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Weight stigma mitigating approaches to gender-affirming genital surgery

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Abstract
The use of body mass index (BMI) to determine eligibility for gender-affirming surgery in transgender and nonbinary individuals has been contested. While BMI thresholds are often meant to be protective, restricting patients from access to surgery can also cause harm. There is a rationale for the continued use of BMI, but the inherent problems with it must also be recognized, including how weight stigma impacts patients' access to gender-affirming surgery and influences clinical care. This article uses a narrative review of current literature to discuss how high BMI affects surgical outcomes in gender-affirming genital surgeries, as well as analogous procedures, existing de facto BMI thresholds, and how to both minimize the harms of proceeding with surgery in patients with a high BMI or the harms of delaying for weight loss. BMI factors into surgical decision-making based on the existing literature, which demonstrates that high BMI is associated with increased surgical risk, including higher incidences of surgical site infections and poor wound healing, as well as the possibility of free flap complications, which are a component of certain genital procedures. This patient population is at higher risk for eating disorders, and it is prudent to find alternatives to requiring patient self-monitored weight management. The impacts of weight stigma should be considered when treating gender-affirming surgery patients, and further data and research are needed to augment shared decision-making and lead to practice change.

Keywords: Gender-affirming surgery, weight stigma, phalloplasty, vaginoplasty, metoidioplasty, body mass index

INTRODUCTION

The use of body mass index (BMI) to determine eligibility for gender-affirming surgery has been previously described in the surgical literature; however, the evidence is limited, and BMI thresholds can restrict access[1]. While not all transgender, nonbinary, two-spirit, and other patients with gender expansive identities (hereafter, trans) request surgical interventions, access to gender-affirming surgery has been shown to improve health outcomes[2]. BMI has a racialized and gendered history, and the origins are nonspecific to individual health risks. BMI was created in the 19th century to measure the body size distribution of the "average man" at a macro level. Though at the time, data was collected only from cisgender European men. It was not until the 20th century that BMI was used as an individual measure of health, first for the purposes of calculating life insurance premiums and later as a measure of cardiovascular risk, despite its proponents' inability to demonstrate BMI's incremental validity as a predictor of health over other physiological parameters[3,4]. Due to the historical context in which it was created, BMI has not been validated for use in non-white, non-cisgender populations[1]. Advocates of the Health At Every Size (HAES) movement have noted that the health effects of weight-related stigma may be an underlying factor that contributes to poorer health outcomes[5-7]. HAES attempts to shift the focus of health from weight to improved health behaviors, in response to societal preoccupation with body size instead of health-promoting behaviors. Weight stigma is the term we will use to describe the impact of weight-related bias on fat patients and people with higher body weights[8]. We will use the word fat at times in reference to these patients, in alignment with fat activists who seek to destigmatize the word and reframe it from a pejorative to a neutral descriptor of a particular spectrum of body types[9].

Although BMI is an imperfect measure, it is used in clinical decision-making and in the medical literature as a proxy for body-fat percentage or distribution, primarily because it is straightforward to calculate[3]. Multiple studies with large numbers of patients controlling for confounding variables have consistently demonstrated that as BMI and body fat percentage increase, so does the likelihood of poor cardiometabolic outcomes[10-13]. While there are unanswered questions about causality, BMI-based thresholds have been consistently evaluated in the surgical literature, describing increased risk for perioperative complications, including surgical site infection[14], general anesthesia[15], increased operative time[16], and greater technical difficulty of the operation. The HAES movement examines and attempts to mitigate the influence of weight stigma on health, but has not yet been used to examine the independent role of weight stigma on surgical outcomes. To date, it has influenced clinical care by emphasizing a focus on patient-centered care and a holistic analysis of patients' overall lives[17].

