

## Peer Review File

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### Reviewer A

Comment 1: I congratulate the authors for this concise but informative and thorough narrative review on this interesting topic (breast reconstruction in obesity). It followed a systematic approach and a streamlined presentation. I believe it would be of a great interest to the readers.

Reply 1: The authors thank Reviewer A for their kind words and congratulations. We are pleased that this reviewer found our work to be concise, informative, thorough, streamlined, and of interest to readers.

Changes in the text: N/A

### Reviewer B

Comment 1: Congratulations on your work summarizing the current available evidence in this complex field for the breast reconstructive surgeon

Reply 1: The authors thank reviewer 2 for their congratulations and have addressed further comments below. We thank the reviewer for your comments, which feel have resulted in changes that have strengthened the manuscript.

Changes in the text: N/A

Comment 2: I have missed some further explanation on some small topics of the article.

Obesity paradox: it might be interesting if you can explain in a few lines some of the main theories for this to happen.

When you talk about how "Compared to DIEP flap reconstruction, free MS-TRAM reconstruction provides an increased number of perforators" on lines 237-238, I would appreciate if you can extend it a bit more. It might be interesting, particularly for the residents / junior staff not being very familiar with the MS1-2 tram (in some departments favoring DIEP) to explain that by doing it instead of the DIEP you can more easily capture several perforators as compared to the tedious intramuscular dissection if you want to do this with a pure MS3 - DIEP flap (not that you can't do it). Also, when you say how this technique "also offers the ability to dissect out the pedicle to its origin on the external iliac artery, providing additional length" at lines 239-240, I am not sure about what you mean. Isn't that possible with the DIEP flap too? Please explain it a bit more.

Reply 2: The authors thank the reviewer for their comments and requests for further clarification, we feel that these are important points.

Changes in the text:

The following text has been added to provide potential explanations for the obesity paradox: “The leading hypothesis for this phenomenon is that a frailty phenotype is predictive of mortality, with body mass and weight acts as a protective measure for patients at risk of mortality. Additionally, some have theorized that the obese populations studied may have higher cardiorespiratory fitness than their non-obese counterparts, accounting for the paradoxical findings” (See page 7, line 176).

“This technique also offers the ability to more easily capture multiple perforators down to their pedicle on the external iliac artery, compared to the more laborious intramuscular dissection with DIEP flap reconstruction.” (See page 11, line 265).

Comment 3: I also miss some comments about long term prepectoral vs retro muscular results

Reply 3: Thank you for your comment regarding the inclusion of more information about long-term prepectoral vs. retro-muscular results. We have included information regarding long-term explant and implant failure rates (which appear to be comparable between the techniques, with explant rates for both reconstruction types rising in class II and III obese populations). Unfortunately, to the authors knowledge, no strong data has been published comparing long-term PROMs between prepectoral and retro-muscular implant-based reconstruction in obese patients.

Changes in the text: The text includes the following information regarding explanation following prepectoral or retro muscular reconstruction: “Prepectoral breast reconstruction has been shown to have the same rate of skin necrosis (3.5%), wound dehiscence (5.9%), seroma rate (4.7%), and failure rate of (1.2%) in patients with obesity compared to nonobese patients<sup>55</sup>. Nguyen et al. determined that every one-point increase of BMI raised the odds of complications and explantation following implant-based breast reconstruction by 3.4% for prepectoral implants and by 8.6% for subpectoral implants<sup>21</sup>.” (See page 12, line 292)

Reviewer C

Comment 1: A job well done on a well-written and thoughtful overview of the important considerations for the management of breast reconstruction in patients with obesity. I really enjoyed reading your high-quality work and thoughtful analysis.

Reply 1: The authors would like to thank Reviewer C for their kind words. We are pleased this reviewer found the manuscript to be well-written, thoughtful, enjoyable to read, and of high quality.

Changes in the text: N/A

Reviewer D

Comment 1: The authors described "Breast Reconstruction After Mastectomy in Patients with Obesity: A Narrative Review". This review article was professionally written and organized. This topic should be informative and attractive for potential readers. I have some suggestions to improve this manuscript.

Reply 1: The authors both appreciate and thank Reviewer D for their kind words and for their edits, which have contributed to strengthening our revised manuscript.

Changes in the text: N/A

Comment 2: A Figure describing the Goldilocks mastectomy technique should be added, because it would allow a safe breast reconstruction alternative for patients with significant comorbidities especially in elevated BMI patients.

Reply 2: The authors agree that this technique is important and important to depict, as it contributes to positive outcomes in patients with an elevated BMI.

Changes in the text: A figure depicting the Goldilocks technique has been created and added to the manuscript. (See Figure 1)

Comment 3: How about the reconstruction after radiotherapy? Irradiated tissues should be difficult in case of whether autologous or implant. Please add the content.

Reply 3: The authors agree that irradiated tissue represents an important surgical consideration in the setting of breast reconstruction due to decreased elasticity of the skin and poor wound healing. While data is limited regarding how these two risk factors (obesity and chronic radiation-induced fibrosis) work in tandem, it can be assumed that a patient with both would be at particularly high risk for complications.

Changes in the text: The following text has been added to the manuscript: "While the obese population may have more abundant skin, its quality can be compromised in the presence of radiation. Radiation-induced skin fibrosis has deleterious effects on skin elasticity and wound healing ability, leading to increased complication rates for all patients with a history of radiation in the reconstructive surgical field. Although not unique to the obese population, a delayed reconstruction with autologous tissue is recommended to reduce complication rates and increase patient satisfaction. The reason for this is that critical structures or foreign body exposure resulting from suboptimal wound healing are more concerning than wound dehiscence along a well-vascularized flap or abdominal flap site suture line." (See page 4, line 98)

Reviewer E

Comment 1: In this narrative review, the authors do a good job at summarizing current trends in breast reconstruction for the obese patient.

