

## The Surgical Techniques and Outcomes of Secondary Phalloplasty After Metoidioplasty in Transgender Men: An International, Multi-Center Case Series

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### ABSTRACT

**Introduction:** Some transgender men express the wish to undergo genital gender-affirming surgery. Metoidioplasty and phalloplasty are procedures that are performed to construct a neophallus. Genital gender-affirming surgery contributes to physical well-being, but dissatisfaction with the surgical results may occur. Disadvantages of metoidioplasty are the relatively small neophallus, the inability to have penetrative sex, and often difficulty with voiding while standing. Therefore, some transgender men opt to undergo a secondary phalloplasty after metoidioplasty. Literature on secondary phalloplasty is scarce.

**Aim:** Explore the reasons for secondary phalloplasty, describe the surgical techniques, and report on the clinical outcomes.

**Methods:** Transgender men who underwent secondary phalloplasty after metoidioplasty were retrospectively identified in 8 gender surgery clinics (Amsterdam, Belgrade, Bordeaux, Austin, Ghent, Helsinki, Miami, and Montreal). Preoperative consultation, patient motivation for secondary phalloplasty, surgical technique, perioperative characteristics, complications, and clinical outcomes were recorded.

**Main Outcome Measure:** The main outcome measures were surgical techniques, patient motivation, and outcomes of secondary phalloplasty after metoidioplasty in transgender men.

**Results:** Eighty-three patients were identified. The median follow-up was 7.5 years (range 0.8–39). Indicated reasons to undergo secondary phalloplasty were to have a larger phallus ( $n = 32$ ; 38.6%), to be able to have penetrative sexual intercourse ( $n = 25$ ; 30.1%), have had metoidioplasty performed as a first step toward phalloplasty ( $n = 17$ ; 20.5%), and to void while standing ( $n = 15$ ; 18.1%). Each center had preferential techniques for phalloplasty. A wide variety of surgical techniques were used to perform secondary phalloplasty. Intraoperative complications (revision of microvascular anastomosis) occurred in 3 patients (5.5%) undergoing free flap phalloplasty. Total flap failure occurred in 1 patient (1.2%). Urethral fistulas occurred in 23 patients (30.3%) and strictures in 27 patients (35.6%).

**Clinical Implications:** A secondary phalloplasty is a suitable option for patients who previously underwent metoidioplasty.

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**Strengths & Limitations:** This is the first study to report on secondary phalloplasty in collaboration with 8 specialized gender clinics. The main limitation was the retrospective design.

**Conclusion:** In high-volume centers specialized in gender affirming surgery, a secondary phalloplasty in transgender men can be performed after metoidioplasty with complication rates similar to primary phalloplasty. **Al-Tamimi M, Pigot GL, van der Sluis WB, et al. The Surgical Techniques and Outcomes of Secondary Phalloplasty After Metoidioplasty in Transgender Men: An International, Multi-Center Case Series. J Sex Med 2019; XX:XXX–XXX.**

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**Key Words:** Phalloplasty; Metoidioplasty; Transgender Men; Gender-Affirming Surgery; Genital Surgery

## INTRODUCTION

Genital gender-affirming surgery (gGAS) in transgender men is considered challenging and complex, but transgender men report an improved quality of life after gGAS.<sup>1,2</sup> Two options exist to perform gGAS in transgender men: metoidioplasty and phalloplasty.<sup>3,4</sup> In the 1970s, Laub et al<sup>5</sup> first described the main principles of metoidioplasty, and several refinements have been published since. In metoidioplasty, local tissue is used to construct a neophallus. Hormonal treatment stimulates clitoral hypertrophy. The hypertrophied clitoris is released and extended to reconstruct the neophallus and neoglans. In those who opt for urethral lengthening, the native urethra is lengthened to reach the tip of the neopenis, enabling some to void while standing.<sup>6,7</sup> Advantages of this technique are the erectile capabilities, preservation of genital erogenous and tactile sensation, limited donor-site scar formation, being a single-stage procedure, and having considerably lower costs compared to a phalloplasty. Possible drawbacks include a relatively small neopenis, which limits the possibility of having penetrative sexual intercourse and voiding from a standing position.<sup>8,9</sup>

The evolution in microsurgery enabled the use of free flaps to construct a neophallus. In 1984, Chang and Hwang<sup>10</sup> first described the phalloplasty technique using a free radial forearm flap (FRFF). Since then, several phalloplasty techniques using pedicled, free, or combination flaps have been described.<sup>9,11</sup> The advantages, in comparison to metoidioplasty, are a larger neopenis and the possibility of implanting a penile prosthesis to enable penetrative sexual intercourse.<sup>12,13</sup>

Some transmen who undergo metoidioplasty express a desire to undergo secondary phalloplasty. There are 2 reasons to perform a secondary phalloplasty. A secondary phalloplasty can be performed as a planned second stage after metoidioplasty or in patients who are not satisfied with their metoidioplasty. Today, patients who opt for gGAS are informed about both options. During a process of counseling and shared decision making, transmen can decide to undergo either metoidioplasty or phalloplasty. Several studies have addressed the incidence of secondary phalloplasty and reported rates ranging from 10% to 25%.<sup>6–8,14,15</sup> In general, the risk of complications is greater in secondary surgical interventions. Scarred tissue and changed surgical anatomy make secondary surgery theoretically more

challenging. Therefore, we hypothesize that in comparison to primary phalloplasty, secondary phalloplasty is associated with a higher complication rate.

