

## Peer Review File

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### Reviewer A

I would like to comment the authors for presenting this study this data is important for the pre-operative counseling with concern to the patient post surgery expectations. A major limitation however is the small sample size and the single surgeon measurements.

**Comment:** Difference between phallo and meta is known by now. more relevant is why to choose for phallo or meta. since these studies is about meta, authors should outline pro's and cons for meta I miss this in the introduction.

**Reply:** We have modified our text as advised (see page 4, lines 117-120).

**Changes in Text:** Benefits of metoidioplasty when compared to traditional phalloplasty include lower risk of complications, fewer surgeries and better sexual sensation. Disadvantages include shorter length of the resulting neophallus that typically does not allow for penetrative intercourse, and may or may not allow for a patient to void in the standing position.

**Comment:** Line 112-115: I wonder if this still accounts. To my experience less trans men opt for meta.

**Reply:** The updated US Transgender Survey is anticipated to be released in 2023. It will be interesting to see updated attitudes and trends towards these procedures.

**Changes in Text:** NA

**Comment:** Line 124-126 expected length can help in the pre-op counseling with concern to post op expectations. people who choose meta know that they will have a small phallus.

**Reply:** We have added additional context for benefits of this research on pre-op counseling. (See page 5, lines 150-152).

**Changes in Text:** However, patients often do not have a reference for how much smaller the neophallus may be, nor for the magnitudes of bottom growth and subsequent impact on neophallus length.

**Comment:** Line 137: I miss the surgical steps taken to alter phallic length.

**Reply:** We added additional information regarding surgical steps (see page 6, lines 165-175).

**Changes in Text:** Metiodioplasty was performed using the Belgrade technique. This technique uses a buccal mucosal graft and overlapping labia minora flaps to lengthen the urethra. After releasing the dorsal suspensory ligament which helps to optimize exposed neophallus length, a strip of vestibular mucosa (urethral plate) is marked from the clitoral glans to the urethral meatus. A transverse incision is made at the level of the glans and the flap is raised off the ventral aspect

of the corporal bodies, releasing the chordee and maximally exposing the clitoris. This leaves a defect on the ventral aspect of the corporal bodies that is covered with a strip of buccal mucosa to create the dorsal aspect of the urethra. The ventral aspect of the urethra is formed using overlapping labia minora flaps in a double-breasted fashion, to avoid overlapping suture lines.<sup>10</sup> The vast majority of metoidioplasty patients benefit from monsplasty, and this technique is often performed concurrently.

**Comment:** Exposed length was also stretched? Patient was in lithotomy position: stretch means stretched upwards? phallus was flaccid? Simple drawing of the measurement technique can be helpful

**Reply:** We added additional information regarding length measurements (see page 6, lines 183-187).

**Changes in Text:** Clitoral length was measured from the base of the clitoris to the tip of the glans, with the patient in the lithotomy position and the clitoris on full stretch. Exposed neophallus length was measured from the base of the neophallus to the tip of the glans with traction pulled straight out from the body at a 90-degree angle, again with the patient in lithotomy. The phallus is flaccid as this measurement was obtained in the OR under anesthesia.

**Comment:** Figure 1 shows 15 dots. while 16 pt were included

**Reply:** We appreciate this attention to detail. We have confirmed that there are 5 dots displayed in what appears to be 4 dots in the cluster with stretched clitoral length=6 and Exposed neophallus length = 7. Thus, there are 16 patients included in the figure.

**Changes in Text:** NA

**Comment:** 4 pt had same length. What was the reason?

**Reply:** It is unclear why 4 patients did not achieve growth of their neophallus following metoidioplasty. Measurements were taken in centimeters. We suspect however that if measurements were taken more precisely to the nearest millimeter, patients would have achieved at least some additional growth, although not likely visually or functionally significant.

**Changes in Text:** NA

**Comment:** Is there phallic length available of the patients not included? What data do you have from them?

**Reply:** The patients who were not included did not have pre- or post-operative measurements for phallic length, and, as such could not be included within our analysis. This data was not available for all patients who underwent metoidioplasty as it did not become standard practice to measure phallic length until more recently at our institution.

**Changes in Text:** NA

**Comment:** Is there data of T values and are you able to correlate this with the delta phalic length. This also suites the aim of your study

**Reply:** We did not collect data for the values of testosterone levels for patients who underwent metoidioplasty. However, this would be an interesting factor to study in future studies which aim to understand factors which are associated with either clitoromegaly or neophallus length following metoidioplasty.

