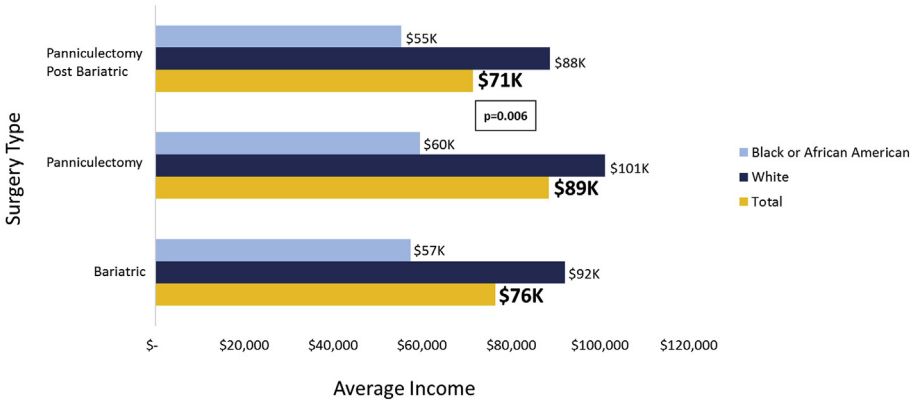

Fig. 4. Breakdown of income by surgery type and race.

discussed, it is unclear where the disparity truly lies. For example, are patients aware that panniculectomies are an option? Are providers referring patients for panniculectomies when they meet criteria? Is insurance status precluding patients from receiving panniculectomies? Answers to these questions can elucidate where interventions can be implemented to reduce the observed disparity.

We were able to identify a sub-population of patients receiving panniculectomies (those who previously underwent bariatric surgery) where a disparity did not exist. This is the first step in determining what causes the disparity seen in the larger population of panniculetomy patients and subsequently intervening to improve the disparity. By focusing on this subset of patients, we can evaluate if there is a difference in access to care, social support, integration into the healthcare system, the multidisciplinary nature of the bariatric program, and/or surgeon knowledge that mitigates the disparity seen in the larger population of patients receiving a panniculectomy for any etiology.

Future areas to explore that will allow for improved understanding of these factors include ascertaining individual insurance status, patient knowledge, and surgeon referral patterns. Due to the retrospective nature of our study, these variables were not able to be examined. There were a few other limitations to our study as well. First, since this was a single-institution study, the findings may not be generalizable. However, if a similar mitigation of the disparity does not exist in other settings, this lends even more credence to our study so that we can define the characteristics of our healthcare system that may be emulated to achieve similar results elsewhere. Second, there is bias in the form of loss to follow-up. A recent study using the bariatric outcomes longitudinal database reported a one year follow-up rate of 30.6%,[28] which is consistent with the 36% seen in our study and indicates there may

be a subset of patients that did not follow-up at our institution to receive a panniculectomy after their bariatric surgery. Finally, the data used to calculate average income per patient was derived from each patient's zip code area as opposed to their actual income. This is again a limitation of the retrospective nature of the study and can be corrected in future prospective studies where patients can be directly asked about their income range.

Conclusions

The racial disparity observed in patients receiving panniculectomies is not present when patients are integrated into the healthcare system through bariatric surgery. By identifying a subpopulation of patients in which the surgical disparity is mitigated and subsequently comparing those patients to a group in which the disparity persists, we may be able to identify areas to intervene and reduce the disparity. Areas of future study include assessment of insurance coverage, income, provider knowledge and patient health literacy. Once these factors are better delineated, a similar evaluation may be applied to improve disparities observed in other surgical procedures.

Meeting presentation

This paper was given as a podium presentation at the 28th Annual Society of Black Academic Surgeons Meeting on April 28, 2018 in Birmingham, AL.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.amjsurg.2019.01.002.

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