There is a lack of knowledge in the published literature on patient motives, surgical techniques, feasibility, safety, and outcomes of secondary phalloplasty. Also, most published literature on surgical techniques and outcomes after gGAS in transgender men are based on single center experiences that include a limited number of patients. Hence, the aim of this study was to explore the patient reasons for secondary phalloplasty, describe the surgical techniques, report the clinical outcomes, and evaluate the patient-experienced outcomes.

## METHODS

### Center and Patient Selection

Sixteen centers worldwide, each of them high-volume centers specializing in GAS, were invited to be part of the study. Representatives of 8 centers that perform secondary phalloplasty agreed to contribute data: Amsterdam UMC (Vrije Universiteit Amsterdam), Belgrade University Hospital, University of Miami Health System, Gender Reassignment Surgery Montreal, Helsinki University Hospital, Crane Surgical Services, Bordeaux University Hospital, and Ghent University Hospital. In all of these centers, transgender men who underwent secondary phalloplasty after metoidioplasty were retrospectively identified. Data were collected at each study site by surgical team members and anonymized before being shared in a central database. The anonymized data were reviewed and analyzed centrally at Amsterdam UMC. According to the Dutch Central Committee for Human Research, retrospective medical research is exempt from institutional review board approval.

### Data Collection: Retrospective Chart Review

Electronic standardized forms were used to collect center specific and patient data. Only patients with a completely filled-in case report form regarding primary outcomes (eg, patient demographics, surgical technique and outcomes) were included. Center specific outcomes were only discussed descriptively to prevent confounding and selection bias. The following institution-specific information was provided by surgeons at each center:

- Surgical team composition
- Whether the facility is the main center to perform GAS in that country
- Type of health insurance coverage
- Number of metoidioplasty and phalloplasty procedures performed each year
- Stages of genital surgery
- Preferred phalloplasty flap type
- Type of preoperative counseling regarding secondary phalloplasty available at the center, categorized into 3 types of counseling: (i) secondary phalloplasty is actively offered to all patients with a current metoidioplasty, (ii) secondary phalloplasty is only discussed if the patients have a strong desire, or (iii) expressing restraint regarding a secondary phalloplasty even if there is strong patient desire
- Postoperative outpatient visit schedule

### Retrospective chart reviews were performed, and the following patient data were recorded after metoidioplasty

- Patient demographics (age at metoidioplasty, age at phalloplasty, history of smoking, history of drug use, surgical history, psychiatric comorbidity, and somatic comorbidity)
- Reason for secondary phalloplasty; information collected from the medical records identified 5 main reasons: to have a larger phallus, to be able to have penetrative sexual intercourse, have had metoidioplasty performed as a first step toward phalloplasty, to void while standing, and a category of “other”
- Surgical technique (urethral lengthening technique and meatus localization)
- Surgical and urological outcomes, including intraoperative complications and postoperative complications (hematoma, wound infection, and skin necrosis); only complications that required (surgical) intervention were scored
- Urological complications (fistula and strictures)

### The following data were recorded after secondary phalloplasty

- Surgical technique (phalloplasty type and urethral lengthening technique)
- Operative characteristics (operation time and hospitalization duration)
- Intraoperative complications (hemorrhage and re-do microvascular anastomosis),
- Postoperative complications (hematoma, complete/partial flap failure, and wound infection)
- Urological complications (fistula and stricture)
- Scheduled additional phalloplasty correction surgeries
- Clinical outcomes (last outpatient clinic visit, penile implantation, and the ability to have penetrative sexual intercourse and/or void while standing, retrospectively identified from patient medical records)

Physician-recorded information in the medical records was used as a proxy for patient overall satisfaction. The local data collectors used the information provided in the medical records to estimate overall patient satisfaction on a 4-point scale (very satisfied, somewhat satisfied, somewhat dissatisfied, and very dissatisfied).