**Changes in Text:** NA

**Comment:** Line 183: this is not only important for patient but also for healthcare providers

**Reply:** Thank you for raising this point, we have modified our text as advised (see page 8, lines 228-229).

**Changes in Text:** Healthcare providers may find benefit from augmenting pre-operative gGAS counseling with data regarding post-operative neophallus length.

**Comment:** Line 194-198: I agree with the authors that prolonged T use does not cause extra clitoral enlargement but emphasis should be made about the first 1-2 years and that surgery should not be in the first two years after start with hormonal therapy.

**Reply:** We have modified our text as advised (see page 8, lines 237-243).

**Changes in Text:** Time on testosterone (beyond the at least one year recommended by WPATH) was not significantly correlated with either stretched clitoral length nor exposed neophallus length. The clitoromegaly that develops with exposure to exogenous testosterone typically occurs within the first 1-2 years and surgery is not indicated before 12 months of continuous hormonal therapy. The timing of clitoromegaly may explain the non-significant relationship between growth of the clitoris and prolonged testosterone exposure past the one-year recommendation.

**Comment:** The measurement was done by one surgeon which is also a limiting factor.

**Reply:** We have modified our text as advised (see pages 8-9, lines 254-256).

**Changes in Text:** Finally, all measurements were obtained by a single surgeon, which may introduce bias but also may provide a degree of standardization with measurements.

## **Reviewer B**

Overall:

Kudos to the authors for working on an important topic and thank you for using affirming language throughout. However, the paper requires extensive revision to be properly evaluated as it is impossible to properly evaluate the results through the methods the authors have chosen to use.

**Comment:** The 3rd paragraph of the introduction is weak compared to the rest of the introduction. See following comments for specific details. It is odd that the authors cite a systematic review and

meta-analysis on metoidioplasty to support their argument that "Despite this, research has largely focused on phalloplasty techniques and outcomes." while stating that there is a paucity of literature in this area in the following sentence. For example, the cited meta-analysis reviews neophallus lengths in the published literature, which would be helpful to include within the framing of the introduction for readers to understand the current state of neophallus lengths after metoidioplasty.

**Reply:** We have modified the introduction including the current understanding of post-metoidioplasty neophallus length as advised (see pages 4-5, lines 131-138).

**Changes in Text:** Existing metoidioplasty research has focused on surgical techniques, complications, and outcomes including post-operative patient satisfaction and neophallus length.<sup>14,15,16</sup> For example, one review article evaluating gender-affirming surgeries noted that 80% of patients were satisfied with sexual function and 77% were satisfied with aesthetics post-metoidioplasty.<sup>17</sup> With respect to neophallus length, the 2021 metoidioplasty meta-analysis by Jolly et al., showed that the average neophallus length varied from 5.7 - 8.7 cm, with ranges ranging from 2 - 5 cm to 6 - 12 cm.<sup>13</sup> While metoidioplasty research often reports neophallus length, there are few reports examining patient-specific factors contributing to neophallus length post-metoidioplasty.

**Comment:** The current paper also focuses on a surgical outcome (i.e., neophallus length) so I am not certain what the authors are trying to convey with their statement that outcomes have focused on surgical outcomes and techniques. Please revise these 2 sentences for accuracy.

**Reply:** We have modified our text as advised (see pages 4-5, lines 121-138).

**Changes in Text:** See below

**Introduction has been edited:**

According to the 2015 US Transgender Survey, a roughly equal number of transmasculine or nonbinary patients elect to undergo metoidioplasty when compared to phalloplasty. Additionally, it showed a greater percentage of transmasculine or nonbinary individuals who want metoidioplasty "someday" when compared to those who desire phalloplasty.<sup>11</sup> However, there is an imbalance between phalloplasty and metoidioplasty literature. A 2022 meta-analysis of phalloplasty research analyzed 37 original research studies, including 1,731 patients in analysis.<sup>12</sup> Meanwhile, a 2021 meta-analysis of metoidioplasty research included only 7 studies and 403 patients.<sup>13</sup> Furthermore, when searching terms on PubMed for the last five years (2018-2023) the term "phalloplasty" provides 300 results, while the term "metoidioplasty" provides only 91 results.

Existing metoidioplasty research has focused on surgical techniques, complications, and outcomes including post-operative patient satisfaction and neophallus length.<sup>14,15,16</sup> For example, one review article evaluating gender-affirming surgeries noted that 80% of patients were satisfied with sexual function and 77% were satisfied with aesthetics post-metoidioplasty.<sup>17</sup> With respect to neophallus length, the 2021 metoidioplasty meta-analysis by Jolly et al., showed that the average neophallus length varied from 5.7 - 8.7 cm, with ranges ranging from 2 - 5 cm to 6 - 12 cm.<sup>13</sup> While metoidioplasty research often reports neophallus length, there are few reports examining patient-specific factors contributing to neophallus length post-metoidioplasty.

