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Research Article

Long-Term Urogynecological Complications after Sex Reassignment Surgery in Transsexual Patients: a Retrospective Study of 44 Patients and Diagnostic Algorithm Proposal -

Nina Combaz[1]* and Annette Kuhn[2]

[1]*Department of Women and Child, Canton Hospital of Sitten, Avenue du Grand-Champsec 80, CH-1951 Sion, Switzerland*

[2]*Urogynäkologie Frauenklinik, Inselspital Bern, Effingerstr. 102, CH-3010 Bern, Switzerland*

***Address for Correspondence:** Nina Combaz, Department of Women and Child, Canton Hospital of Sitten, Avenue du Grand-Champsec 80, CH-1951 Sion, Switzerland, Tel. +41 27 480 44 60; Fax +41 27 566 71 66; E-mail: nina@combaz.ch

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ABSTRACT

Objective: Sex reassignment surgery involves complex operations of the urethra. Despite the immediate surgical complications being well documented, there is a paucity of knowledge about long term micturition disorders.

The aim of this retrospective study was to analyse long term micturition disorders in male and female patients after sex reassignment surgery.

Study Design: Between January 2010 and January 2017 we examined 120 patients after sex reassignment surgery. A patient history was taken, along with a clinical examination including a perineal ultrasound and multichannel urodynamics. The Visual Analogue Scale (VAS) as measurement of the psychological impact of the urinary symptoms was analysed. Interventions and their outcomes were noted.

Results: Thirty-six of the Male to Female (MTF) and eight of the Female to Male (FTM) transsexuals presented with urinary problems. With a mean interval of 72 months after surgery 51% out of 44 patients considered themselves very bothered by their urogynaecological problems.

In MTF transsexuals, overactive bladder (13/36), stress urinary incontinence (9/36), a reduced urinary flow (7/36), and meatal stenosis (5/36) were common problems. Post void dripping (2/36), fistula (2/36) and urinary tract infection (3/36) had a rather rare occurrence.

Five of eight FTM patients presented with recurrent urinary tract infections. Overactive bladder (2/8), stress urinary incontinence (3/8), post void dripping (3/8), and meatal stenosis (1/8) occurred - but less frequently.

Conclusion: Transsexuals have an increased risk for the development of micturition disorders after sex reassignment surgery. Patients should be counselled on the risks preoperatively, and lifelong specialized follow-up is necessary for the early detection and treatment of arising problems. Treatment is always chosen on an individual basis and differs from common urogynecological findings.

Keywords: Urinary incontinence; Transsexuals; Micturition disorders; Bulking agents; Overactive bladder

ABBREVIATIONS

FTM: Female to Male; MTF: Male to Female; SRS: Sex Reassignment Surgery; VAS: Visual Analogue Scale

INTRODUCTION

Transsexualism is described as the desire to live and to be accepted as a member of the opposite sex, usually accompanied by a sense of discomfort with, or inappropriateness of one's anatomic sex, and a wish to get hormonal treatment and surgery in order to make one's body as congruent as possible with one's preferred sex [1].

Transgender people and other gender minorities represent roughly 0.3-0.5% (25 million) of the global population [2]. This underlines the need for appropriate healthcare. There is still a paucity of data about the development of sexual orientation. Probably a combination of genetics, prenatal hormonal exposure, life experience and social contextual factors [3] play a role. MTF (male to female) patients are worldwide approximately three to four times more prevalent than their FTM (female-to-male) counterparts [2,4,5].

Usually life-long cross gender hormones are required. Female-to-male FTM transsexuals are treated with androgens. MTF transsexuals receive oestrogens. This therapy is mostly combined with an antiandrogen (cyproteronacetate) or with spironolactone, which shows synergistic and modulating effects to oestrogens [6,7].

Consecutively, sex reassignment surgery (SRS, alternatively, gender reassignment surgery, gender-confirming surgery, sexual reassignment surgery, or gender-affirming surgery) may be undertaken. This comprehends subcutaneous mastectomy, hysterectomy and oophorectomy as well as colpectomy for FTM transsexuals. Phalloplasty is still debated as it is, even with recent surgical techniques, related to a high complication rate [8-13], long recovery time, a large number of operations and questionable functional and esthetical outcomes [14]. Scrotoplasty may be managed inserting testicle prostheses or using the labia majora tissue [15].