### Data Analyses

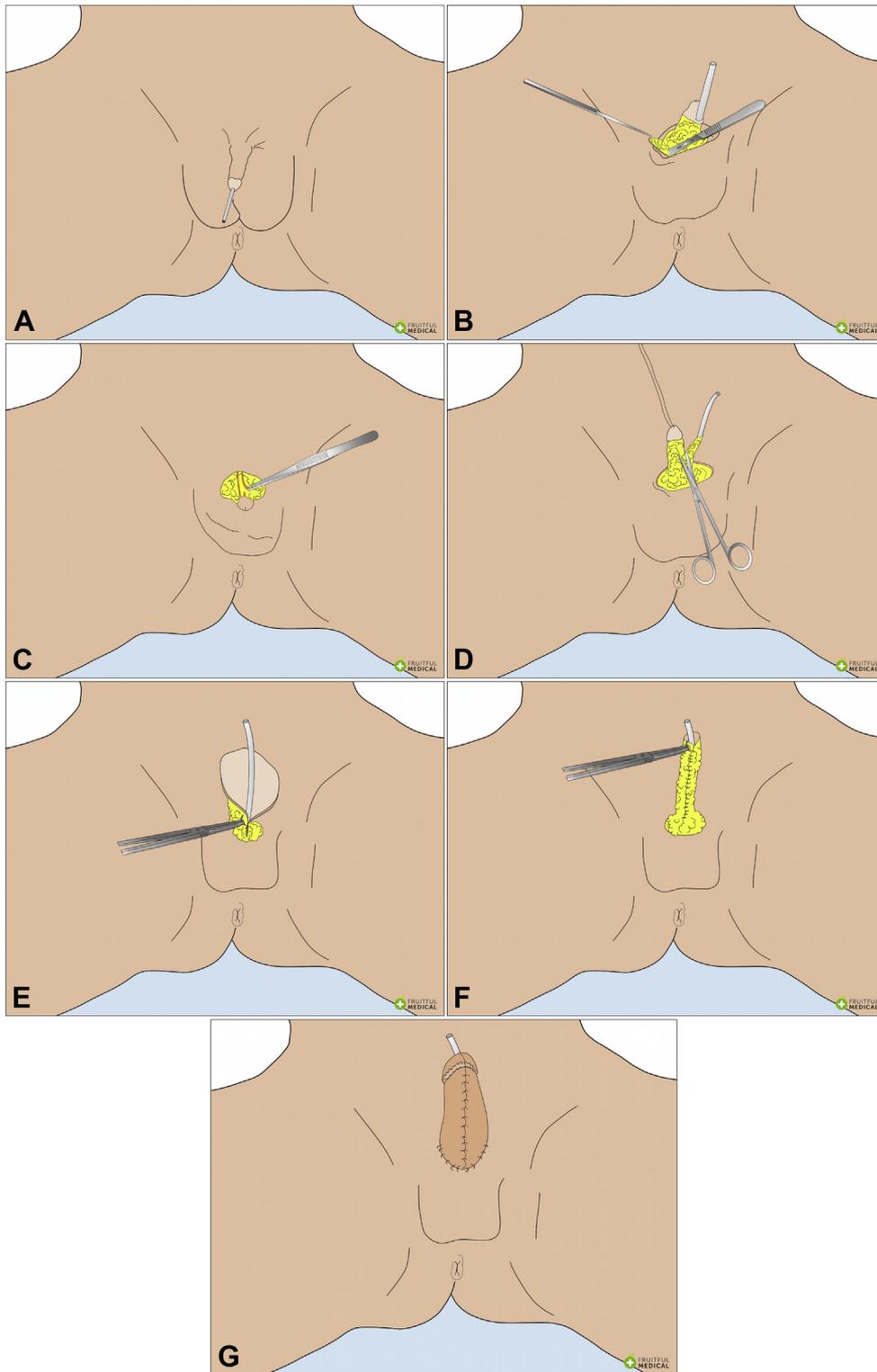
Continuous variables were presented as means with standard deviations or as medians with ranges. Descriptive analyses were performed using SPSS Statistics 22.0 (IBM Corp.; Armonk, NY). As the study objective was to investigate the secondary phalloplasty procedures in general, and the sample size was limited, no subgroup comparisons were made per study site or flap type. Eighty-three patients were included in the study. One patient had a follow-up of less than 6 months after secondary phalloplasty and was excluded from the analysis regarding the outcomes after secondary phalloplasty. Postoperative complications after metoidioplasty and secondary phalloplasty were subdivided and analyzed in 3 groups: (i) intraoperative complications, (ii) postoperative complications, and (iii) urological complications.

## RESULTS

### Surgical Technique

Patients were screened and counseled preoperatively in accordance with the standard of care.<sup>16</sup> All patients had a surgical history of metoidioplasty, resulting in a lengthened urethra, extended clitoris, and a neoscrotum. Secondary phalloplasty surgery was performed using a pedicled flap and/or free flap. For phalloplasty shaft reconstruction, pedicled flaps were raised from the groin, anterolateral thigh (ALT), lower abdomen, and gracilis muscle. Free flaps (eg, FRFF, fibula flap, latissimus dorsi flap, ALT free flap) were raised from a remote location, requiring microvascular arterial and venous anastomosis. The flap artery was anastomosed end-to-side to the superficial femoral artery and the flap vein end-to-end to the great saphenous vein.

Multiple surgical techniques for urethral reconstruction were utilized: a tube-in-tube flap configuration or the use of full-thickness skin grafts, buccal mucosa, or a second fasciocutaneous flap. Reconstruction was performed in either a 1- or 2-stage procedure, based on the surgeon's preference. The redundant metoidioplasty shaft skin, former clitoral hood skin, was excised (Figure 1A and B). This skin may be used as a full-thickness skin graft to cover the base of the neophallus. Subsequently, the penile glans (former glans clitoris) was completely degloved and denuded to allow it be buried in the phalloplasty. Positioning of the degloved clitoris varied based on the surgeon's preference. Nerve cooptation was performed in free flap phalloplasty between the ilioinguinal nerve and/or the clitoral nerve and the cutaneous nerves of the phalloplasty flap. For clitoral nerve cooptation, 1 of the 2 dorsal clitoral nerves was isolated (Figure 1C) and later anastomosed end-to-end to the phalloplasty flap nerve.



