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The effect of colpectomy on lower urinary tract function in transgender men

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ABSTRACT

Background: In transgender men, effects of colpectomy on voiding function are unknown, except for the incidence rates of urinary tract infections and urinary retention.

Aims: To provide insight into the effect of colpectomy on Lower Urinary Tract Function (LUTF) in transgender men.

Methods: A retrospective chart review was conducted among transgender men who underwent colpectomy between January 2018 and October 2020. Primary outcomes were objective and subjective changes in voiding. Secondary outcomes were transurethral catheterization length and the need for clean intermittent self-catheterization (CISC).

Results: Of 132 men, 89 (67%) underwent Robot-assisted Laparoscopic Colpectomy (RaLC) and 43 (33%) Vaginal Colpectomy (VC). Maximum flow rate on uroflowmetry decreased following RaLC (mean of 29.1 vs. 38.3 mL/s, $p = 0.002$) and VC (mean of 29.2 vs. 40.3 mL/s, $p < 0.001$) after a median of four months postoperatively. An increase in total International Prostate Symptom Score was seen more frequently following VC compared to RaLC. Subjective changes were indicated by 39%, more often by men who underwent VC, of which the majority improved during the first months postoperatively. Trial without catheter (TWOC) on the first postoperative day was more successful after RaLC (79/89, 89%) than VC (24/43, 56%). Secondary TWOC was successful in 22/132 (17%) patients after a median of eight days postoperatively. In 5/132 (4%) men (three VC and two RaLC), temporary CISC was necessary for a period ranging from 5 to 21 days. The last 2/132 (2%) men after RaLC were still performing CISC at end of follow-up. Eventually, 5% (two VC and four RaLC) had to refrain from genital gender-affirming surgery with urethral lengthening due to voiding dysfunction.

Discussion: After colpectomy, most objective and subjective worsening in LUTF is of a temporary nature, however, 5% had to refrain from genital gender-affirming surgery with urethral lengthening due to persistent voiding dysfunction, despite the desire to void while standing.

KEYWORDS
Clean intermittent self-catheterization; colpectomy; gender-affirming surgery; lower urinary tract function; transgender men

Introduction

During surgical transition of transgender men, colpectomy can be performed for two reasons. First, the vaginal cavity may have a negative effect on gender dysphoria and can cause bothersome vaginal discharge, especially during sexual arousal (Nikkels et al., 2019). Second, in our institution, colpectomy is performed prior to genital Gender-Affirming Surgery (gGAS; phalloplasty or metoidioplasty) with single-stage Urethral Lengthening (UL) to reduce the risk of postoperative urological complications, mainly proximal urethral fistulas (Al-Tamimi et al., 2018; Massie et al., 2017). Al-Tamimi et al. (2018) showed that the urethral fistula rate after gGAS with UL significantly decreased in men who previously underwent colpectomy (48% (111/232)

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without colpectomy versus 21% (13/62) with colpectomy) (Al-Tamimi et al., 2018).

In transgender men, colpectomy is performed transvaginally or laparoscopically (i.e. conventional or robot-assisted) (Gomes da Costa et al., 2016; Groenman et al., 2017; Jun et al., 2021; Nikkels et al., 2019). During Vaginal Colpectomy (VC), the vaginal epithelium can be removed by sharp dissection or electrothermal ablation (Jun et al., 2021; Nikkels et al., 2019). Postoperative urological complications after sharp dissection VC in transgender men were previously described, with urinary tract infection in 15% and urinary retention in 16% of the patients (Nikkels et al., 2019). Following Robot-assisted Laparoscopic Colpectomy (RaLC), combined with Total Laparoscopic Hysterectomy (TLH) and Bilateral Salpingo-Oophorectomy (BSO), urinary tract infection occurred in 6% and urinary retention in 17% of the patients (Groenman et al., 2017). Besides these complication rates, effects of colpectomy on voiding function in transgender men are unknown.