In MTF transsexuals the penis shaft is resected, the urethra shortened and the testes are removed. The neovagina is created utilising the inverted penile skin or a bowel segment [14,16]. The prostate usually stays *in situ* [17]. In MTF as in FTM patients there is no gold-standard for operating procedures as techniques do vary from centre to centre [18,19].

Sex reassignment surgery remains an area of super-specialization. It is still under development.

Urinary complications after sex reassignment surgery are common and reports are numerous [13,20-25]. These publications refer mainly to severe complications such as carcinoma [26], urethral fistula, urethral strictures and meatal stenosis.

Prospective long-term data on voiding problems in transsexuals are still rare. In 2007 Kuhn et al reported about micturition problems in 25 transsexual patients [27]. The authors detailed about a high incidence of micturition disorders as incontinence, overactive bladder and decreased urinary stream, particularly in MTF transsexuals.

The aim of this study was to investigate micturition disorders and management in a larger cohort of MTF and FTM transsexuals.

PATIENTS AND METHODS

As part of the routine follow-up, between 2010 and 2017 patients were followed annually after sexual reassignment surgery and were asked about urogynecological disorders at the gender dysphoria clinic of the university hospital at Bern (Inselspital).

Medical history was taken. Visual Analogue Scale (VAS) was used as measurement of urinary symptoms bother. The question we asked our patients was: „How much are you bothered by your bladder problem with 0 = no bother and 10 = the most imaginable bother you can imagine? ". We rated 0 as no bother, 1-3 as some bother, 4-7 as intermediate bother and a VAS of 8-10 as strong bother.

All patients were examined clinically including pelvic floor testing. Measurement of the pelvic floor force was performed using

the revised Oxford Grading Scale [28]: 0/5 represents no perineal force at all, 1/5 and 2/5 a poor pelvic floor contractibility, 3/5 and 4/5 was considered as a good voluntary pelvic floor contraction and 5/5 is a very strong pelvic floor contraction

Transabdominal ultrasound (curved array 3.5-5 MHt probe C40 S Sonoline Adara, Siemens®) was used to determine the post void residual urine. We considered residual urine of less than 100 ml as normal.

For Uroflow measurements we used Sedia SE8 Flowmeter. A maximum flow of more than 20 ml/s was considered normal, between 15 and 19 ml/ s was considered slightly decreased and less than 15 ml/s was noted as decreased.

Multichannel urodynamics were performed in all 44 patients (MMS solar®). Urodynamics were performed according to the "Good Urodynamic Practices and Terms" of the International Continence Society [29,30].

RESULTS

Patients' operations had taken place in four different centres, comprising Switzerland, the United Kingdom, France and the United States.

All in all, 120 patients presented for their annual check-up. 44 (36, 6%) of these transsexual patients presented urinary problems, whereof 36 were Male-to-Female Transsexuals (MTF) and 8 female-to-male transsexuals. Demographic data are shown in table 1.

All 36 MTF had their sex reassignment including removal of their testes and penis and formation of a neovagina. Thirty-four had received a neovagina by penile-scrotal inversion and two a neovagina formed of bowel.

All eight FTM had hysterectomy and oophorectomy as well as breast removal. Six of them had phalloplasty with urethral reconstruction during the same operation. Two had no phalloplasty at all. Operations were performed by four surgeons in four different centres. For this reason, surgical procedures were not standardized.

Patients bother with their current urinary problems as determined by VAS is shown in table 2.

Main clinical diagnoses were post void dripping, uncompleted bladder emptying, recurrent urinary tract infections (more than 2/ year), stress urinary incontinence and urge urinary incontinence. Details are given in table 3.

Oxford grading evaluating clinically the force of pelvic floor contractions showed 0/5 in seven patients (all MTF), poor contraction in 21 patients (15 MTF, 6 FTM), good contraction in 13 patients (11 MTF, 2 FTM) and in 3 MTF a very good voluntary contraction.

Significantly increased residual urine was found in three of eight FTM patients and in five of 36 MTF patients.

Table 4 summarises the results of post void residual urine, pelvic floor testing and urodynamic findings.

Table 1: Age at SRS and at follow-up including time interval SRS.

	All	FTM	MTF
Age at sex reassignment surgery (mean, years)	37	40	36
Age at follow up (mean, years)	43	50	41
Time interval between sex reassignment surgery and follow up (mean, months)	72	115	63

Table 2: Results of the Visual Analogue Scale (VAS; patients bother).