Research has discussed the intersection of BMI and gender-affirming surgery previously in gender-affirming mastectomy[18,19]. It is important to note that chest surgeries and genital surgeries vary widely in terms of complexity and anatomical location, so these outcomes cannot necessarily be extrapolated to apply to all gender-affirming surgeries. For gender-affirming genital surgery in particular, patients impacted by weight stigma face specific barriers to accessing surgery. Given the urgency and necessity of these procedures, as well as the potential for serious complications, the utilization of BMI to limit access to procedures can be both protective and harmful. An approach to providing gender-affirming surgery which is cognizant of weight stigma in healthcare, and honestly acknowledges the complex psychosocial experience of fat patients is necessary. This is especially important considering the research that shows trans people have a higher likelihood of being considered medically overweight or obese compared to cisgender people[20,21]. In this paper, we examine the application of BMI thresholds in gender-affirming genital surgery. We discuss our rationale for continued use of BMI thresholds in current clinical practice, describe our strategy for shared decision making when discussing the risks of gender-affirming genital surgery, and examine the implications of these choices on patients and clinical care.

WEIGHT IN SURGICAL CARE

We conducted a narrative review of relevant literature. A literature review was performed in PubMed using the search terms in Table 1. Search terms were used independently or combined when relevant for further specificity (see Table 1). Articles in English in any peer-reviewed journal were reviewed for relevant information. Primary evidence as well as meta-analyses, literature and systematic reviews were collected. Articles authored by the senior authors of this paper were selected for review where relevant.

Independent reviewers evaluated the selected articles to determine appropriateness and relevancy to the topic. Articles that discussed surgery and BMI and/or weight stigma were analyzed in particular for relevancy. Additionally, articles that discussed eating disorders in the trans population were reviewed. Articles deemed irrelevant or lacking information specific to the article topic were discarded. Data included in articles on patient BMIs for phalloplasty and vaginoplasty/vulvoplasty was recorded and compiled.

Surgical considerations for high body mass index

Our research identified measures, such as waist circumference and waist-to-hip ratio, which were developed for cases in which BMI did not reflect visceral or subcutaneous body fat distribution, i.e., for patients with significant skeletal muscle hypertrophy. Some patients may have relatively elevated BMI despite low overall body fat distribution, such as those with greater muscle mass. While these alternative metrics are better correlated with central adipose tissue distribution, BMI performs similarly in predicting the risk of cardiometabolic disease, including hypertension, diabetes mellitus, and hyperlipidemia[14].

There are additional considerations for fat patients undergoing any type of surgery. High BMI can impact anesthesia, as the difficulty of ventilation and oxygenation, when controlling for age, increases linearly with BMI[15]. Specifically increased BMI can lead to poor oxygenation and severe hypoxemia, with subsequent end-organ effects, challenges in extubation, or the need for prolonged intubation[22]. Patients with higher BMIs have a higher incidence of sleep apnea, which must be additionally factored into anesthetic considerations[23]. A further cardiopulmonary stressor may be venous thromboembolism, which has an elevated perioperative incidence in patients with high BMI[24]. Large, population-based studies have demonstrated consistent associations of increased adiposity (along with older age and smoking) with a significantly greater likelihood of venous thromboembolism in general[25].

Surgical morbidity and mortality in intermediate to low-risk procedures, as defined by Stevens *et al.*[26], is highest for patients who are classified as underweight (< 18.5 kg/m^2) and morbidly obese (BMI > 40 kg/m^2), with lower rates occurring for patients who fall in the middle of these numbers[26]. High BMI may carry increased risk of wound complications, delayed wound healing[26-28] and postoperative infection[14,29]. Infection, despite perioperative antibiotics is the most common cause of morbidity for fat surgical patients in certain procedures, including gastric bypass[28] and spinal surgery[30,31]. One meta-analysis of spinal surgery found a BMI over 30 kg/m^2 to be a risk factor of surgical site infections[31]. Furthermore, operative time increases with BMI due to increased technical complexity, positional difficulties and potentially impaired monitoring[26].