On the contrary, gynecological surgery in cisgender women (e.g. for deep infiltrating endometriosis or cervical cancer) is known for postoperative voiding dysfunction and the need for clean intermittent self-catheterization (CISC) (Dubernard et al., 2008; Geller, 2014; Laterza et al., 2015; Volpi et al., 2004; Zilberman et al., 2013). It is thought that resection or injury of peripheral nerve endings in the vaginal and retropubic spaces lead to changes in voiding (Azaïs et al., 2015; Novackova et al., 2020; Volpi et al., 2004; Zilberman et al., 2013). In addition, tissue swelling, inflammation, pain, or medication used perioperatively can affect voiding function after surgery (Bekos et al., 2020; Geller, 2014). In women who underwent surgery for deep infiltrating endometriosis, temporary CISC was necessary in 21% to 29% of the patients (Dubernard et al., 2008; Volpi et al., 2004; Zilberman et al., 2013). Adequate postoperative management of voiding dysfunction, in particular the management of urinary retention, is important to avoid prolonged bladder distention which can lead to detrusor underactivity (Geller, 2014). In our institution, detrusor underactivity and the need for CISC are contraindications for gGAS with UL, which is desired by the majority of men undergoing colpectomy (Al-Tamimi et al., 2018).

Insight into the effect of colpectomy on voiding function in transgender men provides relevant information for preoperative counseling.

Methods

Study design

We performed a single-center, retrospective chart review among transgender men who underwent colpectomy between January 2018 and October 2020. Colpectomy was performed using a vaginal approach in transgender men who previously underwent hysterectomy with or without BSO. If transgender men desired colpectomy and hysterectomy with or without BSO, these surgical treatments were combined in a robot-assisted laparoscopic approach. Standardized voiding analyses, consisting of the International Prostate Symptom Score (IPSS), Frequency Voiding Chart (FVC), and uroflowmetry with post-void residual volume (PVR) were conducted preoperatively and two to four months postoperatively. If voiding dysfunction was identified preoperatively, pelvic floor physiotherapy was used to optimize urinary functioning or the surgical treatment plan was modified. Transgender men that underwent gGAS before colpectomy were excluded from analysis. Written informed consent was obtained before inclusion, and the study protocol (2021.0277) was approved by the Medical Ethics Review Committee of our institution (OHRP number IRB00002991). The FWA number assigned to our institution is FWA00017598.

Data collection

Primary outcomes were differences in IPSS, FVC, uroflowmetry, and PVR pre and post colpectomy and subjective changes in voiding. Secondary outcomes were length of transurethral catheterization and the need for CISC postoperatively. Recorded data were participant characteristics (age at colpectomy, BMI, duration of testosterone therapy, previous hysterectomy with or without BSO, and urological follow-up time), perioperative variables (surgical approach (i.e. VC or RaLC),

hospital stay, length of transurethral catheterization, and the need for CISC), voiding analyses (IPSS, FVC, and uroflowmetry with PVR) pre and post colpectomy, and additional subjective changes in voiding indicated during urological consultation postoperatively.

Voiding analysis

Since there is no validated questionnaire for Lower Urinary Tract Function (LUTF) in transgender men, the IPSS survey was used. This survey consists of eight questions, of which the first seven questions (scale 0–5) relate to storage and voiding function and are added up to indicate mild (1–7), moderate (8–19) or severe (20–35) urinary symptoms. A postoperative change in IPSS score of at least four points was considered as clinically relevant (Barry et al., 1995). The last question (scale 0–6) regards the quality of life due to urinary symptoms. Of the FVCs, day and night frequency, maximum voided volume (mL), and 24-hour urine production (L) were scored. Uroflowmetry data with a minimum voided volume of 150 mL was included in analysis. This cutoff value was based on previous literature (Jørgensen & Jensen, 1996; Matsuo et al., 2019; Sorel et al., 2017). A transabdominal sonographic bladder-scan was used to measure PVR after uroflowmetry.

