

Peer Review File

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Reviewer A

Editorial Note: Although we consider this manuscript as a clinical practice review, we agree with reviewer A regarding the suggestion of highlighting what additional information this clinical practice review offers compared to existing reviews.

Comment 1: This is a "narrative" review paper that summarizes the surgical method, anatomy, and surgical results of PAP flap. Although the authors have clearly described their experience with relevant literatures, there was little additional information compared to previous studies. However, there are systemic review papers which are not cited in this study. (*A Systematic Review and Meta-Analysis on Microsurgical Safety and Efficacy of Profunda Artery Perforator Flap in Breast Reconstruction J Oncol . 2019 Jul 29;2019:9506720.*, *Comparison of transverse upper gracilis and profunda femoris artery perforator flaps for breast reconstruction: A systematic review Microsurgery . 2020 Nov;40(8):916-928.*) The results from these studies should be mentioned.

Reply 1: We appreciate these constructive comments. We have added the outcomes of the meta-analysis published by Qian et al to the "Outcomes" subsection of the manuscript. It reads as follows: "A meta-analysis of 516 PAP flaps showed an overall flap success rate of 99%, and overall complication rate of 23%. Wound dehiscence was found to be the most common complication at 6%, and seroma (2%) and hematoma (1%) were relatively uncommon."

While the above referenced systematic review by Jo et al was not specifically quoted in the manuscript, it was referenced in the manuscript, and can be found as reference 23. To add additional information, we have included some more specific findings from their paper as follows: "In a systematic review by Jo et al, the PAP flap was found to have longer pedicle length, higher flap weight, less donor site wound dehiscence, and comparable rates of flap loss and fat necrosis compared to the TUG flap."

Reviewer B

Comment 1:

This is a very interesting clinical practice review summarizing the anatomy and characteristics of the PAP flap and their relevance as suitable option in breast reconstruction. The relevant anatomy is well described, the advantages and disadvantages are fairly discussed including the design of the flap and planning considerations. The importance of preoperative imaging and marking is emphasized.

Thus, this interesting manuscript should be published.

Reply 1:

Thank you.

Reviewer C

The authors report on evolution, anatomy, (dis)advantages, flap design, surgical technique, and outcome of the PAP flap in a clinical practice review. The structure of the article is good. There are only few minor aspects to be pointed out:

Comment 1:

- section PAP flap: advantages and disadvantages: The authors describe very nicely the advantages and disadvantages of the PAP flap especially in relation to other flaps in breast reconstruction. Is there any literature available on donor site morbidity of the PAP flap, particularly in comparison to the gracilis flap? If yes, this should also be included into this section.

Reply 1:

Yes, thank you for the comment. We have added some evidence-based references to support differences in PAP over TUG flaps and donor site morbidity. It now reads as follows: “In a systematic review by Jo et al, the PAP flap was found to have longer pedicle length, higher flap weight, less donor site wound dehiscence, and comparable rates of flap loss and fat necrosis compared to the TUG flap.”

Comment 2:

- section preoperative imaging: The authors describe the usage of CTA and MRA for detecting perforators for the PAP flap. However, they do not report on (duplex) sonography techniques. As those are less invasive and cheaper and CTA and MRA is not available to every institution, the authors should also report on this technique more in depth.

Reply 2:

The senior author does not routinely use duplex/ultrasound for preoperative planning. In general, preoperative MRA at our institution has proven to be the most reliable method of perforator assessment. We also, as described in the dissection portion of the paper, make the anterior dissection first and it allows for dissection along a broad front to find all available perforators and make an intraoperative clinical decision regarding the best perforator and in a literature search of surgeons using ultrasound for preoperative planning in PAP flaps, we could only find one paper looking at power doppler vs hand held doppler efficacy in PAP flap planning for head and neck reconstruction (*Kehrer A, Hsu MY, Chen YT, Sachanandani NS, Tsao CK. Simplified profunda artery perforator (PAP) flap design using power Doppler ultrasonography (PDU): A prospective study. Microsurgery. 2018 Jul;38(5):512-523. doi: 10.1002/micr.30266. Epub 2017 Nov 4. PMID: 29105818*). Thus, we felt there was not enough literature published at present to comment on use of ultrasound in this review.

Comment 3:

- the preoperative marking and operative techniques sections are a description of the authors' own technique without any literature review. In general, this is ok, but it should be mentioned as a limitation of the study. As a matter of fact, a separate section of strengths and limitations in the main body as recommended in the author guidelines is missing.

Reply 3:

We have included a section on strengths and limitations in the body of the review. It now reads as follows:

“STRENGTHS AND LIMITATIONS

This review aims to provide a thorough and in-depth overview of the PAP flap and its applications relevant to breast reconstruction. The clinical pearls provided by the senior author's preferences may allow other microsurgeons a quicker learning curve and facilitate efficient dissection in the operating room. Shortcomings of this review are mainly related to the relatively newer development of this flap and the limited data on longer term outcomes, especially across large patient populations. Another limitation of this review includes the fact that certain aspects such as preoperative markings, patient positioning, and imaging techniques are more anecdotal in nature based on the senior author's preferences and expert opinion. Further studies are encouraged to further elucidate long term outcomes for patients undergoing PAP flap reconstruction."

Comment 4:

- Figure 3: please be more specific in the description of the figure (e.g. name the muscles, point out perforators) either by adding markings/descriptions in the figure itself or describe exactly what can be seen in the figure legend.

Reply 4:

We have added additional details and anatomic descriptions to help the readers identify relevant structures. The description now reads as follows:

"PAP flap dissection is begun out by making the anterior incision only. This provides a wide field of dissection to avoid working in a hole, and allows for the identification of multiple PAP perforators. The gracilis is retracted superiorly by yellow fish hooks, and the perforators (marked in purple) can be seen emerging from the adductor magnus. Exposing the entire length of the anterior incision allows the surgeon to excellent exposure to determine the most favorable perforator(s) for harvest before sacrificing any perforators."

Reviewer D

This is a lovely clinical review piece of the PAP flap.

If the opportunity arose, I would suggest:

Comment 1:

- another intraoperative image, demonstrating the perforator anatomy and its relations - with the goal of highlighting any intraoperative tips
- photo of any complications, which could highlight the pitfalls.

Reply 1:

Unfortunately, we do not currently have any additional suitable photos to include for this manuscript.