Operating in the deep pelvis or perineum of fat patients carries unique risks for adverse effects, such as positional neuropraxia, and increased technical challenges of dissection and suturing, in addition to venous thromboembolic event and pelvic infection. In microvascular surgery, increasing BMI and waist-to-hip ratio are both significant risk factors for donor site complications[32]. Type of flap, the robustness of blood supply, and anatomical positioning may have an effect on the success of the flap relative to adiposity. For microvascular free flap phalloplasty in particular, which has a particularly high rate of complications even in

Table 1. Search terms utilized for narrative review and final inclusion

Main search term/topic	Related search terms/topics		
Body mass index/BMI	Weight, obese, obesity, overweight, bariatric, fat, sizeism, Health at Every Size/HAES, eating disorder, disordered eating, anorexia	AND	Stigma, loss, interventions, body, interventions, techniques
AND			
Surgery	Robotic surgery, operative time, risk, complications, adverse events, surgery, outcomes, perioperative, postoperative, adverse events, informed consent, patient reported outcomes, quality of life	OR	Phalloplasty, microvascular surgery, penile reconstruction, penis size, penis length
			Breast reconstruction, mastectomy
			Vaginoplasty, vulvoplasty, peritoneal flap
			Prostatectomy
OR			
Transgender	Gender	AND	Affirming, confirming, confirmation, affirming surgery

BMI: Body mass index, HAES: health at every size.

expert hands, the overall risk of any given procedure can be further increased by high BMI.

There are also finite limits to what can be accomplished physically in the operating room using available equipment. Apart from the risks of anesthesia, infection, and increased technical difficulty, which was previously discussed, there is a weight that is above the safe limit for standard operating tables, hospital beds, CT scanners, and other aspects of the medical supply chain. A patient weighing 500 lbs (227 kg), for example, would need to be accepting of these perioperative limitations.

No standardized guidelines exist for preoperative surgical care of fat patients, so it is left up to the surgeon to determine their own best practices in this demographic[26], as well as to determine their own BMI thresholds. Existing literature recommends utilizing mechanical and pharmaceutical thrombo-prophylaxis to reduce the risk of postoperative venous thromboembolism and specialist referrals for cardiac, respiratory, and metabolic concerns when appropriate[27]. We have found there is often a discussion of mitigating the potential risks associated with high BMI by recommending weight loss, either through diet and exercise modification, pharmacologic assistance or surgical intervention, rather than denying surgery to fat patients who otherwise would be appropriate surgical candidates[28].

Weight loss interventions may be dangerous or inaccessible

Regardless of the impact of BMI on surgical risk, weight-related counseling and pre-operative weight loss may have their own significant negative health impacts. Rapid weight loss is unsustainable for the majority of individuals[5], and can create both acute and chronic health issues[33,34]. Attempts at weight loss can lead to further weight gain in the long-term; it can also create and compound mental health issues[5]. Trans patients are at increased risk for eating disorders, and access to gender-affirming medical interventions such as surgery has been shown to reduce eating disorders[35]. Additionally, restrictive eating disorders can lead to the same negative and chronic health issues that occur with intentional rapid weight loss.

More sustainable interventions to improve metabolic health, such as economic means to purchase fresh and unprocessed foods or kitchen facilities to prepare meals have been shown to be less accessible to trans populations[36]. Trans youth have been shown to participate in sports at a lower rate than cisgender peers, with lower baseline bone mineral density as a potential consequence[37]. Access to changing facilities, restrooms, and public spaces for recreation and exercise is compromised due to experiences of violence, with 46% of respondents to the 2015 United States Transgender Survey reporting verbal harassment and 9% reporting physical assault in the past year due to their gender identity. These social determinants of health manifest on the individual level as weight gain, with few options for management. While gender-affirming surgeons are often sub-specialists with a narrow scope of practice, a strong alliance with both primary care systems and interlinked social services is needed to provide equitable surgical care. Additionally, while surgeons can refer to and collaborate in multidisciplinary care, they can also be social and political advocates for their patients to be full participants in economic and social life[36].

