Long-Term Sensitivity and Patient-Reported Functionality of the Neoclitoris After Gender Reassignment Surgery

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ABSTRACT

Introduction: A cornerstone of treating gender dysphoria for transgender women is gender reassignment surgery (GRS) encompassing vaginoplasty and clitoroplasty. The neoclitoris is harvested as a flap with a neurovascular pedicle from the proximal dorsal part of the glans penis. Few long-term follow-ups exist on postoperative sensation and patient-reported sexual functionality of the neoclitoris.

Aim: To examine the sensitivity of the neoclitoris and its relation to orgasm and sexual function at least 1 year after GRS.

Methods: Twenty-two patients were included, with a mean follow-up of 37 months (range = 12–63) after initial surgery. Tactile and vibratory sensitivities were measured with Semmes-Weinstein monofilaments and the Bio-Thesiometer vibratory measurement device, respectively. A questionnaire was provided to the patients, as were interview questions about body image, orgasm, pain, and general satisfaction with the surgery.

Main Outcome Measures: Tactile and vibratory sensitivities of the neoclitoris and questionnaire on satisfaction with orgasm, sexual function, and general satisfaction.

Results: The average tactile threshold for the clitoris was 12.5 g/mm² and the average vibratory threshold was 0.3 µm. Most participants (86%) experienced orgasm after surgery, had no or little pain, and were satisfied with the surgery. No statistical correlation was found between better or worse objective pressure and vibratory thresholds and patient answers to questions about the clitoris in the Body Image Scale for Transsexuals questionnaire.


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Key Words: Transsexualism; Vaginoplasty; Neoclitoris; Sensitivity; Orgasm; Gender Reassignment Surgery

INTRODUCTION

Gender dysphoria and gender identity disorder have been defined in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition1 and in the International Classification of Diseases, Tenth Revision2 (code F64.X). A cornerstone in the surgical treatment of gender dysphoria for transwomen is genital gender reassignment surgery (GRS), including vaginoplasty and neoclitoroplasty. The female clitoris has long been regarded the stimulatory focus point for achieving sexual orgasm.3 In genital GRS, the neoclitoris is made from the proximal dorsal section of the glans penis and harvested with a neurovascular pedicle. The provision of erogenous and tactile sensitivities of the neoclitoris in GRS was first described by Brown4 and Wesser,5 and this technique is used by most surgeons performing GRS.6–12 However, measurements of the sensory function of the neoclitoris and investigation of orgasmic function have been limited to a few studies.6,12,13 In particular, few studies have correlated objective measurements of clitoral functionality with patient-reported outcomes. We describe the vibratory and...
pressure sensitivities of the neoclitoris and patient-reported orgasmic function and overall satisfaction with surgery.

METHODS

The surgical technique has been described in the literature. In short, the clitoral flap is harvested as a triangular piece of the glans penis. The neurovascular bundle is dissected superficial to the tunica albuginea, beginning at the distal end of the penis. Dissection continues in the proximal direction to the bifurcation of the crus corpora, where the penile remnants are amputated.

Sixty-five patients who underwent male-to-female GRS at our center from January 1, 2011 through June 1, 2015 with a minimum follow-up of 1 year were invited to participate in the study. No exclusion criteria were applied. Twenty-two patients came for follow-up testing. The remaining 43 patients did not respond to the invitation letter for the study and no further attempt was made to contact these patients.

Data on comorbidities and any complications (bleeding, infection, wound dehiscence, rectal perforation, and thrombotic events) from surgery were gathered from electronic medical records for each patient.

Patients were examined and tested by a plastic surgeon or a specialized nurse. Furthermore, patients completed the Body Image Scale for Transsexuals (BIS) questionnaire. This questionnaire is used to evaluate body satisfaction for transgender individuals. It consists of 30 body domains, which are rated on a Likert scale (range = 1–5), with the highest score being 1 (“very satisfied”) and the lowest score being 5 (“very dissatisfied”). The BIS scale results have been reported and shown high sensitivity in the transgender population.

In addition, patients were asked three questions: (i) Have you had an orgasm (yes or no)? (ii) Do you have feelings of genital pain or discomfort (visual analog scale [VAS] = 1–10)? (iii) Are you satisfied with the GRS (Likert scale = 1–5)?