**Figure 1.** Surgical technique for secondary phalloplasty. (A) Preoperative view. (B) Excision of the metoidioplasty shaft skin. (C) Isolation of a dorsal nerve of the clitoris for phalloplasty flap nerve anastomosis. (D) Separation of the urethra from the metoidioplasty shaft. (E) The use of a fasciocutaneous flap for additional lengthening of the pars pendulans. (F) The pars pendulans is sufficiently lengthened to allow localization of the neomeatus on top of the secondary phalloplasty. (G) A second fasciocutaneous flap is used to form the secondary phalloplasty shaft. The degloved clitoris is buried in the phalloplasty.

The reconstructed pars pendulans in the metoidioplasty, former labia minora skin with or without buccal mucosa, was carefully separated from the penile shaft and glans (Figure 1D). The required urethra size to lengthen the urethra to the top of the phalloplasty was determined, and the urethral anastomosis was performed onto the previously lengthened pars pendulans (former metoidioplasty meatus) in a spatulated manner (Figure 1E and F). If the patient did not prefer complete urethroplasty, the existing meatus of the metoidioplasty could have been localized in the penoscrotal angle or penile shaft of the secondary phalloplasty. If necessary, the scrotum was repositioned more anteriorly by performing an advancement of the existing scrotoplasty. A suprapubic and Foley catheter are left in place (Figure 1G). Figure 2 illustrates the pre- and postoperative views of several patients that underwent secondary phalloplasty.

### Inter-Center Variability in Perioperative Protocols

Considerable variation existed in perioperative care and protocols between the participating centers (Table 1). In 4 of 7 centers, surgeons only discussed the possibility of undergoing secondary phalloplasty with patients who expressed a strong desire to undergo phalloplasty. In 3 centers, secondary phalloplasty was routinely discussed with patients. In 1 clinic, metoidioplasty was routinely performed as a first step toward phalloplasty. Also, differences existed in surgical team composition, genital surgery health insurance coverage, number of GAS procedures performed annually (range 10–150), and postoperative outpatient visit schedules.

### Patients Demographics

A total of 83 transgender men were included who underwent secondary phalloplasty. An overview of the patient demographics is given in Table 2. The main reasons to undergo secondary phalloplasty were to have a larger phallus ( $n = 32$ ; 38.6%), to be able to have penetrative sexual intercourse ( $n = 25$ ; 30.1%), have had metoidioplasty performed as a first step toward phalloplasty ( $n = 17$ ; 20.5%), and to void while standing ( $n = 15$ ; 18.1%). The median time between metoidioplasty and secondary phalloplasty was 4.5 years (range 0.7–36). The mean clinical follow-up time was 7.5 years (range 0.8–39), and it was calculated as the time between metoidioplasty surgery and the last outpatient clinic visit.

### Surgical Characteristics and Urological Outcomes After Metoidioplasty

An overview of the surgical and urological outcomes is presented in Table 3. No intraoperative complications were reported, but 12 patients (14.5%) developed postoperative complications. Urethral lengthening was performed in 81 patients (98%), of which 12 (14.8%) developed a urethral stricture and 19 (23.5%) had a urethral fistula.

### Surgical Characteristics and Outcomes After Secondary Phalloplasty

An overview of the surgical outcomes is presented in Table 4. The median follow-up time after secondary phalloplasty was 16 months (range 10–266), calculated as the time between phalloplasty surgery and the last outpatient clinic visit). The mean operation time was  $427 \pm 110$  minutes. Vascular anastomoses had to be redone in 3 (3.6%) patients. Total flap failure occurred in 1 ALT patient and was successfully salvaged with a new FRFF flap. Of 81 patients who previously underwent metoidioplasty with urethral lengthening, 77 patients (95.1%) had additional lengthening of the pars pendulans. For lengthening, a tube-in-tube flap configuration was performed in 44 patients (57.1%), a second fasciocutaneous flap in 21 patients (27.3%), buccal mucosa in 10 patients (12.9%), and full-thickness skin grafts in 2 patients (2.6%). The meatus was localized on top of the phalloplasty in 72 patients (86.8%), on top of the previous metoidioplasty in 9 patients (10.8%), and on the perineum in 2 patients (2.4%). The median hospitalization was 11 days (range 4–38). Of 77 patients who underwent additional urethral lengthening, 76 had a minimum follow-up of 6 months. Of these 76 patients, 23 (30.3%) developed a urethral fistula and 27 (35.6%) a urethral stricture.