Postoperative protocol

In our institution, VC or RaLC is performed as previously described with a similar protocol for postoperative care (Groenman et al., 2017; Nikkels et al., 2019). Trial Without Catheter (TWOC) is performed on the first postoperative day. After catheter removal, the PVR must be <150 mL twice after a voided volume of >200 mL. In case of a successful TWOC, the patient is discharged. If TWOC is unsuccessful, a transurethral catheter is replaced and the patient is discharged, after which TWOC is repeated in the hospital six days postoperatively. If the PVR persists during secondary TWOC, CISC is clinically instructed and continued as long as deemed necessary.

Statistical analysis

The IBM Statistical Package for the Social Sciences (SPSS®), version 26 (IBM Corp., Armonk, NY, USA) was used to perform statistical analyses. Participant characteristics were described using mean ± standard deviation (SD), median with interquartile range (IQR), or number of participants with percentages (%) as appropriate. Dichotomous variables were analyzed using the chi-square test. Urinary functioning was compared pre and post colpectomy using a paired sample t-test in case of normally distributed data, and a Wilcoxon signed-rank test if the data was skewed. Due to multiple testing in the comparison of voiding analyses, a Bonferroni correction was performed and a p value of <0.003 indicated the level of significance. In other analyses, the level of significance was set at a p value of 0.05.

Results

Participant characteristics

In total, 134 transgender men underwent colpectomy between January 2018 and October 2020. Two of these men were excluded as they previously underwent gGAS. Therefore, 132 transgender men were included in the study (Table 1). The majority of men (114/132, 86%) had colpectomy in preparation for gGAS with UL at a later stage. A RaLC was performed in 89/132 (67%), and a VC in 43/132 (33%) men. All participants that underwent VC, previously had a hysterectomy with or without BSO and normal voiding function at urological consultation pre colpectomy. In case of RaLC, a TLH with tubectomy or BSO was performed simultaneously.

Lower urinary tract function

Frequency voiding charts (FVCs) were obtained in 101 (77%) men preoperatively and 81 (61%) postoperatively, IPSS questionnaires in 96 (73%) men preoperatively and 69 (52%) postoperatively, and uroflowmetries in 96 (73%) men preoperatively and 112 (85%) postoperatively. A voided volume of less than 150 mL was regarded as not representative and consequently 19/96 (20%) uroflowmetries

Table 1. Participant characteristics.

Total number of included participants	132
Median age at colpectomy, yr (IQR)	24 (21–29)
Mean BMI, kg/m^2 (±SD)	24.3 (4.3)
Median duration of testosterone therapy before colpectomy, yr (IQR)	3 (2–4)
Indication of colpectomy, n (%)	
Preparation for gGAS with UL at a later stage	106 (80)
Gender dysphoria	18 (14)
Both	8 (6)
Previous gender-affirming surgery, n (%)	
LAVH-BSO	1 (1)
TLH-BSO	41 (31)
TLH without BSO	1 (1)
Surgical approach during colpectomy, n (%)	
Vaginal approach	43 (33)
Robot-assisted laparoscopic approach	89 (67)
Colpectomy combined with other gender-affirming surgery, n (%)	
TLH-tubectomy (ovaries in situ)	8 (6)
TLH-BSO	81 (61)
Median hospital stay, d (IQR)	2 (2–2.5)
Median duration of indwelling catheter, d (IQR)	2 (2–2.5)
Median urological follow-up time, mo (IQR)	4 (2–14)

IQR: Interquartile Range; BMI: Body Mass Index; SD: Standard Deviation; gGAS: genital Gender-Affirming Surgery; UL: Urethral Lengthening; LAVH: Laparoscopic-Assisted Vaginal Hysterectomy; BSO: Bilateral Salpingo-Oophorectomy; TLH: Total Laparoscopic Hysterectomy.

preoperatively and 24/112 (21%) postoperatively were excluded. Postoperative voiding analysis was conducted after a median interval of four months (IQR 2–8) following colpectomy. A paired analysis of LUTF pre and post VC is displayed in Table 2, and pre and post RaLC in Table 3.