Published literature does not provide robust evidence for fat patients

To date, there are no studies of microvascular free flap phalloplasty or vaginoplasty in which the median BMI was greater than 30 kg/m^2 [Tables 2 and 3][38-50]. An analysis of 1457 patients seeking consults for any gender-affirming surgery at a single high-volume institution from 2015-2019 demonstrated that 382 (26%) patients had a BMI ≥ 30 kg/m^2 at initial consult, and that 369 (27%) patients had a BMI ≥ 30 kg/m^2 at their subsequent consult[51]. The patients in this study with elevated BMI did not have surgery. Multiple cohort studies of trans adolescents and adults demonstrate a high prevalence of increased BMI overall[52-54]. A 2017 NIH analysis of Behavioral Risk Factors Surveillance System data showed that 72.4% of the trans adult respondents have a BMI equal to or greater than 25 kg/m^2, compared to 65.5% of cisgender respondents[21]. An additional study that analyzed Medicare claim records reported trans Medicare beneficiaries have a 31.3% incidence of medically-defined obesity, compared to 17.2% in cisgender beneficiaries[20].

Evidence applicable to phalloplasty

Longer-term data on the outcomes of free flap phalloplasty, including overall risks of flap loss of 11% and urethral complication of nearly 40% is now available[55]. Increased subcutaneous tissue can make tubularization of the phallus more difficult and potentially compromise the microcirculation. Due to the relative paucity of published evidence specific to phalloplasty in patients with higher BMI, we evaluated the analogous free flap reconstructive literature. In microsurgical breast reconstruction, there is robust data on negative surgical outcomes and higher rate of flap loss with increasing BMI[56-60]. For microsurgical head and neck reconstruction, however, high BMI did not necessarily lead to an increased risk of free flap complications[61,62]. A meta-analysis looking at free flaps used in breast *vs.* non-breast reconstruction found that high BMI was associated with a higher risk of complications in breast surgeries, while a subgroup analysis of 5 groups (n = 1684 patients) undergoing head, neck, and lower leg free flap procedures showed no significant differences in flap complications between clinically obese and non-obese patients[62].

Evidence applicable to vaginoplasty and colpectomy

Analysis of the National Inpatient Sample in patients undergoing pelvic reconstructive surgery demonstrated a 40% increase in the risk of perioperative complications with increasing BMI, when adjusting for potentially confounding covariates, including medical comorbidities[63]. These complications included respiratory failure, venous thromboembolic event, and pelvic infection. Venous thromboembolism in particular represents an important emerging area of investigation, with adiposity having a documented impact on the clotting cascade[64]. Drawing on the prostatectomy literature, in which the working space of the pelvis is analogous to colpectomy and vaginoplasty, BMI > 30 is independently associated with high grade complications (Clavien-Dindo 3 and above)[65]. One possible mechanism for this increase in surgical risk is due to prolonged operating time secondary to pelvic visceral adipose tissue volume. Increased pelvic visceral fat volume has been found to correlate with BMI, as well as longer operative time and postoperative anastomotic leak rate[66]. Lastly, the longer any operation in steep Trendelenburg and lithotomy takes, the higher the risk of positional neuropraxia[67].

Table 2. Outcomes of microvascular flap phalloplasty reported in the recent literature, with median and maximum BMI as available