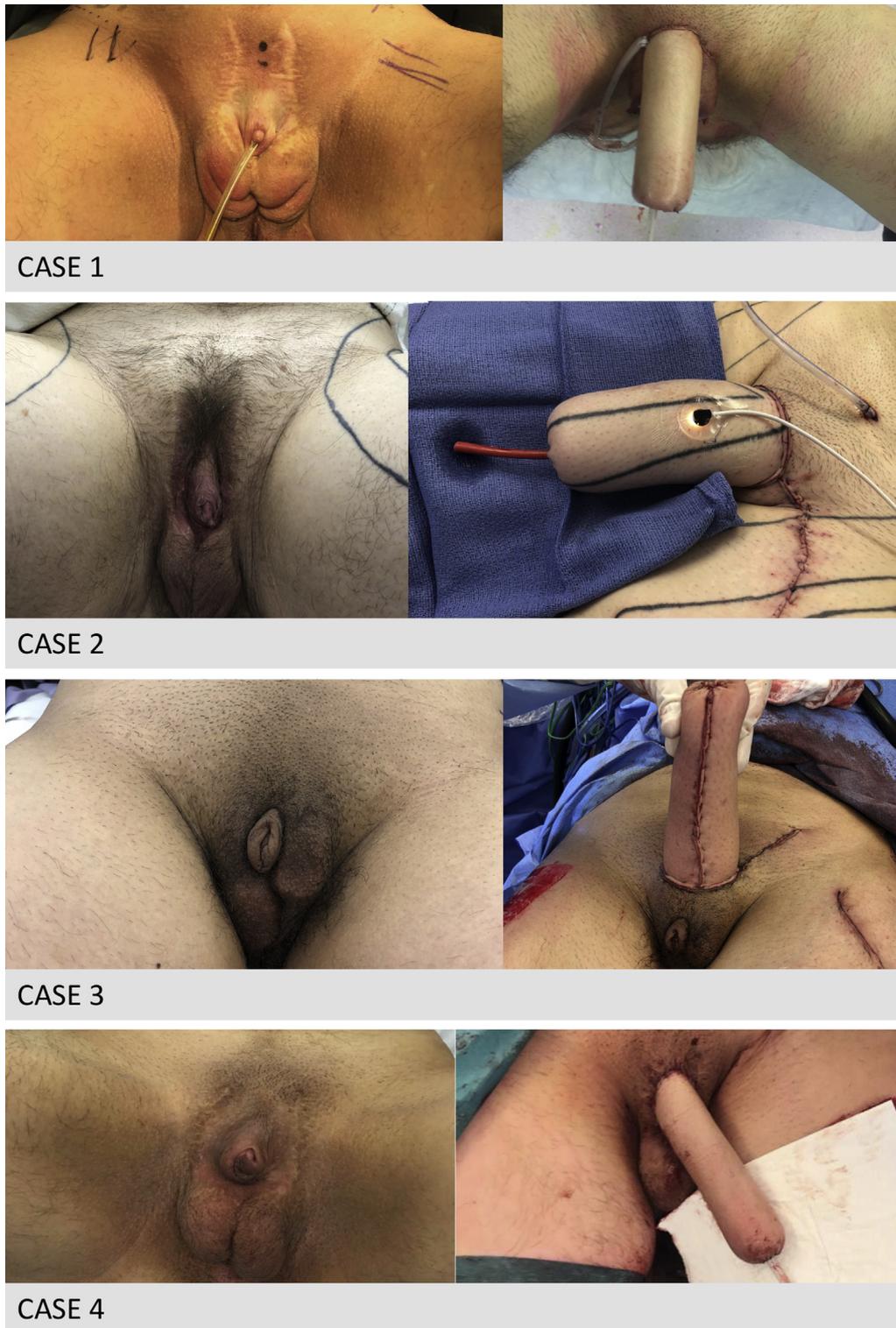
The patient reported and clinical outcomes are provided in Table 5. Penile prostheses were implanted in 21 (25.6%) patients, of whom 15 (71.4%) reported the ability to have penetrative sexual intercourse. Voiding from a standing position was possible in 69 patients (90.8%). Physician-reported information in the medical records that served as a proxy for overall patient satisfaction was available for 66 patients, of whom 65 (98.5%) were reported to be very or somewhat satisfied with their surgery.

## DISCUSSION

To our knowledge, this study is the first international research collaboration of gender surgeons to investigate the preoperative consultation, surgical techniques, and clinical outcomes of secondary phalloplasty procedures in transgender men. The main reasons to undergo secondary phalloplasty were to have a larger phallus, to be able to have penetrative sexual intercourse, and to be able to void from a standing position. Surgical outcomes showed that secondary phalloplasty can be performed with complication rates similar to those of primary phalloplasty.

### Flap-Related Complications

Rates on complete flap loss after primary phalloplasty vary from 0.7% to 4.9%.<sup>11,13,17–19</sup> Various rates have been reported depending on the phalloplasty type. After FRFF phalloplasty, a flap loss rate of 0.7% to 3% has been reported, 2% after abdominal flap phalloplasty, 3% after groin flap, 2.2% after ALT, and 4.9% after fibula flap phalloplasty. In our study, total flap loss occurred in 1 patient (1.2%) after ALT phalloplasty, which is in accordance with the published literature. Vascular



**Figure 2.** Pre- and postoperative views of secondary phalloplasty. (Case 1) Secondary phalloplasty was performed using 2 sensate superficial circumflex iliac artery perforator flaps to reconstruct the neourethra and neophallus shaft; the neomeatus is localized on top of the phalloplasty. (Case 2) The neourethra and neophallus shaft were reconstructed with a tube-in-tube anterolateral thigh flap; the neomeatus is localized on top of the phalloplasty. (Case 3) Anterolateral thigh flap was used to reconstruct the neophallus shaft; no urethral lengthening was performed, and the meatus remained localized in the scrotum. (Case 4) Tube-in-tube free radial forearm flap was used to reconstruct the neourethra and neophallus shaft.