Tactile sensitivity measurements were performed by a plastic surgeon or a specialized nurse on the neoclitoris with a kit of 20 monofilaments (Touch Test Sensory Evaluators Semmes-Weinstein von Frey Aesthesiometers; Stoelting Europe, Dublin, Ireland). There was no blinding procedure used for

![Figure 1. Touch Test Sensory Evaluators Semmes-Weinstein von Frey Aesthesiometers (left) and the Bio-Thesiometer (right). Figure 1 is available online at www.jsm.jsexmed.org.](image1)

![Figure 2. Scatterplot of results of pressure thresholds for each patient (N = 22). Logarithmic values (blue) from Semmes-Weinstein filaments are displayed (error bars = SDs). Converted means (green) are presented as grams per square millimeter. Figure 2 is available online at www.jsm.jsexmed.org.](image2)
the examiner or patient. These filaments (Figure 1) provide a non-invasive evaluation of cutaneous sensation levels and results that are objective and repeatable. The procedure for measuring tactile sensibility of the neoclitoris with the Semmes-Weinstein filaments was as follows. The filaments were applied to the skin and force was applied until the filaments bent 1 to 2 mm. Then, the filament was withdrawn. The method of limits was used. The filaments were applied in an ascending order of magnitude to assess the threshold at which sensation appeared (perception threshold) and then in descending order to assess the threshold at which sensation disappeared (disappearance threshold). This procedure was repeated twice and a mean threshold value was calculated. The pressure threshold results are presented as grams per square millimeter.

The vibration test for vibratory thresholds was performed using a Bio-Thesiometer (Bio-medical Instrument Company, Newbury, OH, USA; Figure 1). Measurements were performed in standardized fashion with graded amplitudes and values are presented in micrometers as described by the manufacturer. The amplitude of the Bio-Thesiometer was gradually increased until vibration was perceived. Then, the amplitude was increased by 2 V before it was decreased and the patient was asked to state when she no longer perceived the vibration. This was repeated three times and the mean of these measurements was documented.

Pearson and Spearman ρ coefficients were used to assess the correlation between measured values and variables. The significant level was set at 0.05.

The study was approved by the regional ethical board under approval authentication Dnr 2015/2225-31.

RESULTS

The patients’ median age was 45 years (range = 23–63) and the average follow-up time was 37 months (range = 12–63) after initial GRS. One patient had been circumcised in childhood.

Of the 22 patients assessed, the average pressure threshold (Figure 2) for the neoclitoris was 3.10 (Semmes-Weinstein filament). The converted result was 0.38 g (SD = 0.56) and adjusted for the area of the filament (12.5 g/mm²; range = 1.4–29.2). The average vibratory threshold was 0.3 μm (range = 0.07–0.74). Having had a complication was not associated with less neo-clitoral sensation or the ability to reach orgasm. The single circumcised patient had the lowest registered score for pressure thresholds (29.19 g/mm²) but a better than average vibratory threshold (0.25 μm).

Patients were asked about having had an orgasm, pain, and general satisfaction with the GRS. Nineteen patients reported the ability to reach orgasm (86%), one was not able to reach orgasm (4.5%), and two had not attempted to reach orgasm (9%). No statistical difference among these three groups was found concerning the results of objective sensitivity testing for any modality. The VAS (range = 0–10) was used to report on genital pain or discomfort; 19 patients (86%) reported no pain (VAS score = 0) and three patients (14%) reported pain, although at low levels of discomfort (VAS scores = 2, 3, and 4, respectively).

Patients were asked to indicate satisfaction with having undergone GRS on a scale from 1 to 5, where 1 represented the best score (“very satisfied”) and 5 represented the worst score (“very dissatisfied”). Nineteen patients answered that they were very satisfied (score = 1) or satisfied (score = 2). Three patients were neither satisfied nor dissatisfied (score = 3). The average score was 1.5. Correlation analysis showed no correlation between pressure thresholds (r = −0.15607, P = .49) and vibratory thresholds (r = 0.31845, P = .15) and with answers to the clitoris question in the BIS questionnaire. There was no significant correlation between the measured objectives and the answers to the three questions on orgasm, pain, and satisfaction.

DISCUSSION

Sensitivity of the neoclitoris in the male-to-female transsexual patient is an important part of GRS as a likely prerequisite for

Table 1. Comparison of pressure thresholds (g/mm²) and vibratory thresholds (μm) between published studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Present study</th>
<th>Selvaggi et al.²⁶ 2007</th>
<th>Gilbert et al.²¹ 1988</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured organ</td>
<td>neoclitioris</td>
<td>neoclitoris</td>
<td>glans penis</td>
</tr>
<tr>
<td>Pressure thresholds (g)</td>
<td>12.5 (1.4–29.2)</td>
<td>11.1 (1.45–47.3)</td>
<td>18.5</td>
</tr>
<tr>
<td>Vibratory thresholds (μm)</td>
<td>0.3 (0.07–0.74)</td>
<td>0.5 (0.04–9)</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Values are given in means (standard deviation).

n/a = not available.