**Comment:** The authors claim "There are no reports examining patient-specific factors contributing to neophallus length post-metoidioplasty." I believe at least one paper has considered at very least patient-specific aspects (e.g., chromosome karyotyping in neophallus length: Cohanzad S. Penile Improvement Protocol in Postoperative Management of Patients Undergoing Metoidioplasty. *Aesthetic Plast Surg.* 2016;40(6):947-953. doi:10.1007/s00266-016-0700-3)

**Reply:** We have modified our text as advised (see page 5, lines 137-138).

**Changes in Text:** While metoidioplasty research often reports neophallus length, there are few reports examining patient-specific factors contributing to neophallus length post-metoidioplasty.

**Comment:** I would add a sentence expanding on the author's argument that neophallus length influences patient decision making. Perhaps briefly explain why neophallus length may affect this decision (e.g., length for sexual penetration). The authors may find this paper helpful for making their argument: Ganor O, Taghinia AH, Diamond DA, Boskey ER. Piloting a Genital Affirmation Surgical Priorities Scale for Trans Masculine Patients. *Transgend Health.* 2019;4(1):270-276. Published 2019 Oct 25. doi:10.1089/trgh.2019.0038

**Reply:** We have modified our text and utilized the above citation as advised (see page 5, lines 139-148).

**Changes in Text:**

**Introduction has been edited:**

With both growing interest and options for masculinizing gGAS, there is a need for increased evidence and data for patients to make informed decisions regarding their care. The expected length of a neophallus post-metoidioplasty or other masculinizing gGAS is a factor that may impact patient decision-making.<sup>18</sup> One study developing a genital affirmation surgical priorities scale concluded that, when compared to patients interested in metoidioplasty, patients interested in phalloplasty endorsed significantly greater concerns about neophallus length, as well as with activities requiring sufficient length such as standing to urinate and penetration.<sup>18</sup> A 2023 mixed methods study from Butcher et al. demonstrated, however, that transmasculine patients may experience decisional conflict when choosing what type of gGAS to pursue, highlighting the need for continued research to help aid patients in their decision making.<sup>19</sup>

**Comment:** Was vaginoplasty performed?

**Reply:** Yes, vaginectomy was performed at least 3 months pre-operatively. We have updated our methodology section (page 6, line 178).

**Changes in Text:** Vaginectomy was also performed at least 3 months pre-operatively.

**Comment:** Was there urethral lamination in patients who had urethral lengthening?

**Reply:** No, urethral lamination is not performed in urethral lengthening in metoidioplasty.

**Changes in Text:** NA

**Comment:** What tissues were used? Please add a citation for the "Belgrade technique".

**Reply:** A buccal graft for the dorsal aspect of the urethra and a double-breasted labia minora flap for the ventral aspect of the urethra are used. We have updated our surgical description and added a citation for the Belgrade technique (page 6, lines 165-175).

**Changes in Text:** Metiodioplasty was performed using the Belgrade technique. This technique uses a buccal mucosal graft and overlapping labia minora flaps to lengthen the urethra. After releasing the dorsal suspensory ligament which helps to optimize exposed neophallus length, a strip of vestibular mucosa (urethral plate) is marked from the clitoral glans to the urethral meatus. A transverse incision is made at the level of the glans and the flap is raised off the ventral aspect of the corporal bodies, releasing the chordee and maximally exposing the clitoris. This leaves a defect on the ventral aspect of the corporal bodies that is covered with a strip of buccal mucosa to create the dorsal aspect of the urethra. The ventral aspect of the urethra is formed using overlapping labia minora flaps in a double-breasted fashion, to avoid overlapping suture lines.<sup>10</sup> The vast majority of metiodioplasty patients benefit from monsplasty, and this technique is often performed concurrently.

**Comment:** Was urethral lengthening included in analysis? This could affect neophallus length.

**Reply:** Typically, patients noted to have small labia minora were counseled that urethral lengthening may lead to increased complications / smaller neophallus; and were more likely to choose simple release. This could affect measurement outcomes. However, we are not able to perform a robust analysis given the small subgroup number. We have included more detail regarding the number of patients who had undergone urethral lengthening (page 7, line 216). We have also adjusted Table 1 to include data on the number of patients who underwent monsplasty and urethral lengthening.