After VC, a higher IPSS total score was seen (median (IQR) of 5 (2–10) vs. 2.5 (1–4), $p = 0.001$). A clinically relevant increase (≥4) in IPSS total score postoperatively was observed in 8/22 (36%) men. In addition, maximum flow rate (Qmax) on uroflowmetry was lower postoperatively (mean (SD) of 29.2 (14.7) vs. 40.3 (15.0) mL/s, $p < 0.001$).

In the group after RaLC, 7/31 (23%) men had a clinically relevant increase (≥4) in IPSS total score. On the contrary, there also were 2/31 (6%) men with an improvement in IPSS total score of four points following RaLC. Additionally, a significantly lower Qmax was observed after RaLC (mean (SD) of 29.1 (14.7) vs. 38.3 (16.2) mL/s, $p = 0.002$).

All other variables of LUTF, including quality of life due to urinary symptoms, were comparable pre and post VC and RaLC.

Subjective changes in voiding

Subjective changes in voiding were stated by 52/132 (39%) men after a median of 46 days (IQR 20–61) post colpectomy, with some experiencing multiple changes simultaneously (Figure 1). These changes in voiding were indicated relatively more often by men who underwent VC (25/43 (58%) vs. 27/89 (30%) respectively, $p = 0.002$). In 42/52 (81%) men these changes were temporarily, with improvements reported during urological consultation after a median of 136 days (IQR 67–270) postoperatively. At the moment of subjective improvement, 23/42 (55%) fulfilled an IPSS survey, of which in 8/23 (35%) men the IPSS total score still indicated moderate urinary symptoms (median total score of 11.5 (IQR 8.5–14)), five after VC and three after RaLC.

In 10/132 (8%) men, subjective changes in voiding persisted at the end of urological follow-up, 3/43 (7%) after VC and 7/89 (8%) after RaLC. Three of these men only had a urological follow-up time of two to three months after RaLC. The other seven men (three VC and four RaLC) had a median urological follow-up time of 17 months (IQR 11–37).

Catheter removal

A flowchart of catheter removal and the need for CISC post colpectomy is shown in Figure 2. During admission, primary TWOC was successful in 103/132 (78%) men, with more success after RaLC compared to VC (79/89 (89%) vs. 24/43 (56%) respectively, $p < 0.001$). The median PVR during successful TWOC was 25 mL (IQR 0–64). Of the remaining 29/132 (22%) men, three (10%) had a prolonged indwelling catheter due to perioperative bladder injury during VC, and 26 (90%) had an unsuccessful TWOC with a median PVR of 462 mL (IQR 265–608). After discharge, a following TWOC was successful for 22/132 (17%) participants, including all three men with perioperative bladder injury, after a median of eight days (IQR 8–10.5) postoperatively and with a median PVR of 123 mL (IQR 70–198). Of these 22 men, the PVR further improved during urinary analysis after a median of two months (IQR 2–6) post colpectomy from 123 mL to 33 mL (IQR 0–122; $p = 0.03$).

For 5/132 (4%) men (three VC and two RaLC), temporary CISC was necessary for a period ranging from 5 to 21 days. The remaining 2/132 (2%) participants were still in need of CISC at the end of urological follow-up (11 and 27 months post colpectomy), both after an uncomplicated RaLC

Table 2. Lower urinary tract function after vaginal colpectomy.