Table 2. Comparison of pressure thresholds (g) between published studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Present study</th>
<th>Bleustein et al.²² 2002</th>
<th>Bleustein et al.²³ 2003</th>
<th>Cordeau et al.²⁶ 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured organ</td>
<td>neoclitioris</td>
<td>glans penis</td>
<td>glans penis</td>
<td>clitoris</td>
</tr>
<tr>
<td>Pressure thresholds (g)</td>
<td>0.38 (0.56)</td>
<td>0.9 (0.24)</td>
<td>0.83 (1.0)</td>
<td>0.025 (n/a)</td>
</tr>
</tbody>
</table>

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achieving sexual orgasm. The surgical technique for creating a neoclitoris from the corresponding anatomic region in a cisman, the glans penis, is universally used by surgeons.20

In a study published by Selvaggi et al,6 clitoral sensitivity in transwomen was measured using the same methods and devices as described in the present study. Our results (12.5 g/mm² and 0.3 μm) are in line with their findings (11.1 g/mm² and 0.5 μm) on pressure and vibratory sensations. In another relevant comparison (Table 1), Gilbert et al21 reported values of 18.5 g/mm² and 0.2 μm in men with unoperated glans penis. Our results on the magnitude of sensitivity are comparable to previous studies on the transgender neoclitoris but somewhat different from cisgender glans penis and clitoris. The mean pressure threshold in our study was 0.38 g (SD = 0.56). Compared with the results reported by Bluestein et al (0.90 g22 and 0.83 g23), the pressure thresholds of the neoclitoris are somewhat lower than those of the normal male glans but higher than those of the cisgender clitoris reported by Cordeau et al24 (0.025 g; Table 2). This indicates that the smaller surface area used for the neoclitoris compared with the unoperated glans penis does not affect sensory thresholds with stimuli and that the pressure thresholds are slightly higher compared with the cisgender clitoris. In our clinical experience, hypersensitivity of the neoclitoris is common and routinely leads to a secondary surgery to create a clitoral hood flap to cover the neoclitoris and protect it from overstimulation from clothes and movement.

In this study, objective measurements on sensitivity were combined with patient-reported outcomes. Observing a non-correlation between the clitoral question of the BIS questionnaire and pressure or vibratory thresholds could indicate that the sensitivity of the neoclitoris is good and that the reconstructed organ does not limit orgasmic function. For patient reports on (i) having experienced an orgasm, (ii) satisfaction with having undergone surgery, and (iii) the occurrence of genital pain or discomfort, no overall statistical difference could be found when correlating the objective testing results for any modality or any answer. The responses to all questions were favorable by the vast majority of patients. Eighty-six percent of patients reported having had an orgasm and 86% reported experiencing no pain, and all patients showed sensitivity at good to acceptable thresholds for vibratory and tactile stimuli. Complications (eg, bleeding or wound dehiscence) after GRS could be a risk factor for decreased sensitivity. Four patients sustained postoperative bleeding requiring medication (desmopressin and/or tranexamic acid). Two patients developed wound dehiscence. There were no cases of postoperative infection, rectal injury, or thrombotic events in the patient group. Having sustained complications did not result in decreased sensitivity of the neoclitoris. Another risk factor for decreased sensitivity could be comorbidities such as diabetes, genital sores, or previous nerve injury. None of the participants had such comorbidities. A limitation of this study is that only one-third of patients invited were willing to participate. Therefore, we cannot determine whether the respondents were representative of the entire group. We did not ask the patients about preoperative orgasmic function. Future research should examine patient-reported preoperative functionality and measure sensitivity thresholds for postoperative comparison.

Our results indicate that GRS using the pedicled glans penis for neo-clitoral reconstruction is a reliable method for attaining long-term sexual sensitivity and function. However, despite measurement values within normal ranges for sensitivity our results indicate that correlation between objective measurements and patient experienced outcomes in terms of sexual function is complex and not easily determined.

CONCLUSIONS

We present results of neo-clitoral sensitivity testing from a cohort of transgender women. The measurements show that the sensate neo-clitoral flap has protective tactile sensation and provides erogenous sensitivity and the ability to reach orgasm in most patients. In general, the vast majority of patients who underwent male-to-female GRS were satisfied.

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REFERENCES