**Changes in Text:** 9 patients had urethral lengthening, and 7 underwent simple release.

**Comment:** Can the author's justify using Pearson's correlation over regression? Generally, regression with covariates controlling for potential confounding is used when testing whether one variable predicts another, as is being done in this analysis. Correlation does not equate to causation - correlations do not contribute meaningfully in the context of this analysis. Please revise the analyses with more appropriate methods for the research question.

**Reply:** We have chosen to analyze these data using descriptive and bivariate statistics. Pearson's correlation was chosen because this is an appropriate statistic with a small sample size to describe the strength of a linear relationship between 2 variables. Among the 3 independent variables of interest, there was a strong linear relationship found between the outcome, exposed neophallus length, with only 1 independent variable. If more than one was found to have a strong relationship, then further description would be necessary. As there wasn't evidence here, a paired t-test was used to describe the association within patient between stretched clitoral length and exposed neophallus length. Correlation nor regression can prove causation in this small study and without further assessment of confounding. Due to the limited sample size, this is beyond this study.

## **Changes in Text: NA**

**Comment:** The results cannot be interpreted through the methods used in this study. Please revise the analyses. The sample size is incredibly small for the research question. Consider revising this paper to be descriptive rather than analytic.

**Reply:** Due to the small sample size, this paper is descriptive. As described above, descriptive and bivariate statistics (correlations and a paired t-test) are feasible and appropriate analytic methods with 16 patients. It would be unacceptable to use a regression model with this sample size so we have refrained from including. We have edited the results, discussion, and conclusion to more accurately represent the strength of the analysis with the strength of the result.

**Changes in Text:** See below

**Methods Paragraph 5** (page 7, line 202-205): A descriptive analysis was performed and reported per the Guidelines for Reporting of Statistics for Clinical Research in Urology. Bivariate statistical relationships were described using Pearson's correlation coefficient, and compared with a paired t-test.

**Results Paragraph 2** (page 7, line 220-224): There was no evidence of correlations between stretched clitoral length or exposed neophallus length with patient BMI ( $\rho = -0.02$ ,  $p = 0.93$ ;  $\rho = 0.05$ ,  $p = 0.83$ , respectively). Time on testosterone had weak and not significant correlation with stretched clitoral length, nor exposed neophallus length ( $\rho = -0.28$ ,  $p = 0.15$ ;  $\rho = -0.35$ ,  $p = 0.18$ , respectively).

**Discussion and the conclusion have removed the following statement:** Pre-operative stretched clitoral length was the most significant predictor of post-operative exposed neophallus length.

**Discussion Paragraph 2 was edited** (page 8, 237-243): Time on testosterone (beyond the at least one year recommended by WPATH) ~~was not significantly correlated~~ with either stretched clitoral length nor exposed neophallus length was not found. The clitoromegaly that develops with exposure to exogenous testosterone typically occurs within the first 1-2 years, and surgery is not indicated before 12 months of continuous hormonal therapy. The timing of clitoromegaly may explain the lack of evidence of a relationship between growth of the clitoris and prolonged testosterone exposure past the one-year recommendation.

**Discussion Paragraph 3 was edited** (page 8, line 245-246): We found ~~that~~ no evidence that BMI was ~~not significantly~~ correlated with either stretched clitoral length nor exposed neophallus length,

**Comment:** Please revise in the context of the current literature, not just 1 or 2 articles.

**Reply:** We have expanded our current cited literature to include articles which reviewers noted in their comments, in addition to more recent and relevant literature. We have made relevant alterations to the introduction and discussion sections and updated our full reference list.

**Changes in Text:** See below

**Introduction Paragraph 3 has been edited:** According to the 2015 US Transgender Survey, a roughly equal number of transmasculine or nonbinary patients elect to undergo metoidioplasty when compared to phalloplasty. Additionally, it showed a greater percentage of transmasculine or

nonbinary individuals who want metoidioplasty “someday” when compared to those who desire phalloplasty.<sup>11</sup> However, there is an imbalance between phalloplasty and metoidioplasty literature. A 2022 meta-analysis of phalloplasty research analyzed 37 original research studies, including 1,731 patients in analysis.<sup>12</sup> Meanwhile, a 2021 meta-analysis of metoidioplasty research included only 7 studies and 403 patients.<sup>13</sup> Furthermore, when searching terms on PubMed for the last five years (2018-2023) the term “phalloplasty” provides 300 results, while the term “metoidioplasty” provides only 91 results.