**Table 1.** Inter-institutional characteristics

|  | Amsterdam                                    | Belgrade  | Miami  | Helsinki           | Bordeaux           | Montreal            | Austin                                  | Ghent                         |
|--|--|---|--|--------------------|--------------------|---------------------|---|-------------------------------|
| Patients included (n)  | 27   | 13  | 4  | 5                  | 2                  | 4                   | 6                                       | 22                            |
| Surgical team composition  | Plastic surgeon, urologist, and gynecologist | Plastic surgeon, urologist, gynecologist, and pediatric surgeon   | Plastic surgeon, urologist, and gynecologist | Plastic surgeon    | Plastic surgeon    | Plastic surgeon     | Plastic surgeon and urologist           | Plastic surgeon and urologist |
| Main center performing gender-affirming surgery in your country? | Yes  | Yes   | No   | Yes                | No                 | Yes                 | No                                      | Yes                           |
| Health insurance coverage of genital gender-affirming surgeries? | Yes, full coverage                           | Partially; metoidioplasty with urethral lengthening is covered but phalloplasty, testicular implants, and penile implants are not | Yes, full coverage                           | Yes, full coverage | Yes, full coverage | Yes                 | Yes, full coverage depending on insurer | Yes, full coverage            |
| Metoidioplasty procedures per year                               | 10–20, since 1989                            | 10–20, since 1993   | 10–20, since 2010                            | 0–10, since 2003   | 0–10, since 2008   | Unknown, since 2011 | 90–100, since 2013                      | 0–10, since 2006              |
| Phalloplasty procedures per year*                                | 20–30, since 1989                            | 30–40, since 1995   | 0–10, since 2010                             | 10–20, since 2003  | 0–10, since 2014   | Unknown, since 2013 | 150, since 2013                         | 30–40, since 1992             |
| Stages of phalloplasty surgery†                                  | One-stage                                    | One-stage or two-stage  | Two-stage                                    | One-stage          | One-stage          | One-stage           | Two-stage                               | One-stage                     |
| Preferred flap type for secondary phalloplasty                   | FRFF and ALT                                 | LD  | FRFF   | GMF                | FRFF               | FRFF                | FRFF and ALT                            | FRFF and ALT                  |

(continued)

Table 1. Continued

|  | Amsterdam                               | Belgrade  | Miami   | Helsinki   | Bordeaux                                | Montreal                                | Austin  | Chent   |
|--|---|---|---|--|---|---|---|---|
| Preoperative counseling regarding secondary phalloplasty?  | Only discussed in case of strong desire | Actively offered for all patients with a metoidioplasty | Actively offered for all patients with a metoidioplasty | Only discussed in case of strong desire          | Only discussed in case of strong desire | Only discussed in case of strong desire | Actively offered for all patients with a metoidioplasty | Actively offered for all patients with a metoidioplasty and as a first step toward phalloplasty |
| Postoperative outpatient visit schedule for local patients | 3 wk; 3, 6, and 12 mo                   | 1, 2, and 4 wk; 3, 6, and 12 mo                         | 2 and 4 wk; 3, 6, and 12 mo                             | 1 and 4 wk; 3, 6, and 12 mo; then 3, 5, and 10 y | 1, 3, 6, and 12 mo                      | 1, 3, 6, and 12 mo                      | 2, 3, and 4 wk  | 2 and 4 wk; 3, 6, and 12 mo; after 1 y, yearly follow-up  |

ALT = anterolateral thigh; FRFF = free radial forearm flap; GMF = gracilis muscle flap; LD = latissimus dorsi.

\*Primary and secondary phalloplasty.

<sup>†</sup>One-stage consists of construction of the phalloplasty and complete urethroplasty; two-stage includes construction of the phalloplasty and complete urethroplasty, which is additionally closed in the second stage.

Table 2. Patient demographics

| Demographic  | Value        |
|--|--------------|
| Number of patients   | 83           |
| Mean body mass index (kg/m <sup>2</sup> ) ± SD                           | 24 ± 3       |
| Mean age at metoidioplasty (y) ± SD                                      | 32 ± 10      |
| Median time between metoidioplasty and secondary phalloplasty, y (range) | 4.5 (0.7–36) |
| Median clinical follow up time, y (range)                                | 7.5 (0.8–39) |
| Able to void while standing after metoidioplasty, n (%)                  | 33 (45.2)*   |
| Reason(s) for secondary phalloplasty, n (%) <sup>†</sup>                 |              |
| Larger phallus   | 32 (38.6)    |
| Ability to have penetrative sexual intercourse                           | 25 (30.1)    |
| Metoidioplasty was first step toward phalloplasty                        | 17 (20.5)    |
| To void while standing   | 15 (18.1)    |
| Other  | 2 (2.4)      |
| Unknown  | 1 (1.2)      |
| Comorbidities, n (%) <sup>‡</sup>  |              |
| Psychiatric  | 19 (22.9)    |
| Drug usage history   | 1 (1.2)      |
| Smoking history  | 26 (31.3)    |
| Surgical history, n (%) <sup>‡</sup>                                     |              |
| Mastectomy   | 83 (100)     |
| Hysterosalpingo-oophorectomy   | 83 (100)     |
| Colpectomy   | 31 (37.3)    |
| History of cross-sex hormone therapy, n (%)                              | 83 (100)     |

\*Data available for 73 patients.