	n	Preoperative analysis	Postoperative analysis	*p* value
Frequency volume chart				
Day frequency*	24	6.8 (2.3)	6.9 (2.6)	0.82
Night frequency†	24	0 (0–1)	0 (0–1)	1
Maximum voided volume, mL*	23	477 (128)	467 (133)	0.75
24-hour urine production,* L	23	2.2 (0.8)	2.0 (0.6)	0.19
IPSS†				
Total score	22	2.5 (1–4)	5 (2–10)	0.001
Incomplete emptying	22	0 (0–0)	0 (0–1)	0.02
Frequency	22	1 (1–2)	1.5 (1–3)	0.02
Intermittency	22	0 (0–0)	0 (0–1)	0.06
Urgency	22	0 (0–0)	0 (0–1)	0.06
Weak stream	22	0 (0–1)	1 (0–1)	0.05
Straining	22	0 (0–0)	0 (0–1)	0.01
Nocturia	22	0.5 (0–1)	0 (0–1)	0.20
Quality of life	22	0.5 (0–1)	0.5 (0–2)	0.32
Uroflowmetry				
Qmax,* mL/s	23	40.3 (15.0)	29.2 (14.7)	<0.001
Qavg,* mL/s	23	18.6 (7.1)	14.3 (8.6)	0.009
Flow time,† s	23	19 (15–36)	27 (13–55)	0.07
Time to maximum flow,† s	23	5 (4–10)	7 (4–12)	0.07
Voided volume,* mL	23	404 (183)	385 (193)	0.68
Post-void residual volume,† mL	22	0 (0–15)	6 (0–39)	0.08

Due to multiple testing in this analysis, a Bonferroni correction was applied and statistical significance was set at a *p* value of <0.003. Number of participants may vary per observation, as some data was incomplete or excluded from analysis.
IPSS: International Prostate Symptom Score; Qmax: Maximum flow rate; Qavg: Average flow rate.
*Normal distribution, presented as mean (±SD) and analyzed using the paired sample t-test.
†Skewed distribution, presented as median (IQR) and analyzed using the Wilcoxon signed-rank test.

Table 3. Lower urinary tract function after robot-assisted laparoscopic colpectomy.

	n	Preoperative analysis	Postoperative analysis	*p* value
Frequency volume chart				
Day frequency*	39	6.0 (2.4)	6.1 (1.9)	0.85
Night frequency†	39	0 (0–0)	0 (0–0)	0.10
Maximum voided volume,* mL	38	429 (181)	395 (123)	0.19
24-hour urine production,* L	37	1.7 (0.9)	1.6 (0.7)	0.15
IPSS†				
Total score	31	3 (1–4)	4 (2–6)	0.01
Incomplete emptying	29	0 (0–1)	0 (0–1)	0.33
Frequency	29	1 (0–2)	1 (1–2)	0.41
Intermittency	29	0 (0–1)	0 (0–1)	0.82
Urgency	29	0 (0–0.5)	0 (0–1.5)	0.02
Weak stream	29	0 (0–1)	0 (0–1)	0.49
Straining	29	0 (0–0)	0 (0–0)	0.34
Nocturia	29	0 (0–1)	1 (0–1)	0.02
Quality of Life	31	0 (0–2)	0 (0–2)	0.29
Uroflowmetry				
Qmax,* mL/s	32	38.3 (16.2)	29.1 (14.7)	0.002
Qavg,* mL/s	32	17.8 (8.7)	15.2 (8.5)	0.17
Flow time,† s	32	27 (18–35)	22 (13–38)	0.88
Time to maximum flow,† s	32	6 (4–10)	6 (4–9)	0.64
Voided Volume,* mL	32	435 (178)	353 (181)	0.03
Post-void residual volume,† mL	31	21 (0–53)	0 (0–42)	0.32

Due to multiple testing in this analysis, a Bonferroni correction was applied and statistical significance was set at a *p* value of <0.003. Number of participants may vary per observation, as some data was incomplete or excluded from analysis. In two men, IPSS total score and quality of life were described without separate scores per question of the IPSS.
IPSS: International Prostate Symptom Score; Qmax: maximum flow rate; Qavg: average flow rate.
*Normal distribution, presented as mean (±SD) and analyzed using the paired sample t-test.
†Skewed distribution, presented as median (IQR) and analyzed using the Wilcoxon signed-rank test.

and due a urinary retention with consequently detrusor underactivity without bladder outlet obstruction on urodynamic testing. One patient only had one acceptable PVR measurement described of 53 mL during secondary TWOC, and returned two days later with a urinary retention of >1500 mL, combined with obstipation. A second patient also had only one acceptable PVR during secondary TWOC of 110 mL, after a first measurement of 155 mL, and returned several hours after discharge with a urinary retention of 1260 mL.

