

ORIGINAL RESEARCH—INTERSEX AND GENDER IDENTITY DISORDERS

Quality of Life and Sexual Health after Sex Reassignment Surgery in Transsexual Men

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ABSTRACT

Introduction. Although sexual health after genital surgery is an important outcome factor for many transsexual persons, little attention has been attributed to this subject.

Aims. To provide data on quality of life and sexual health after sex reassignment surgery (SRS) in transsexual men.

Methods. A single-center, cross-sectional study in 49 transsexual men (mean age 37 years) after long-term testosterone therapy and on average 8 years after SRS. Ninety-four percent of the participants had phalloplasty.

Main Outcome Measures. Self-reported physical and mental health using the Dutch version of the Short Form-36 Health Survey; sexual functioning before and after SRS using a newly constructed specific questionnaire.

Results. Compared with a Dutch reference population of community-dwelling men, transsexual men scored well on self-perceived physical and mental health. The majority reported having been sexually active before hormone treatment, with more than a quarter having been vaginally penetrated frequently before starting hormone therapy. There was a tendency toward less vaginal involvement during hormone therapy and before SRS. Most participants reported an increase in frequency of masturbation, sexual arousal, and ability to achieve orgasm after testosterone treatment and SRS. Almost all participants were able to achieve orgasm during masturbation and sexual intercourse, and the majority reported a change in orgasmic feelings toward a more powerful and shorter orgasm. Surgical satisfaction was high, despite a relatively high complication rate.

Conclusion. Results of the current study indicate transsexual men generally have a good quality of life and experience satisfactory sexual function after SRS. **Wierckx K, Van Caenegem E, Elaut E, Dedecker D, Van de Peer F, Toye K, Weyers S, Hoebeke P, Monstrey S, De Cuyper G, and T'Sjoen G. Quality of life and sexual health after sex reassignment surgery in transsexual men. J Sex Med 2011;8:3379–3388.**

Key Words. Gender Identity Disorder; Sexual Functioning; Sex Reassignment Surgery; Transsexualism; Quality of Life

Introduction

Gender identity disorder (GID) is a condition in which a person experiences discrepancy between the sex assigned at birth and the gender they identify with, often leading to extensive personal distress. Transsexualism is considered the

most extreme form of GID. The treatment consists of cross-sex hormone therapy and sex reassignment surgery in accordance with the Standards of Care of the World Professional Association of Transgender Health [1]. The prevalence of female-to-male transsexualism in Belgium is estimated at 1 per 33,800 females [2].

In our center, transsexual men are treated in a multidisciplinary approach consisting of hormone replacement therapy including sex reassignment surgery (SRS) for most. SRS in transsexual men includes mastectomy, hysterectomy, and ovariectomy. Due to the extensive experience in phalloplasty at our center [3], most transsexual men proceed immediately with a phalloplasty (creation of a full-sized phallus) and less frequently with metoidioplasty (creation of a microphallus by surgical enhancement of the androgen dependent hypertrophy of the clitoris). Furthermore, the majority of transsexual men who choose for an initial metoidioplasty proceed for phalloplasty afterward. Both procedures are most of time combined with scrotoplasty [4] and vaginectomy. Our surgeons have offered phalloplasty since 1993. Since then, the same surgical team has changed the surgical procedure from an all-in-one surgical intervention that included a subcutaneous mastectomy, a lower abdominal hysterectomy and ovariectomy and a complete genitoperineal transformation to a dual stage procedure. Currently, a subcutaneous mastectomy is combined with a totally laparoscopic hysterectomy and ovariectomy. In a second time, the genitoperineal transformation procedure is performed. Because of increasing experience, aesthetic results and complication rates have been remarkably improved [3,5]. Surgical techniques have several advantages and disadvantages and will have a different outcome on sexual function. Phalloplasty, for example, creates the opportunity to void standing and mimics normal adult penis size, with the possibility of performing penetrative sexual intercourse. However, it creates a residual scar on the donor site and there is a rather high complication rate [5,6]. In contrast, metoidioplasty avoids the scarring at the donor site, but the microphallus is often too small to allow sexual intercourse or to urinate while standing [6,7]. Most of the time, a vaginectomy is performed during both surgical procedures, affecting future female receptive sexual activities. As surgical outcome has a marked influence on sexual and general functioning after SRS [8,9], it remains an important parameter to investigate.

Sexual health is an important element of general health, and this is often underexposed by health-care professionals dealing with transsexual individuals. Previous results from our group on surgical and sexual outcome in lower numbers of transsexual men indicate that, in general, most were satisfied with the surgical results of their newly formed genitalia. The vast majority also

indicated an improvement in their sexual life and increased sexual excitement after SRS. With the current surgical techniques, tactile and erogenous sensitivity is maintained enabling most participants to achieve orgasm both through masturbation and intercourse. However, transsexuals' expectations were less met at a physical and sexual level in comparison with a social or emotional level. This indicated that, preoperatively, more attention needed to be paid to sexual expectations and possible sexual changes [4,5,9,10]. However, the current knowledge on postoperative sexual functioning is scarce, especially in transsexual men due to the lower prevalence in comparison with male-to-female transsexualism [2].