<sup>†</sup>Multiple answers possible.

<sup>‡</sup>Prior to secondary phalloplasty.

anastomotic revision was performed in 3 patients (5.5%) after free flap phalloplasty, which is considerably lower compared to published anastomotic revision rates of 12% after FRFF phalloplasty.<sup>13,17</sup> Possible explanations for these relatively low vascular flap-related complications in our cohort could be the extensive surgical experience of the gender surgeons and improved surgical preoperative assessment over time. For example, preoperative computed tomography angiography is increasingly being performed to evaluate the feasibility of free or pedicled flaps and to allow precise surgical planning.

## Urological Complications

The ability to void from a standing position is an important reason for transgender men to undergo primary phalloplasty. Of 83 transgender men undergoing secondary phalloplasty, 15 (18.1%) indicated that the ability to void while standing was their main goal. Unfortunately, urological complications (eg, urethral fistulas and strictures) occur frequently after phalloplasty and can delay the possibility of voiding from a standing position. The reported rates of urethral fistulas after FRFF primary phalloplasty range from 10% to 68%, and strictures from 14% to 58%.<sup>12,19–23</sup> The present case series, with a fistula rate of 30.3% and stricture rate of 35.6%, indicates that secondary

**Table 3.** Surgical and urological outcomes after metoidioplasty

| Outcome                      | n (%)                  |
|------------------------------|------------------------|
| Intraoperative complications | 0 (0)                  |
| Hemorrhage                   | 0 (0)                  |
| Postoperative complications* |                        |
| Hematoma                     | 5 (6)                  |
| Wound infection              | 5 (6)                  |
| Skin necrosis <sup>†</sup>   | 2 (2.4)                |
| Urethral lengthening         | 81 (98)                |
| Urethral stricture           | 12 (14.8) <sup>‡</sup> |
| DUS                          | 8 (9.8)                |
| PUS                          | 4 (4.9)                |
| Urethral fistula             | 19 (23.5) <sup>‡</sup> |
| DUF                          | 11 (13.6)              |
| PUF                          | 8 (9.9)                |

DUF = distal urethral fistula (fistula at the distal urethral anastomosis and/or penile shaft); DUS = distal urethral stricture (stricture at the distal urethral anastomosis and/or penile shaft); PUF = proximal urethral fistula (fistula at the proximal urethral anastomosis and/or fixed part of the urethra); PUS = proximal urethral stricture (stricture at the proximal urethral anastomosis and/or fixed part of the urethra).

\*Within 3 weeks.

<sup>†</sup>Requiring debridement.

<sup>‡</sup>N = 81 with urethral lengthening.

phalloplasty can be performed with similar neourethral complication rates. As expected, the majority of these complications occurred at the distal part of the neourethra, as most of the complications after metoidioplasty were resolved before secondary phalloplasty.

### Patient Selection and Counseling

Good patient counseling and selection are key to achieving successful surgical outcomes. Proper patient counseling involves establishing realistic preoperative expectations and discussing the risks and benefits of the surgical procedure, postoperative management, and long-term follow-up.<sup>24</sup> This study revealed differences in preoperative counseling regarding secondary phalloplasty and follow-up approaches among the institutions. Possible explanations for differences in preoperative counseling could be differences in health care coverage and a shift toward more patient-centered care.

Insurance coverage for GAS varies greatly among countries. Underinsured patients have insufficient access to gender-affirming health care such as mental health counseling and proper preoperative counseling.<sup>25</sup> Also, secondary procedures (eg, prosthesis implantation, surgical corrections) are not always covered by insurance. Yet, in many countries, these insurance coverage policies are changing, improving the accessibility, affordability, and availability of undergoing (secondary) phalloplasty.<sup>26</sup>

Over time, patients have become increasingly more involved in surgical decisions. Earlier, metoidioplasty was described as a

**Table 4.** Surgical and urological outcomes after secondary phalloplasty\*

| Outcome                                  | n (%)                   |
|--|-------------------------|
| Total                                    | 83 (100)                |
| Free radial forearm flap                 | 41 (49.4)               |
| Anterolateral thigh flap                 | 22 (26.5)               |
| Latissimus dorsi flap                    | 8 (9.6)                 |
| Gracilis muscle flap                     | 5 (6.0)                 |
| Abdominal flap                           | 4 (4.8)                 |
| Groin flap                               | 2 (2.4)                 |
| Lateral upper arm flap                   | 1 (1.2)                 |
| Intraoperative complications             |                         |
| Hemorrhage                               | 0 (0)                   |
| Re-do microvascular anastomosis          | 3 (5.5) <sup>†</sup>    |
| Postoperative complications <sup>‡</sup> | 31 (37.8)               |
| Hematoma                                 | 7 (8.5)                 |
| Complete flap failure <sup>§</sup>       | 1 (1.2)                 |
| Partial flap failure with loss of skin   | 16 (19.5)               |
| Phalloplasty wound infection             | 7 (8.5)                 |
| Urethral lengthening                     | 77 (95.1)               |
| Urethral stricture                       | 27 (35.6) <sup>  </sup> |
| DUS                                      | 25 (32.9)               |
| PUS                                      | 3 (3.9)                 |
| Urethral fistula                         | 23 (30.3) <sup>  </sup> |
| DUF                                      | 17 (22.4)               |
| PUF                                      | 6 (7.9)                 |

DUF = distal urethral fistula (fistula at the distal urethral anastomosis and/or penile shaft); DUS = distal urethral stricture (stricture at the distal urethral anastomosis and/or penile shaft); PUF = proximal urethral fistula (fistula at the proximal urethral anastomosis and/or fixed part of the urethra); PUS = proximal urethral stricture (stricture at the proximal urethral anastomosis and/or fixed part of the urethra).