	All (n = 44)	MTF (n = 36)	FTM (n = 8)
some bother at all	13	9 (25%)	4 (50%)
Intermediate	27	24 (75%)	3 (37,5%)
strong bother	4	3 (8%)	1 (12,5%)

Table 3: Patients' complaints and clinical diagnoses (percentages refer to the overall number of 120 screened patients).

	All (n = 44/120)	FTM (n = 8/18)	MTF (n = 36/102)
Diverted stream	0	0	0
Feeling of incomplete emptying (Valsalva for voiding)	2 (1,7%)	0	2 (2%)
Recurrent urinary tract infections (>2/year)	8 (6,7%)	5 (28%)	3 (3%)
Stress urinary incontinence	12 (10%)	3 (17%)	9 (9%)
Overactive bladder	15 (12,5%)	2 (11%)	13 (13%)
Hematuria	0	0	0
Fistula	2 (1,7%)	0	2 (2%)
Post void dripping	5 (4,2%)	3 (17%)	2 (2%)

Table 4: Pelvic floor testing and Urodynamic results.

	All (n = 44)	FTM	MTF
Post residual volume (ml/s; median, range)	35 (0-260)	85 (0-200)	30 (0-260)
Pelvic floor testing (Oxford grading scale; median, range)	1,45 (1-5)	2 (1-4)	2 (0-5)
Peak flow (ml/s; median, range)	14,5 (3-34)	13 (9-21)	18 (3-34)
Micturition time (s; median, range)	45 (12-101)	45 (12-101)	40 (12-101)
Maximal detrusor pressure (cmH_2O; median, range)	13 (0-54)	33 (12-49)	12 (0-54)
Obstruction - according to Blaivas [30]	2	1	1

Therapies were always chosen on an individual base

- Two MTF patients presented 34 and 36 months after surgery with a vesico-vaginal fistula. Fistula were resected abdominally including interposition of omentum majus. Postoperative follow-up was uneventful and after bladder drainage of 10 days catheters could be removed after cystogram showed no leakage.
- Patients with meatal stenosis were treated by meatal dilatation. During follow-up patients were instructed by our incontinence nurse to perform meatal autodilatation. No deleterious side effects were observed and no recurrence requiring repeat surgical intervention were noted.
- Recurrent urinary tract infections without further anatomical pathologies were treated with antibiotics according to urinary culture.
- Patients with overactive bladder and no additional anatomical abnormalities were treated with anticholinergics or with

Mirabegron. Two of our patients did not improve under oral medication but injection of 200 IE of Botox into the detrusor muscle.

- Stress urinary incontinence was treated initially with pelvic floor exercises and half of the patients were improved and did not need any further treatment. The remaining 50% received transurethral injection of bulking agents (Bulkamid®) and improved after treatment.

DISCUSSION

The current study shows that micturition can be severely altered after sex reassignment surgery. One third of our patients suffered from various sorts of incontinence, voiding disorders or recurrent urinary tract infections. Patients who consider sex reassignment surgery should be informed about this side effect preoperatively. Symptoms may deteriorate over time as descried by Hoebeke, et al. [31] who reported worsening of voiding habits in 33,3% FTM and 19,3% MTF patients, three years after surgery. In another recent study 47% of all transsexuals reported voiding difficulties and 40% presented incontinence [32]. Changes of different occurrences are probably due to small subject groups but trends of around 30-50% of patients presenting with voiding disorders after sexual reassignment surgery are overall reported [15]. Various hypotheses for the cause of lower urinary tract symptoms in MTF and FTM transsexuals can be discussed, of which the most likely one will be the sequelae of surgery.

Voluntary pelvic floor contractions measured with the revised Oxford grading scale [28] showed mean values of 2 in MTF and FTM patients; seven of the patients were entirely unable to contract their pelvic floor. This may or may not be related to SRS as even healthy persons are not all able to contract their pelvic floor muscles voluntarily. Surgical side effects as nerve damage (e.g. pudendal nerve or its branches) may also contribute to pelvic floor insufficiency, but we may only speculate about this as there is no data regarding pelvic floor function before and after SRS.