**Introduction Paragraph 4 has been edited:** Existing metoidioplasty research has focused on surgical techniques, complications, and outcomes including post-operative patient satisfaction and neophallus length.<sup>14,15,16</sup> For example, one review article evaluating gender-affirming surgeries noted that 80% of patients were satisfied with sexual function and 77% were satisfied with aesthetics post-metoidioplasty.<sup>17</sup> With respect to neophallus length, the 2021 metoidioplasty meta-analysis by Jolly et al., showed that the average neophallus length varied from 5.7 - 8.7 cm, with ranges ranging from 2 - 5 cm to 6 - 12 cm.<sup>13</sup> While metoidioplasty research often reports neophallus length, there are few reports examining patient-specific factors contributing to neophallus length post-metoidioplasty.

**Introduction Paragraph 5 has been edited:** With both growing interest and options for masculinizing gGAS, there is a need for increased evidence and data for patients to make informed decisions regarding their care. The expected length of a neophallus post-metoidioplasty or other masculinizing gGAS is a factor that may impact patient decision-making.<sup>18</sup> One study developing a genital affirmation surgical priorities scale concluded that, when compared to patients interested in metoidioplasty, patients interested in phalloplasty endorsed significantly greater concerns about neophallus length, as well as with activities requiring sufficient length such as standing to urinate and penetration.<sup>18</sup> A 2023 mixed methods study from Butcher et al. demonstrated, however, that transmasculine patients may experience decisional conflict when choosing what type of gGAS to pursue, highlighting the need for continued research to help aid patients in their decision making.<sup>19</sup>

**Discussion Paragraph 5 has been edited:** Even with limitations, this study adds to the growing body of literature surrounding metoidioplasty. Next steps should include conducting studies with larger cohorts across multiple nationwide sites to elucidate factors correlating with exposed neophallus length after metoidioplasty, including expanding on demographic data and selecting additional factors which may correlate with neophallus length. For example, one study concluded that utilization of a penile-traction device post-metoidioplasty was an effective step in increasing the size of the neo-phallus over 24 weeks.<sup>26</sup> Additionally, pumping has been anecdotally correlated with increased pre-operative clitoral length. Conducting retrospective analyses using other existing metoidioplasty databases may also further substantiate our analysis.

**Discussion Paragraph 6 has been edited:** Furthermore, a crucial future step will be to partner with transgender and gender diverse patients to better elucidate what factors may contribute to both pre-operative decisions making regarding gGAS and post-operative patient satisfaction. Patient reported outcomes, while not included in this study, are paramount to better understand gGAS for the community it serves.<sup>27</sup> Some metoidioplasty research has included patient reported



outcomes. For example, in Bordas et al. and Stojanovic et al., in addition to evaluating functioning and post-operative outcomes, the authors conducted patient surveys evaluating cosmesis and patient satisfaction post-metoidioplasty.<sup>14,15</sup> In addition to evaluating post-operative complications and ability to void standing, Djordjevic et al. evaluated overall satisfaction with length and appearance of neophallus.<sup>28,29</sup> A more recent study by Robinson et al. in 2021 provided surgical outcomes and patient reported outcomes in 129 patients who underwent gender affirming penile reconstruction, reporting on neophallus length, post-operative erogenous sensation, and post-operative patient genital self-image score.<sup>30</sup> Together, this information along with the findings related to the relationship between pre-operative stretched clitoral length and post-operative exposed neophallus length allows for better pre-operative counseling. As more patients are presenting for gender affirming care, including masculinizing gGAS, this data will be important to aid patients in their decision making when choosing which operation may be most suitable for them.

**Comment:** Discussion should be revised once analyses are revised.

**Reply:** As stated above, we have not changed the analysis as descriptive and bivariate statistics (correlations and a paired t-test) are feasible and appropriate analytic methods with 16 patients. Instead, we have revised statements within the results, discussion, and conclusion to represent the strength of analysis in relationship to the results more accurately.

**Changes in Text:** See below

**Discussion and the conclusion have removed the following statement:** Pre-operative stretched clitoral length was the most significant predictor of post-operative exposed neophallus length.

**Discussion Paragraph 2 was edited:** Time on testosterone (beyond the at least one year recommended by WPATH) ~~was not significantly correlated~~ with either stretched clitoral length nor exposed neophallus length was not found. The clitoromegaly that develops with exposure to exogenous testosterone typically occurs within the first 1-2 years,<sup>18,19</sup> and surgery is not indicated before 12 months of continuous hormonal therapy. The timing of clitoromegaly may explain the lack of evidence of a relationship between growth of the clitoris and prolonged testosterone exposure past the one-year recommendation.

**Discussion Paragraph 3 was edited:** We found ~~that~~ no evidence that BMI was ~~not significantly~~ correlated with either stretched clitoral length nor exposed neophallus length

**Key Finding #2 within the Highlight Box was edited:** After 2 years of testosterone therapy, a longer time on testosterone was not significantly associated with clitoromegaly or post-operative neophallus length following metoidioplasty.