Authors, year	Predominant flap used	Population	Mean or median BMI	Max BMI
Pigot *et al.*[38] 2020	ALT	No UL	25 ± 3	30
Danker *et al.*[39] 2020	RFFF	DIEA anastomosis	26.4 (no SD)	Not reported
Veerman *et al.*[40] 2020	RFFF and ALT	With UL	24 ± 4	Not reported
Al-Tamimi *et al.*[41] 2019	RFFF	Secondary phalloplasty after metoidioplasty	24 ± 3	Not reported
D'Arpa *et al.*[42] 2019	ALT	With UL	Not reported	30
Wirthmann *et al.*[43] 2018	RFFF	With UL	25 (range 19-37)	44*
Ascha *et al.*[44] 2018	RFFF and ALT	With UL	24 ± 4 (ALT) 27 ± 5 (RFFF)	30 (for ALT)
Watanabe *et al.*[45] 2021	RFFF, ALT, combined flap (FC)	With UL	25.9 ± 3.3 (RFFF) 21.7 ± 0.9 (ALT) 32.2 ± 5.1 (FC)	31 (for RFFF)

*This patient suffered total flap loss. RFFF: Radial forearm free flap; ALT: anterolateral thigh flap; UL: urethral lengthening; FC: flap combination; DIEA: deep inferior epigastric artery; BMI: body mass index.

Table 3. Outcomes of vaginoplasty or vulvoplasty reported in the recent literature, with median and maximum BMI as available

Authors, year	Approach	Technique	Mean or median BMI	Max BMI
Whynott *et al.*[46] 2020	Perineal	Penoscrotal vaginoplasty	27 ± 3	Not reported
Dy *et al.*[47] 2021	Robotic + perineal	Peritoneal flap + penile inversion vaginoplasty	25 (range 15-38)	38
van der Sluis *et al.*[48] 2020	Perineal	Vulvoplasty	24 ± 2	28
Manrique *et al.*[49] 2019	Perineal	Penile inversion vaginoplasty	27 ± 6	39
Gaither *et al.*[50] 2018	Perineal	Penile inversion vaginoplasty	25 (22-29)	Not reported

BMI: Body mass index.

The benefits and detriments of BMI thresholds for gender-affirming surgery

Fat patients face barriers within the health system. Complications have not been stratified by BMI or weight, which makes it difficult for the surgeon to fully inform the patient of risks. We propose alternatives to strictly BMI-based counseling, such as offering radiographic evaluation of fat distribution, and advocate for a flexible and patient-centered approach to performing surgery on fat patients. As a practice, we continue to utilize a form of BMI-based eligibility requirements based on our interpretation of available evidence, with a strong recommendation that patients maintain a BMI < 35 prior to any free flap or pelvic surgery. We recognize that our utilization of BMI-based requirements within the current medical infrastructure is impossible to transform into a criterion not impacted by weight stigma. The pervasive effects of weight stigma in healthcare are modeled in Figure 1. Given this entrenched conflict, we further discuss the impacts of weight stigma on patients and the subsequent limitations in access to care, as well as minimizing harms in both operating and not operating on patients above the BMI threshold.

De facto or ceiling BMI thresholds already exist: what is up for debate is how they are defined normatively

At the very least, a BMI-based cutoff would be useful in screening for patients above the acceptable BMI threshold and making them aware of the surgical teams' reluctance to proceed in advance of their scheduled consultation. The concept of a threshold, above which the potential for adverse outcomes would become unacceptably high, must therefore follow. How one defines "adverse outcomes" and "unacceptably high" should arise from discussions between the medical professionals and the patient. Surgeons seeking to mitigate these possibilities must necessarily engage in multidisciplinary management (i.e., with anesthesia and primary care providers), and offer patient assessments of their individual risk. Equipment limitations that impose BMI thresholds, as a result, are not immutable. Equipment suitable for fat people does exist,