FTM patients without a creation of a neophallus undergo generally less invasive surgical genital procedures. The urethra is not touched and therefore scar tissue formation is not an issue. In our study, all three patients with stress urinary incontinence had a creation of a neophallus with a neourethra (3 of 6 patients). Depending on the surgical technique the cause may be an alteration of the muscular and nerve situation postoperatively or the rather relaxed neourethra in which urine is collected after voiding. With a changing position the urine may leak and as such mimicking stress urinary incontinence.

Hoebeke, et al. [31] explained post-voiding incontinence in FTM patients by the new urethral structure, which collects urine due to the poorly compliant phallic urethra without corpora spongiosa and lacking completely any muscular and elastic fibres. In addition to that the newly created urethra contains a syphon. The urine may "fall down" at a later point after micturition. According to this post void dripping was a documented problem in 37,5% of our FTM patients (50% of the patients with a neophallus and neourethra). Patients' instruction to squeeze the penis and to push the urine out of the syphon after voiding may help improve function after surgery.

In transsexuals creating a new vagina is in itself a great challenge, and the resulting voiding situation is quite complex. In MTF patients a large part of the urethra is resected and a de novo pocket is created between the bladder and the rectum that will contain the neovagina. This procedure is a risk factor for the occurrence of stress urinary incontinence as the sphincter complex and the pelvic floor muscles are in the dissected area [31]. Scar formation and strictures at the newly created external urethral meatus may help to reduce stress urinary incontinence but can lead to other problems due to obstruction. Furthermore, the dissection between bladder and rectum is in the area of nerves supplying the bladder. Finally, creating a vagina behind the bladder changes the anatomic position of the bladder, which in itself could be the source of bladder overactivity [31,32]. In addition to that a smaller prostate size of the MTF transsexuals compared to their male age group [33,34] may have a less protective effect on urinary leakage during increased abdominal pressure. This is due to the long-term exposure of oestrogens in MTF patients [34,35].

Surprisingly, of the investigated 44 patients with urinary tract problems, only 81% of MTF ad 50% of FTM patients considered themselves bothered with their current situation on VAS. This is consistent with our findings in a past study [27], with those of Zimmermann, at al. [36], and in accordance with the further study of Kuhn, et al. [37]. We may speculate that patients after SRS have had more serious health problems including pain, discomfort during their everyday activities, and side effects of hormonal therapies, so they consider their urinary symptoms as rather minor.

In non-transsexual people incontinence is perceived as a shameful situation, and is not easily talked about by affected people [38-40]. This probably explains why none of our patients did spontaneously consult any other medical person in order to get help with their bladder problems. We know from a previous study that transsexuals are rather shy in expressing their urogenital problems [27]. This situation is complicated by the fact that well informed clinicians, familiar with the specific problems after sex reassignment surgery, are lacking [41].

Maximum uroflow was reduced in a large part of our patients (see Table 4): Of eight FTM patients only one presented a normal flow. In MTF patients' situation was quite identic with 17 of 36 patients presenting a pathologic and two of 36 patients presenting a slightly decreased uroflow. The critical limit of a maximal detrusor pressor higher than 40 mmHg was reached by four patients. This finding that transsexuals have a decreased maximal uroflow after sex reassignment surgery is in accordance with the observations of Kuhn et al. several years ago [27]. We need to be cautious and careful in patients who are obstructed in order to prevent upper urinary tract problems.

Three main questions are rising from these observations

1. How to avoid scar formation / how to adapt the surgical technique?
2. How to identify patients with clinical impairment due to obstruction and scar formation?
3. How to treat the resulting problems?

Surgical techniques for sex reassignment surgery are still evolving and no technique has proven superiority to other ones concerning long term urinary problems. The resulting problems are the consequence of urethral resection with loss of its competent part and scar formation. In our opinion, all transsexual patients considering surgery should be counselled about the problem of a neourethra, and the possibility to create a neophallus without a neourethra must be argued in FTM patients. Meteoidioplasty, the creation of a neophallus from the hypertrophied clitoris, may be an alternative option, but

surgical results are also related to voiding problems, mainly due to urethroplasty. Due to the nature of the procedure, the penis is reduced in length as compared to normal, resulting in impaired ability to urinate whilst standing and impeded sexual function, for example difficulty with penetration [18].

FTM patients should made aware that complete phallus sensation and voiding while standing cannot be guaranteed [15,22,42].

According to our own study data and to the current literature, we suggest the following algorithm (Figure 1).