In addition, two participants were in need of temporary CISC despite a successful TWOC. One participant after VC was in need of CISC for 30 days due to transient incomplete bladder emptying, which started several weeks after TWOC. The other participant after RaLC had a urinary retention, probably due to morphine use because of prolonged postoperative pain, which led to a PVR in need of CISC for 40 days.

No urethral lengthening due to voiding dysfunction

Six out of 132 men (5%) had to refrain from gGAS with UL due to voiding dysfunction after colpectomy, despite the desire to void while standing (2/43 (5%) after VC and 4/89 (5%) after RaLC). Five of these men had persistent subjective changes in voiding at the end of urological follow-up (range 10–27 months postoperatively). Complaints were incomplete bladder emptying in three men (two of which still in need of CISC as previously described), and two men with hesitancy, intermittency, and a weak stream. The sixth patient did not have subjective changes in voiding after RaLC, however, he had to refrain from gGAS with UL due to persistent asymptomatic hypertonic pelvic floor muscles and voiding dysfunction, despite pelvic floor physiotherapy, after a urological follow-up of 23 months postoperatively.

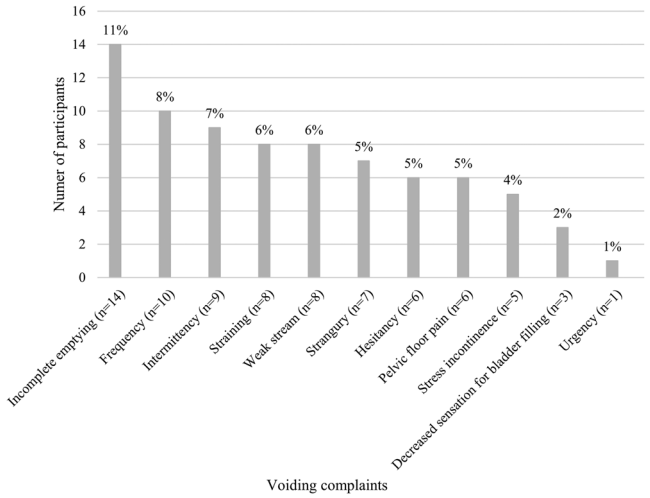

Figure 1. Subjective changes in voiding postoperatively. Each bar represents the number of men who experienced a change in voiding, with the percentages relative to the total cohort (n = 132) above each bar. Subjective changes in voiding were stated by 52/132 (39%) men, with some experiencing multiple changes in voiding simultaneously.

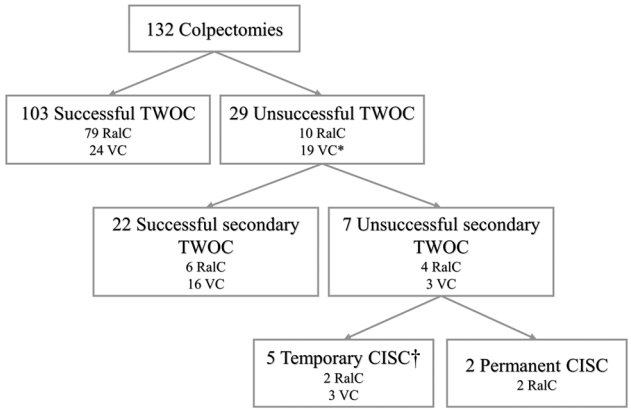

Figure 2. Flowchart of catheter removal and need for CISC after colpectomy. Primary TWOC was performed during admission on the first day postoperatively. After discharge, secondary TWOC was successful after a median of 8 days (IQR 8–10.5) post colpectomy. TWOC: Trial Without Catheter; RaLC: Robot-assisted Laparoscopic Colpectomy; VC: Vaginal Colpectomy; CISC: Clean Intermittent Self-Catheterization. *Three men after VC had prolonged length of transurethral catheterization due to perioperative bladder injury. In these three men, secondary TWOC was successful. †Temporary CISC was necessary for a period ranging from 5 to 21 days.