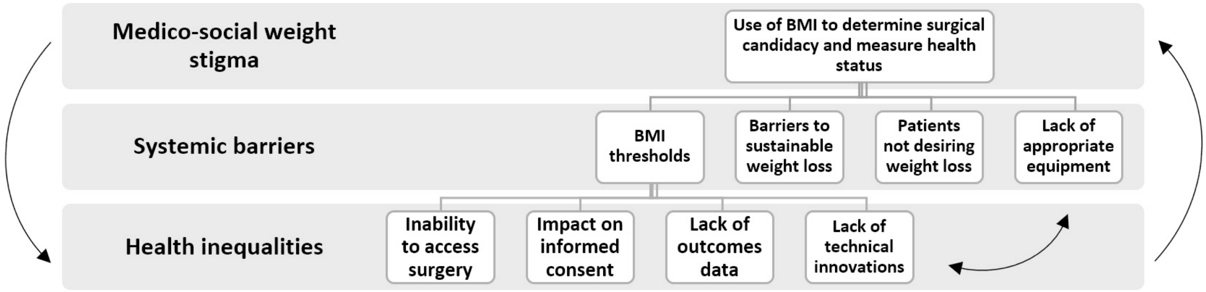

Figure 1. We present our theoretical model of weight stigma impacts on access to gender-affirming surgery. The left and right arrows denote the interconnectedness of the overall domains of the effects of weight stigma; the double-ended arrow demonstrates the cycle the lack of technical innovations has on proliferating the lack of appropriate equipment. BMI: Body mass index.

though it is specialized and not widely available. To overcome this barrier to operating on patients with higher BMIs, institutional support is vital to ensure hospitals are as well-equipped for fat patients as they are for smaller patients.

Surgeon comfort with operating on patients with higher BMI is also an important factor. Over a certain BMI threshold, which will vary among surgeons, it becomes more difficult to operate without undue negative effects on both surgeon and patient. Increased BMI can make the surgical dissection and identification of critical structures challenging. Patient transfer and positioning, as well as intraoperative retraction, require greater strength, raising the potential for work-related strain or injury of surgeons and the clinical care team. This again becomes a matter of technical and ergonomic limitations which could one day be solved by innovations in equipment and surgical technique, but at this time is an obstacle to a safe operation for everyone involved.

Evidence-based recommendations

The combined difficulty of achieving the goals of surgery and the higher likelihood of poor outcomes dissuade surgeons from offering these complex or multi-staged operations to patients with a high BMI. However, for those who do proceed with surgery, based on the results of our literature review and our clinical practice, we have suggestions for counseling patients and proceeding with surgery. In regards to phalloplasty, it is difficult to extrapolate the impact of BMI on outcomes from non-phalloplasty data. Flap donor site selection should be based on patient goals, body habitus, and radiographic imaging. Subcutaneous fat thickness impacts the dimensions of the neophallus and can be measured radiographically[68]. For example, a subcutaneous fat thickness of 3.4 cm would correspond to a neophallus circumference greater than 21 cm with a single tube method. This would be above the 99th percentile for penile girth based on nomograms developed with over 9000 observations[69]. While well-counseled patients are accepting or specifically desiring of this outcome, there is no validated methodology for predicting the resulting penis diameter, and many patients request girth reduction following ALT. Thinning procedures risk injury to the neurovascular structures of the penis, and an acceptable cosmetic or functional result for the patient may not be achievable even with multiple debulking surgeries. To appropriately counsel patients, we have begun routine preoperative measurement of the distance from the dermis to muscle for patients seeking ALT flaps. The intention is to correlate this with long-term phallic dimensions and help facilitate the shared decision-making process. A recent study advising the use of ultrasonic imaging in tandem with BMI to aid in phalloplasty flap selection supports our practice of preoperative measurements[45]. Watanabe *et al.*[45] recommend ALT flap selection only in patients with low BMI and thigh thickness less than 6 mm.

The impacts of limited data

Gender-affirming mastectomy is performed on patients with higher BMI with higher frequency compared to other gender-affirming surgeries[70]. As a result, there is more data showing this is a relatively safe procedure in patients with BMI 35-40[18,19]. A study by Rothenberg *et al.*[19], looked at 948 cases, but only 2.9% had a BMI > 40 kg/m^2, limiting extrapolation of data for patients with higher BMIs. A study by Pittelkow *et al.*[18] reported a higher rate of surgical site infection for patients with BMI > 40 kg/m^2. Clearly, there is a segment of the trans population with a BMI over 35 who seek gender-affirming genital surgery as well, but the data regarding their outcomes is unknown. This consequently leads to more caution around determining surgical candidacy, as genital surgeries involve additional complexity and may be less safe as BMI increases.