- Patients' adherence to the autodilations for meatal stenosis must be analysed with ongoing time. Monstrey, et al. [13] reported about an occurrence of 25-58% of urethral strictures after FTM sex reassignment procedures with phalloplasty. These strictures were treated with endoscopic incision or, if needed, by urethroplasty but recurrence rates were very high (>40%) [24]. Buncamper, et al. [25] reported a 9.7 % rate of meatal stenosis in MTF patients after a median postoperative time of 4 months. Authors choose an operative solution with meatotomy, if possible in combination with resection of the remaining corpora spongiosa. Neto Rossi, et al. [43] recently reported long term data of 332 patients after MTF operations. The authors reported of an overall occurrence of progressive obstructive voiding disorder due to meatal stenosis in 40%. Different stages of obstruction, conducting in some cases to total urinary retention were observed. 15 percent of the operated patients needed a second correction because of stricture recurrence.

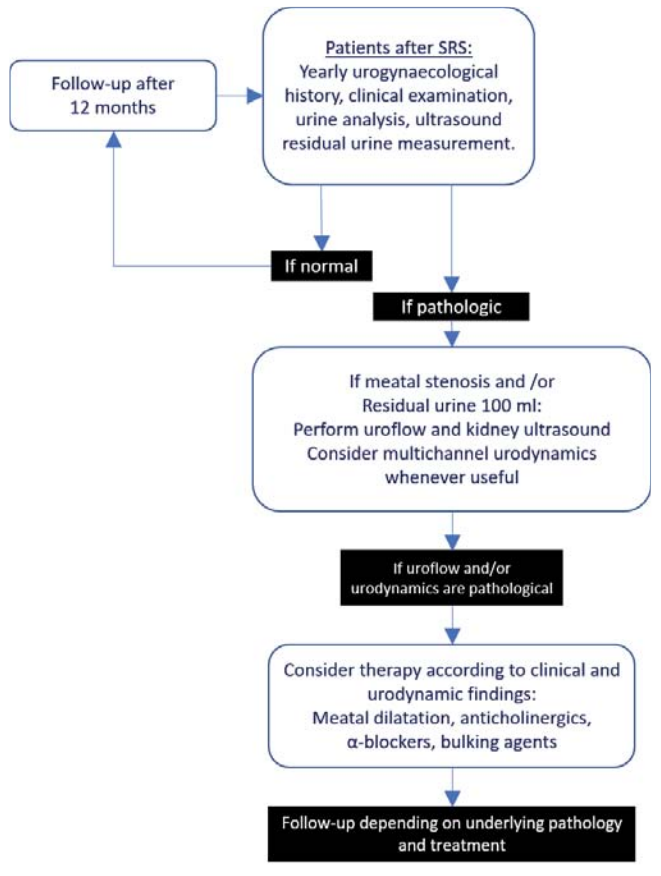

Figure 1: Proposed live long follow up for all patients after SRS.

- Bulking agents present a good treatment option for stress urinary incontinence after sex reassignment surgery as it is easy to perform despite the unique anatomical situation. Suburethral slings may be an alternative – but in MTF patients we did not judge them an ideal solution as the prostate was still in situ and would be situated between urethra and sling. In patients with bladder neck hypermobility colposuspension may also be an option.

In FTM patients suburethral slings may also be a therapeutic option. Recently reports are multiplying about suburethral slings as a treatment of stress urinary incontinence in non-transgender men [44-46]. On our opinion, bulking agents are less invasive. There are no data quantifying the risk of mesh erosion in a neourethra, a complication we did not want to risk. As Uroflow was not fantastic in any of our patients' clinicians have to be alerted that any operative procedure exposes the patient to the risk of urinary retention. Removable bulking agents as they are existing now may be good option for transsexual patients with stress urinary incontinence. This needs to be proven in further studies.

The large number of patients in this study and the use of a standardized examination protocol with objective clinical criteria is a strength of our study. Unfortunately, we do not have any information about voiding disorders before and immediately after surgery.

A weakness if the study is its retrospective character with the usual flaws retrospective studies contain; however, we were able to identify a full set of data in 44 patients, which is a rather high number of patients presenting with a rare entity.

In summary, MTF and FTM transsexuals may present with micturition disorders as incontinence, overactive bladder, urinary tract infections and decreased urinary stream. Patients should be advised about these risks prior to sex reassignment operations. Surgical corrective options should be determined on an individual basis.

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