Discussion

In this study, we described the effect of colpectomy on LUTF in transgender men. Comparison of voiding analyses showed a significant decrease in Qmax after VC and RaLC. A clinically relevant increase in IPSS total score was seen more frequently following VC compared to RaLC. No other differences in voiding analyses were shown. Subjective changes in voiding were indicated relatively more often by men who underwent VC compared to RaLC, of which the majority improved during the first months postoperatively. In addition, primary TWOC on the first postoperative day was more successful in men after RaLC than VC. On the other hand, two men following RaLC were still in need of CISC at the end of urological follow-up due to detrusor underactivity after a urinary retention. Eventually, five percent of men (two VC and four RaLC) had to abandon the possibility of gGAS with UL due to changes in urinary functioning, despite the desire to void while standing. These insights into the voiding function of transgender men following colpectomy are important for preoperative counseling in the surgical transition process.

Type of surgery

Several surgical techniques are available to perform colpectomy in transgender men. In our study, voiding function was assessed after VC and RaLC, where in both cases the vaginal epithelium was removed through sharp dissection. In case of RaLC, surgery was combined with a TLH with tubectomy or BSO, which increased the risk of nerve injury and subsequent voiding dysfunction (Laterza et al., 2015). On the contrary, a laparoscopic approach may be beneficial in preventing nerve injury due to better anatomic access and visualization of the tissues (Gomes da Costa et al., 2016; Groenman et al., 2017). In

addition, recent studies into nerve-sparing laparoscopic gynecological surgery show swifter recovery of voiding function with a reduced need for CISC (Laterza et al., 2015; Novackova et al., 2020; Soares et al., 2021). In our study, primary TWOC was less successful following VC, probably due to more local swelling, inflammation, and pain. Furthermore, the majority of subjective changes in voiding and clinically relevant worsening in IPSS total scores were seen in the first months after VC. These short-term outcomes advocate for a (robot-assisted) laparoscopic approach in colpectomy for transgender men.

Sharp dissection of the vaginal epithelium in a submucosal plane is a precise matter to prevent nerve injury and bleeding from the perivaginal plexus (Asseler et al., 2021; Groenman et al., 2017; Nikkels et al., 2019). A treatment alternative with possibly less perivaginal tissue injury is colpectomy through electrothermal ablation, though (comparative) studies are lacking (Jun et al., 2021). It should also be mentioned that removal of the vaginal epithelium through electrothermal ablation may be less precise, leading to epithelial remnant with persistent vaginal discharge and the risk of perineal cysts (Asseler et al., 2021).

Refrain from urethral lengthening

The majority of transgender men undergoing colpectomy in our institution desire gGAS with UL at a later stage. Colpectomy significantly reduces the risk of urethral fistulas after gGAS with UL from 48% to 21% (Al-Tamimi et al., 2018). However, in our study, 5% of men had to refrain from gGAS with UL due to voiding dysfunction after colpectomy. This new data shines a different light on the preoperative consultation and shared decision-making process prior to surgical transition. It is questionable whether the risk reduction of colpectomy on the urethral fistula rate outweighs the risk of voiding dysfunction caused by the colpectomy, omitting gGAS with UL. A different option could be to withhold colpectomy until a urethral fistula occurs, to in that case reduce the risk of recurrence (Al-Tamimi et al., 2018; de Rooij et al., 2022). Yet, complication risks of colpectomy remain, and treatment of voiding dysfunction (e.g. CISC) after gGAS with UL may be more difficult.