Since there is inadequate data to know what risks are specific to higher BMI, we can only extrapolate outcomes for BMIs over 35 from the relatively limited number of long-term studies from the microsurgical and pelvic reconstructive literature. We would encourage surgeons who routinely perform gender-affirming genital surgery in patients with BMIs over 35 to publish their outcomes, so that this knowledge deficit may be better addressed.

Minimizing harms of BMI-based eligibility: proceeding with surgery

Given the real harms of denying or delaying genital gender-affirming surgery, there is a rationale for proceeding with surgery in sufficiently informed fat patients. As we have outlined, there is a paucity of broadly applicable data on gender-affirming genital surgery, with no large or long-term studies reporting mean or median BMI above 30. Informed consent is a requirement with a minimum acceptable threshold, while fully informing all aspects of consent is an ongoing process rather than a concretely achievable state. Surgeons have a duty to accurately represent the literature and disclose the limits of information they present to patients[71]. When possible, using data on similar procedures can serve as a stand-in to discuss increased risk with increased BMI. Being clear and forthright about operative experience with patients of varying BMIs is necessary to inform patients' decision-making. Further diagnostic work-up may better inform the decision to proceed, such as radiographic imaging to look at fat distribution for flap surgery or tailored hematological management to decrease the risk of pulmonary embolism in pelvic surgery.

Surgeon risk tolerance and autonomy regarding surgery must be accounted for as well. The level of risk a surgeon takes on will vary by individual. Proceeding with surgery on a demographic of patients in which there is little outcomes data is not a task all surgeons will accept. Both patient and surgeon take on a portion of responsibility for operative risks within a shared decision-making paradigm. Operating outside of evidence-based practice, while necessary to establish a wider base of evidence, is not something any individual surgeon should feel obligated to undertake.

Patients impacted by weight stigma seeking gender-affirming surgery are limited in access to information beyond empirically verifiable perioperative risks. These limits include information available within community-based knowledge sharing, which, given the absence of standardized and validated patient-reported outcome measures in this space, have been of paramount importance to patient decision-making[72]. Compounding intra-community weight-related stigma may be a further barrier to sharing surgical narratives and post-surgical outcome photos, where visual outcomes may be deemed unacceptable by commenters or viewers merely because the person is fat, rather than factors related to the surgery itself. Fat patients may avoid seeking social support or sharing their narratives due to the fear that weight stigma will lead peers to assume that their weight represents their individual choices, and ultimately cause any negative outcomes.

Lack of visual representations of post-operative outcomes in patients with higher BMIs, either because these patients are denied surgery or because patients with higher BMI do not share their images, impacts a patient's ability to understand the range of outcomes to expect from a given intervention. Visual outcomes following surgery differ with adiposity, and lack of information about the degree of variation impacts patient's expectations for genital gender-affirming surgery. Surgical algorithms within plastic surgery to define visual ideals themselves, which are now being developed in gender-affirming genital surgery, operationalize this bias[73]. Fat bodies are not scaled-up thin bodies, and the utilization of anthropometric measurements to create visual standards or outcomes is reductive of distinct cultural ideals relating to bodily forms which differ amongst race, ethnicity, class, and other demographics.

Minimizing harms of BMI-based eligibility: delaying for weight loss

Using the existing literature, there is evidence from analogous surgeries to support delaying gender-affirming surgery until achieving weight loss. Requesting patients lose weight without providing specific counseling or interventions has not been shown to be effective in the setting of gender-affirming surgery[51]. A multimodal approach to weight management is necessary, and should be patient-centered, starting with the least invasive approach. Referrals to professionals who can assist with lifestyle modification are the first step. If necessary or requested by the patient, additional referrals can be made to clinicians who can assist with medication management and bariatric surgery[74]. The recently FDA-approved medication semaglutide is promising in regards to medication-assisted weight loss; however, long-term data in regards to the sustainability of said weight loss is forthcoming[75]. Bariatric surgery, while effective, has serious potential complications, and acceptance of these risks has been shown to be influenced by weight stigma[76].