## **Reviewer C**

This study deals with gender affirming surgery in assigned female at birth individuals. The manuscript is interesting and addresses an important topic in the growing field of gender affirming

surgery. The paper describes factors that may affect the resulting neophallus length after metoidioplasty using the “Belgrade method”. The outcome measures are the intraoperative measurements of the stretched clitoral length and the exposed neophallus length.

**Comment:** I have major concerns about the study. The authors state that the study period was from 2000 to 2022, but it seems that only in patients included after 2016 the intraoperative measurements were conducted. It is therefore inappropriate to state that the surgery was conducted between 2000 and 2022 when only one case was operated upon in 2000 and the next in 2017. In total 28 cases had surgery. However, of the 27 that were operated between 2017 and 2022 only 16 had measurements of the neophallus. No reason has been given for why the remaining 12 did not have measurements. Thus, the sample size is small.

**Reply:** We have removed the case performed in 2000 from our study. We explain that the other patients removed from final analysis did not have formal measurements before and after surgery (page 7, lines 209-212).

**Changes in Text:** A total of 27 patients underwent metoidioplasty between 2017 and 2022. Of those, 16 had values recorded for both pre-operatives stretched clitoral length and post-operative exposed neophallus length and were included in the final analysis. Patients excluded from analysis did not have formal measurements before and after surgery.

**Comment:** Furthermore, it is stated that patients were operated both with and without urethral lengthening and that the majority of patients had concomitant monsplasty, but number and/or frequency of these occurrences are not described. These two factors may be important for the final neophallus length and should be reported.

**Reply:** We have modified our text as advised (see page 7, lines 215-216). We have also adjusted Table 1 to include data on the number of patients who underwent monsplasty and urethral lengthening.

**Changes in Text:** 14 out of the 16 patients included in analysis underwent monsplasty. 9 patients had urethral lengthening, and 7 underwent simple release.

**Comment:** The authors use parametric tests for the statistical analyses. They present descriptive data in terms of median and IQR as measures of central tendency and dispersion, indicating that the material is not normally distributed and consequently the comparisons should not be analysed by means of parametric tests.

**Reply:** We have chosen to present medians with IQR because these statistics provide useful information about the set of patients described beyond what a mean and standard deviation provide; the selection was not due to the distribution of the data. Additionally, median and IQR are recommended for reporting per the Guidelines for Reporting of Statistics for Clinical Research in Urology (“Guidelines for reporting of statistics for clinical research in urology” PMID: 30537407), which we have included in our methods section (page 7, line 202-203). The data are centered and have a reasonable dispersion such that parametric tests are warranted.

**Changes in Text:** A descriptive analysis was performed and reported per the Guidelines for Reporting of Statistics for Clinical Research in Urology.

**Comment:** The "Belgrade method" is not described and no references for the method are presented. The manuscript needs a brief description of the method.

**Reply:** We have modified our text and added an additional reference to describe the Belgrade technique as advised (see page 6, line 165-175).

**Changes in Text:** Metiodioplasty was performed using the Belgrade technique. This technique uses a buccal mucosal graft and overlapping labia minora flaps to lengthen the urethra. After releasing the dorsal suspensory ligament which helps to optimize exposed neophallus length, a strip of vestibular mucosa (urethral plate) is marked from the clitoral glans to the urethral meatus. A transverse incision is made at the level of the glans and the flap is raised off the ventral aspect of the corporal bodies, releasing the chordee and maximally exposing the clitoris. This leaves a defect on the ventral aspect of the corporal bodies that is covered with a strip of buccal mucosa to create the dorsal aspect of the urethra. The ventral aspect of the urethra is formed using overlapping labia minora flaps in a double-breasted fashion, to avoid overlapping suture lines.<sup>10</sup> The vast majority of metoidioplasty patients benefit from monsplasty, and this technique is often performed concurrently.

**Comment:** The conclusion of the study is incorrect. In the study, the stretched clitoral length and exposed neophallus length are both measured on the same surgical occasion with the patient in the lithotomy position, preoperatively and directly postoperatively (although the timing is poorly described). The neophallus length at the end of surgery is probably irrelevant as it may not reflect the final result after the healing period. Adhesions and/or retraction to some degree of the tissue during wound healing are not uncommon. Thus, it is incorrect to claim that patients can expect their exposed neophallus length to be 0.5-1 cm greater than their preoperative stretched clitoral length.

**Reply:** We have updated our discussion and conclusion to provide additional context regarding factors affecting final neophalus length. We have modified our text.