Decrease in maximum flow rate

In the comparison of LUTF, a significant decrease in mean Qmax was observed from 40.3 to 29.2 mL/s after VC and from 38.3 to 29.1 mL/s after RaLC, probably due to nerve injury perioperatively (Zilberman et al., 2013). A different cause could be postoperative bladder outlet obstruction, however, this is less likely considering the surgical treatment. A urodynamic test can distinguish between these causes, and should be carried out in future studies. Currently, the postoperative mean values remain well in the range of a normal Qmax (Matsuo et al., 2019; Sorel et al., 2017). On the contrary, a decrease of approximately 10 mL/s can be clinically relevant for men with a lower maximum flow rate preoperatively. Additionally, after phalloplasty with UL, a further decrease in mean Qmax was observed from 29.8 to 21.4 mL/s [de Rooij, unpublished data]. It is assumed that the less pliable skin tube used for neourethral reconstruction during phalloplasty and the siphon-like structure of the fixed urethra postoperatively lead to increased voiding resistance (Hoebeke et al., 2005; Veerman et al., 2020). Since the majority of men had colpectomy in preparation for gGAS with UL, a total decrease of about half the Qmax during surgical transition is expected to be of influence on urinary functioning. The long-term effect of colpectomy and gGAS on voiding function in transgender men is still unknown (Hoebeke et al., 2005).

Catheter removal

The necessity of CISC post colpectomy is an incapacitating setback for transgender men. In two men still performing CISC at the end of urological follow-up, TWOC was not performed according to protocol, resulting in a urinary retention with consequently detrusor underactivity. In our institution, the need for CISC is a contraindication for gGAS with UL, as catheterization may be more difficult. It is therefore important to adequately treat postoperative voiding dysfunction, in particular urinary retention, to prevent prolonged bladder distention which can lead to detrusor underactivity and the need for CISC (Geller, 2014; Novackova et al., 2020).

Recovery of voiding function

Due to the current research design with only one postoperative voiding analysis after a median of four months post colpectomy, it is unclear if LUTF would recover over time. In previous literature, it is described that voiding dysfunction after gynecological surgery in cisgender women is predominately of a temporary nature (Dubernard et al., 2008; Geller, 2014). In our study, the majority of men who indicated subjective changes in voiding, noticed improvements after a median of approximately 4.5 months (136 days). On the contrary, 35% of these men still had moderate urinary symptoms on IPSS. Therefore, it is also possible that some men experience a response shift over time rather than actual improvements of their voiding complaints. In future studies, postoperative voiding function should be analyzed on several moments during long-term urological follow-up, with urodynamic testing, to see if improvements occur.

Strengths and limitations

Although colpectomy in transgender men is frequently performed, this is the first study to describe the effect on LUTF. Strengths of this study comprise the relatively large cohort of transgender men, and the paired analyses of voiding pre and post colpectomy. The incorporation of subjective changes in voiding was of added value, as this provided some perspective to the clinical data. These outcomes on LUTF are an addition to the previously published surgical results of colpectomy (Groenman et al., 2017; Nikkels et al., 2019).

One of the limitations of the study was the missing data in the paired analysis of LUTF, nevertheless, groups remained large enough to draw conclusions. Additionally, some heterogeneity was present in the data, which is important to keep in mind during comparison of groups. Especially the uroflowmetry data differed per patient, namely the day and time of examination and amount of bladder filling. Furthermore, long-term urinary outcomes remain unclear after colpectomy and gGAS with UL, and should be investigated in future studies with multiple voiding analyses and urodynamic testing during urological follow-up.

Conclusions

Transgender men can experience objective and subjective worsening in LUTF after colpectomy. Voiding complaints in the first months postoperatively are seen more frequently in men following VC compared to RaLC. The majority of these changes is of a temporary nature, however, in some men voiding dysfunction persists. In our study, five percent of men had to refrain from gGAS with UL due to changes in urinary functioning, despite the desire to void while standing.

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