\*Median clinical follow-up time was 16 months (range 10–266). One patient had a follow-up of less than 6 months and was excluded from the analysis regarding postoperative complications and urological complications.

<sup>†</sup>N = 55 with free flap phalloplasty.

<sup>‡</sup>Within 3 weeks.

<sup>§</sup>Phalloplasty shaft flap and/or flap for urethral reconstruction.

<sup>||</sup>N = 76 with urethral lengthening and minimum follow-up of 6 months.

first step toward phalloplasty in a staged phalloplasty approach,<sup>27</sup> and phalloplasty was considered to give the best final results with regard to function and cosmesis.<sup>28</sup> Today, there are multiple surgical options, and patient preferences are an important part of the shared decision-making process.

In our cohort, the majority of 83 patients (87%) were dissatisfied with their initial metoidioplasty with regard to their desire for a larger phallus, for penetrative sex, and to void while standing. This underlines the need for proper patient counseling before genital GAS. To improve the preoperative counseling process, a decision aid was developed recently that further involves patients in the decision-making process.<sup>29</sup> It is hoped that the use of this decision aid will result in fewer secondary phalloplasty procedures in the future.

Patient selection for metoidioplasty or phalloplasty is also influenced by surgeon factors, including surgical experience and

**Table 5.** Patient-reported and clinical outcomes after secondary phalloplasty

| Outcome  | n (%)                  |
|--|------------------------|
| Total  | 82 (100)               |
| Scheduled correction surgeries   | 10 (12.2)              |
| Penile implants*   | 21 (25.6)              |
| Able to have penetrative sexual intercourse with implant                 | 15 (71.4)              |
| Able to have penetrative sexual intercourse without implant <sup>†</sup> | 0 (0)                  |
| Reason why not   |                        |
| No rigidity  | 30 (73.2)              |
| No sensation <sup>‡</sup>  | 3 (9.1)                |
| Able to void while standing  | 69 (90.1) <sup>§</sup> |
| Overall patient satisfaction <sup>  </sup>                               |                        |
| Somewhat satisfied   | 30 (45.5)              |
| Very satisfied   | 35 (53)                |
| Somewhat dissatisfied  | 1 (1.5)                |
| Very dissatisfied  | 0 (0)                  |

\*At the time of reporting.

<sup>†</sup>N = 41.

<sup>‡</sup>N = 33 with phalloplasty flap nerve anastomosis.

<sup>§</sup>N = 76 with urethral lengthening.

<sup>||</sup>N = 66 (retrospectively scored from patient medical records).

volume of procedures. It is likely that non-highly specialized gender surgeons who are more familiar with performing metoidioplasty are less eager to perform phalloplasty, and vice versa. Also, as seen in our study, a wide variety of surgical techniques is available to perform (secondary) phalloplasty; therefore, surgeons should be aware of alternative surgical procedures that they may not perform and should refer patients when appropriate to minimize secondary surgical procedures.

### International Collaboration

The number of people who apply for transgender health care, including GAS, has increased drastically. Yet, the available literature on GAS is limited and lacks patient-reported outcome measures and standardization concerning surgical and urological outcomes.<sup>30</sup> This makes it very difficult, if not impossible, to draw generalizable conclusions on these outcomes. There is an urgent need for more evidence-based research to assist surgeons and patients in making well-informed surgical decisions. International research collaboration among specialized gender clinics provides an opportunity to standardize outcome measures, acquire high-quality data, and learn alternative ways of doing things. This international collaboration among specialized gender clinics is a first attempt to achieve standardized data collection.

### Limitations

The main limitation of this study was its retrospective design. Retrospective data gathering was performed by various people located in multiple centers worldwide. Furthermore, selection bias and the lack of a control group increase the risk of

overestimating or underestimating the outcomes rates. Also, physician-reported information in the medical records served as a proxy for overall patient satisfaction, possibly reducing the reliability of our findings. In addition, not having patient-reported outcomes makes it difficult to provide unique information on the impact of a secondary phalloplasty from a patient's perspective. Strengths of our study include the high number of patients that were included. In addition, the participation of various international specialized gender clinics provides unique insight into global secondary phalloplasty procedures.

### CONCLUSION

In high-volume centers specialized in gender-affirming surgery, a secondary phalloplasty in transgender men can be performed after metoidioplasty with complication rates similar to those of primary phalloplasty. We found variations among the centers in the management of secondary phalloplasty. In the emerging gender-affirming surgery field, more international research collaboration among gender clinics is essential to acquire high-quality data and enhance the transfer of expertise and knowledge.

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