**Changes in Text:** See below

**Discussion Paragraph 4:** Finally, neophallus length was measured immediately post-metoidioplasty, and final length may be impacted by post-operative factors (e.g., adhesions and retractions during wound healing, pumping).

**Conclusion:** Our results suggest that, following metoidioplasty, patients can expect their immediate post-operative exposed neophallus length to be about 0.5 to 1 cm greater in length compared to their pre-operative stretched clitoral length, which can be obtained in-clinic with patient consent.

**Comment:** Furthermore, the exact method of how the measurements is achieved is poorly defined and as such it is not possible to reproduce comparable measurements in other settings.

**Reply:** We have added more detail regarding measurement methodology (see page 6, lines 183-187).

**Changes in Text:** Clitoral length was measured from the base of the clitoris to the tip of the glans, with the patient in the lithotomy position and the clitoris on full stretch. Exposed neophallus length was measured from the base of the neophallus to the tip of the glans with traction pulled straight out from the body at a 90-degree angle, again with the patient in lithotomy. The phallus is flaccid as this measurement was obtained in the OR under anesthesia.

## **Reviewer D**

The authors retrospectively reviewed their experience with metoidioplasty over a 22 yr period-specifically, they assessed post-operative phallic length (as compared to preoperative clitoral length). This manuscript is helpful in counseling patients and managing expectations with regards to surgery. I have several questions/comments for the authors:

**Comment:** The sample size is small (n=16) and represents a combination of both 'simple release' (i.e., no urethral lengthening) versus those people who underwent UL using the Belgrade technique. The authors measure preoperative 'clitoral length.' However, using the Belgrade technique, a more likely limitation of post-operative phallic length is the size of the labia minora. It is typically the labia minora, used to lengthen the urethra, that limits the post-operative phallic length. I am interested in the authors' thoughts on this-it is conceivable that the authors choice of surgical technique plays a role in post-operative phallic length. In regard to question #1, was there a difference in length achieved by those people who underwent simple release as compared to UL

**Reply:** Typically, patients noted to have small labia minora were counseled that urethral lengthening may lead to increased complications / smaller neophallus; and were more likely to choose simple release. This could affect measurement outcomes. However, we are not able to perform a robust analysis given the small subgroup number. We have included more detail regarding the number of patients who had undergone urethral lengthening (page 7, line 216).

**Changes in Text:** 9 patients had urethral lengthening, and 7 underwent simple release.

**Comment:** The authors refer to the goal of 'standing urination.' In my experience, this is really the question of 'can I use a public urinal.' In order to use a public urinal, the phallus must have sufficient length to exit the zipper. While this does correlate directly with phallic length, in my experience, this also correlates with BMI (and adiposity of the mons or abdomen/pannus). The authors measure length in lithotomy, but this may not be an accurate functional estimate for the patient (i.e., people with the same phallic length may have different functional length depending upon body habitus). I think that this issue should be considered in the authors' discussion of BMI. Do the authors have data on the number of patients who are able to use a urinal and what their phallic length is?

**Reply:** "Standing urination" has different interpretations to different patients and physicians. We did not explore perceptions of "standing urination" in this paper. Anecdotally, a neophallus length of 3 cm is needed to use public urinals

**Changes in Text:** NA

**Comment:** The authors allude to this, but do they have any suggestions as to techniques (medications, pumping, etc....) which may impact/influence pre- or post-operative phallic length

**Reply:** Anecdotally, pumping makes a significant difference in stretched clitoral length. One study concluded that utilization of a penile-traction device post-metoidioplasty was an effective step in increasing neophallus length. We have included additional details within our discussion (page 9, lines 263-266).

**Changes in Text:** For example, one study concluded that utilization of a penile-traction device post-metoidioplasty was an effective step in increasing the size of the neo-phallus over 24 weeks. Additionally, pumping has been anecdotally correlated with increased pre-operative clitoral length

## Reviewer E

The authors present interesting findings that could translate to pre operative counseling. Several clarifications, namely in describing surgical technique, should be added to assess how well this may correlate to other surgeons performing metoidioplasty:

**Comment:** Authors discuss Belgrade technique, but not all who formally adopt this will release the suspensory ligament; was this done? and was it always done, if not did it affect length? Please include. Similarly, describing release of the ventral chordee, this may be implied in "Belgrade" but should be noted as the whole crux of the study was to discuss length and releasing chordee may directly affect stretched length; how did you release and did depth of dissection or extent of release affect length?

**Reply:** We have included additional details in our surgical description regarding suspensory ligament release and release of the ventral chordee. We did not assess the impact of release of these structures and depth of dissection on neophallus length, but this is an interesting consideration we may pursue in the future (page 6, lines 265-275).