The multidisciplinary setting of gender-affirming care affords a promising foundation from which to provide meaningful care to patients who choose to pursue weight loss for surgical preparation. Prior evidence suggests gender-affirming surgery is an opportunity for sustained positive changes in medical conditions, such as suppression of HIV viral load[77]. It is also important to connect patients who are over the BMI threshold and/or have a current or previous history of eating disorders to specialized mental health professionals. While fat people are often assumed to not suffer from restrictive eating disorders, this is untrue, and they can be triggered or worsened by weight loss requests or attempts[78,79]. The requirement to lose weight and the denial of surgical care may create intertwined harms. It is important to maintain a trauma-informed approach when working with this population, which has a high incidence of eating disorders. Care must be taken when approaching conversations about weight with all patients, whether or not the patient has an eating disorder diagnosis. Prior to requesting a patient lose weight, eating disorder/disordered eating history should therefore be discussed. If the surgeon prefers the patient lose weight, then referrals should be made to clinicians who ideally practice within a HAES framework and are willing to help patients achieve surgery-related BMI goals. A HAES approach to lifestyle and dietary modifications may lead to weight loss and improved health outcomes while limiting potential negative physiological and psychological effects[80]. These resources can assist patients in feeling surgery is within reach, which helps maintain a positive mental health outlook. Lastly, patients may not be able to access eating disorder treatment or HAES clinicians due to geographic location, insurance or financial situation. The surgical practice should make continued efforts to establish relationships with providers who accept state Medicaid plans or are able to assist patients on a sliding scale.

Ideally, patients should be provided with information about BMI thresholds prior to consultation. We would encourage proceeding with consultation prior to weight management to allow discussion of the rationale for BMI thresholds. This helps build rapport between patient and surgeon and avoids miscommunication. We believe that patients benefit from the surgeons' direct perspective on risk management when deciding what pre-operative care will best serve their surgical goals.

CONCLUSION

A review of the gender-affirming genital surgery literature demonstrates that no large or long-term studies report mean or median BMI above 30. This implies either that most high-volume practices implement BMI-based thresholds, or that the data is not reported in the literature. Surgeons offering gender-affirming genital surgery may use BMI thresholds based on evidence from similar procedures. There are real risks of intraoperative and postoperative complications ranging from wound dehiscence to life-threatening multisystem impact in patients with high BMIs undergoing microvascular free flap procedures or operations in the deep pelvis. Weight stigma impacts this evidence and its interpretation, and there are known harms in delaying gender-affirming genital surgery until weight loss has occurred. We encourage surgeons and patients to frankly and openly discuss the risks of delaying surgery and intentional weight loss, as well as the risks of operating. We urge surgeons who operate routinely on patients with a BMI above 35 to report their outcomes. Additionally, stratifying BMI-associated complications by severity can be helpful in ranking risks of morbidity and further augmenting available knowledge. Shared decision-making is integral to the process of determining surgical candidacy, and must take into account patient and surgeon autonomy and risk tolerance amidst currently available data, as well as the consequences of denying or delaying surgery. Surgeons and institutions providing these operations must advocate for further data collection that can lead to practice change.

DECLARATIONS

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Authors' contributions

Drafted initial manuscript, performed initial literature review and data collection: Shakir NA, Blasdel G, Castle E

Substantial edits and revisions to manuscript: Blasdel G, Castle E, Bluebond-Langner R, Zhao LC

Final manuscript preparation and approval: Blasdel G, Castle E, Bluebond-Langner R, Zhao LC

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