The article reads well, has good structure, and relevant references are included  
With minor revisions, the article will be ready for publication

Reply 1: The authors thank this reviewer for their kind comments. We are pleased this reviewer has found the article to read well, have good structure, and include relevant references.

Changes in the text: N/A

Comment 2: Line 68: “pearls”

Reply 2: The authors thank the reviewer for their careful edits and have corrected the spelling in text.

Changes in the text: The term “pearls” has been edited for correct spelling (see page 3, line 72)

Comment 3: Line 84: please include reference. If this is a personal opinion, I would rephrase as “...they should be counseled about the higher risk of nipple and mastectomy flap necrosis”.

Reply 3: The authors thank the reviewer for their recommendation to add a relevant citation to this line and agree that it is necessary. The language has been changed according to the reviewer’s recommendation.

Changes in the text: The relevant citation has been added (see page 4, line 88,93). The following text has been changed: “As they have a significant degree of ptosis, they should be counseled about the higher risk of nipple and mastectomy flap necrosis” (see page 4, line 93).

Comment 4: Line 89: please expand on the indications for two-stage reconstruction in obese patients with severe ptosis. And does the treatment options change if the patients are BRCA versus confirmed breast cancer.

Reply 4: The authors agree that some additional indications for two-stage reconstruction in obese patients with severe ptosis exist. We have added additional language to discuss such instances, especially in settings of radiation.

Changes in the text: The following language has been added: “While the obese population may have more abundant skin, its quality can be compromised in the presence of radiation. Radiation-induced skin fibrosis has deleterious effects on skin elasticity and wound healing ability, leading to increased complication rates for all patients with a history of radiation in the reconstructive surgical field. Although not

unique to the obese population, a delayed reconstruction with autologous tissue is recommended to reduce complication rates and increase patient satisfaction. The reason for this is that critical structures or foreign body exposure resulting from suboptimal wound healing are more concerning than wound dehiscence along a well-vascularized flap or abdominal flap site suture line (11).” (See page 4, line 98)

Comment 5: Line 121: it would be interesting if the authors could present pictures of the Goldilocks technique

Reply 5: Thank you for this comment, which has been brought up by another reviewer as well. The authors agree a visual depiction of the Goldilocks technique will significantly strengthen our manuscript.

Changes in the text: A figure depicting the Goldilocks technique has been created and added to the manuscript. (See Figure 1)

Comment 6: Line 208: “breasts breast satisfaction”?

Reply 6: The authors thank the reviewer for their careful read and for catching this mistake. We have made appropriate clarifications in text.

Changes in the text: The text now reads as follows: “Higher satisfaction with breasts ( $p<0.0001$ ), satisfaction with outcome ( $p<0.01$ ), psychosocial well-being ( $p<0.007$ ), and sexual well-being ( $p<0.006$ ) was reported for patients undergoing autologous reconstruction versus implant-based reconstruction<sup>30</sup>.” (See page 10, line 230)

Comment 7: Please comment on rates of fat necrosis in autologous reconstruction with autologous flaps, and whether 2 or more perforators should be taken in this patient population.

Mulvey CL, Cooney CM, Daily FF, Colantuoni E, Ogbuago OU, Cooney DS, Rad AN, Manahan MA, Rosson GD, Sacks JM. Increased Flap Weight and Decreased Perforator Number Predict Fat Necrosis in DIEP Breast Reconstruction. *Plast Reconstr Surg Glob Open*. 2013 Jun 7;1(2):1-7

Reply 7: The authors thank the reviewer for this comment, which represents an important consideration in surgical planning for obese patients where larger flaps are used. We have added text and the citation recommended to elaborate on this important point.

Changes to text: The following text has been added: “A study of 179 flap reconstructions found that increasing weight of the flap significantly correlated with increased occurrence of fat necrosis. In single perforator flaps weighing more than 1000 grams, more than 42.9% of flaps developed fat necrosis. This number decreased to 14.3% in flaps of the same weight with multiple perforators. In the obese population, increased

flap weight may require careful surgical planning to include multiple perforators supplying the flap so as to minimize risk of fat necrosis.” (See page 11, line 250).

Comment 8: Please comment on the effect of smoking in obese patients seeking breast reconstruction.

Ribeiro LM, Meireles RP, Brito IM, Costa PM, Rebelo MA, Barbosa RF, Choupina MP, Pinho CJ, Ribeiro MP. Impact of Body Mass Index, Age and Tobacco Use on the Outcomes of Immediate Breast Reconstruction with Implants and Acellular Dermal Matrix. *Indian J Plast Surg.* 2021 Sep 27;54(3):350-357.

Sadok N, Krabbe-Timmerman IS, de Bock GH, Werker PMN, Jansen L. The Effect of Smoking and Body Mass Index on The Complication Rate of Alloplastic Breast Reconstruction. *Scand J Surg.* 2020 Jun;109(2):143-150.

Reply 8: The authors agree that smoking, like obesity, represents an important consideration in surgical planning for patients seeking breast reconstruction. However, limited data exist regarding the question of whether the effects of smoking are exacerbated in the obese patient population. The authors thank the reviewer for sharing several citations, which we have reviewed. Both of these studies examine smoking and obesity as risk factors separately, rather than in tandem. The first concludes smoking does not increase risk of complications, while the second concludes it does. Given the scope of the paper focusing on obesity and breast reconstruction and the limited availability of data regarding smoking in this population, we feel refraining from comment on this topic in this manuscript may be appropriate.

Changes in the text: None at this time.