**Changes in Text:** Metiodioplasty was performed using the Belgrade technique. This technique uses a buccal mucosal graft and overlapping labia minora flaps to lengthen the urethra. After releasing the dorsal suspensory ligament which helps to optimize exposed neophallus length, a strip of vestibular mucosa (urethral plate) is marked from the clitoral glans to the urethral meatus. A transverse incision is made at the level of the glans and the flap is raised off the ventral aspect of the corporal bodies, releasing the chordee and maximally exposing the clitoris. This leaves a defect on the ventral aspect of the corporal bodies that is covered with a strip of buccal mucosa to create the dorsal aspect of the urethra. The ventral aspect of the urethra is formed using overlapping

labia minora flaps in a double-breasted fashion, to avoid overlapping suture lines. The vast majority of metoidioplasty patients benefit from monsplasty, and this technique is often performed concurrently.

**Comment:** Our practice is to routinely lengthen urethra; did urethral lengthening affect exposed phallus results?

**Reply:** Typically, patients noted to have small labia minora were counseled that urethral lengthening may lead to increased complications / smaller neophallus; and were more likely to choose simple release. This could affect measurement outcomes. However, we are not able to perform a robust analysis given the small subgroup number. We have included more detail regarding the number of patients who had undergone urethral lengthening (page 7, line 216).

**Changes in Text:** 9 patients had urethral lengthening, and 7 underwent simple release.

**Comment:** Authors note majority had monsplasty done at time of index surgery. does it affect measured length?

**Reply:** We are not able to perform a robust analysis given the small subgroup number.

**Changes in Text:** NA

**Comment:** How are you stretching the clitoris/neophallus? again, may be implied but include that a stay suture was placed or whatever was done; also, it should be explicit in the methods that this was done intra op, only in discussion was this raised

**Reply:** We added more detail regarding measurement methodology (page 6, lines 181-187).

**Changes in Text:** A single surgeon measured both stretched clitoral length and exposed neophallus length in a standardized fashion intra-operatively, with a stay suture placed through the glans. Clitoral length was measured from the base of the clitoris to the tip of the glans, with the patient in the lithotomy position and the clitoris on full stretch. Exposed neophallus length was measured from the base of the neophallus to the tip of the glans with traction pulled straight out from the body at a 90-degree angle, again with the patient in lithotomy. The phallus is flaccid as this measurement was obtained in the OR under anesthesia.

**Comment:** Other considerations/comments include the fact that we do not stretch the organ to assess length in the clinical setting for obvious reasons i.e., patient discomfort and no adequate way to assess without serious tension... so how do we give a "number" to patients? Do we say to them the length of their ERECT neophallus will be 0.5cm-1cm longer? As such how can we translate this further and is it a useful note to make in pre op counseling?

**Reply:** After obtaining patient consent, we do gently stretch the clitoris in-clinic to measure clitoral length. We have modified our conclusion to provide more context surrounding pre-operative counseling (page 9, line 289-292).

**Changes in Text:** Our results suggest that, following metoidioplasty, patients can expect their immediate post-operative exposed neophallus length to be about 0.5 to 1 cm greater in length

compared to their pre-operative stretched clitoral length, which can be obtained in-clinic with patient consent.

**Comment:** In the same vein, I am assuming the authors then do not have reportable patient-reported outcomes to correlate at all with their stretched length findings i.e., patients felt their neophallus is x amount larger/smaller/same post op as it was pre op? If yes that would be great to include, otherwise it is key to elaborate on further in the discussion section and determine what validated PROMs we do have out there and if length is considered in existing ones and how? And if we should focus in the future on including length if it is deemed important in counseling - though many would argue it is not if we are showing length increases by .5cm-1cm.

**Reply:** Thank you for raising the question regarding patient reported outcomes. We did not collect this data as it was outside the scope of this study, but this is an interesting and important area of research we may pursue in the future.

**Changes in Text:** NA

**Comment:** Finally, there is a significant gap between what reads like the "first" metoidioplasty at the institution in 2000 to the majority 27 having been performed from 2017 on; is there much use in noting that first one as it wasn't included in final analysis anyway? Consider just noting the most recent ones that were the majority cohort anyway.

**Reply:** We have removed the case performed in 2000 from our study and included those which were performed after 2017 (page 7, lines 209-211).

**Changes in Text:** A total of 27 patients underwent metoidioplasty between 2017 and 2022. Of those, 16 had values recorded for both pre-operatives stretched clitoral length and post-operative exposed neophallus length and were included in the final analysis.

Overall, nice findings and thank you for contributing to the ever evolving and dynamic field of gGAS.