A review of Klein and Gorzalska [11] confirmed overall improvement in sexual functioning after SRS in transsexual men. However, so far, only studies with small sample sizes focusing on sexual health in postoperative transsexual men are available. Also, most of those studies only focused on one topic of sexual health (mainly orgasm) [12] or sexual health was only a part of the outcome [10,13–16].

The objective of this cross-sectional study was to provide single-center, follow-up data on the quality of life and sexual functioning of transsexual men after SRS. Extensive data on sexual functioning in a relatively large group of transsexual men after phalloplasty, almost all performed by the same surgical team, is as yet not available.

Methods

Study Population

All Dutch-speaking transsexual men who underwent SRS between 1987 and 2009 at our hospital ($N = 79$) were invited by letter, in which they were asked to confirm their participation by telephone or electronic mail. Two participants could not be reached because of change of address.

Those who did not reply in due time (1 month) were contacted by telephone, and if not reachable, a voice message was left as a reminder. If necessary, potential participants were contacted a second time. A total number of 47 persons agreed to participate in the study, which included a full-day hospital visit, resulting in a response rate of 64%. Three transsexual men, informed by other participants, offered to participate in the study resulting in a final study population of 50 participants.

The first year after SRS is often called the honeymoon period; a period that does not represent a realistic picture of long-term sexual and psycho-

logical status. Therefore, we excluded one participant, who was only 9 months after SRS, resulting in a final study population for the current paper of 49 participants.

All participants underwent sex reassignment surgery (hystero-oophorectomy and mastectomy) at least 1 year before inclusion in this study. On average, participants were 8 years after SRS, with a minimum of 2 years and a maximum of 22 years. All started hormonal therapy at least 2 years before SRS. Nine participants underwent metoidioplasty, but the majority ($N = 8$) proceeded for phalloplasty afterward. Thirty-eight participants chose immediately phalloplasty, whereas two persons had not yet made up their minds about having further genital surgery.

Study Procedures

Those who agreed to participate in the study received questionnaires on their quality of life, physical, and sexual health by regular mail. Subsequently, they were invited to the University Hospital Ghent, Belgium between November 2009 and April 2010 for further evaluation. This included a fasting morning blood sample, dermatological, urological, speech, bone, and body composition evaluations—data that will be reported in other publications.

This study complied with the recommendations of the declaration of Helsinki and was approved by the Ethical committee of the Ghent University Hospital, Belgium.

Main Outcome Measures

Mental and Physical Health

Self-perceived physical, social, and mental health was measured using the Dutch version of the Short Form-36 Health Survey (SF-36). This questionnaire contains 36 questions with fixed response choices, organized in eight scaled scores, based on the weighted sums of the questions in their section. These scores were converted into a 0–100 summary score for each section: vitality, physical functioning, bodily pain, general health, physical role functioning, emotional role functioning, social role functioning, and mental health, with higher scores indicating higher levels of well-being [17,18]. Internal consistency with the SF-36 was high (Cronbach's $\alpha = 0.81$).

A self-constructed questionnaire pertaining medical history, current and post-hormonal treatment, medication use, and smoking habits was

completed. Information was compared with data from medical files for accuracy.

Sexual Functioning

A self-constructed questionnaire concerning sexual functioning was completed; two versions (one for participants with a partner and another one for participants without a partner) were constructed. They were requested to take the previous month as reference, except for the questions that specifically refer to the time before SRS or hormone therapy.

Participants currently not in a partnership reported on following subjects: sexual orientation before and after SRS, marital status, frequency of masturbation before and after SRS (five-point scale from never to daily), how often they were able to reach orgasm during masturbation before and after SRS (five-point scale from never to almost always, or not applicable), difficulty to achieve orgasm through masturbation (five-point scale from impossible to not difficult), change in orgasmic feeling after SRS (no or yes and description in case of affirmative); before SRS use of vagina and clitoris during masturbation (five-point scale from never to almost always, or no masturbation), vaginal involvement during sexual activities before and after hormone therapy (three-point scale: no, yes touching, yes penetration, or not applicable). Comparison of sexual arousal before and after SRS (five-point scale from much higher to much lower).

Additional questions were answered by participants in a partnership on mean relationship duration, gender of partner, sexual satisfaction with their partner (five-point Likert scale from very unsatisfied to very satisfied, or not applicable), frequency of sexual communication, frequency of sexual arousal with partner, frequency of sexual activities with partner, whether they enjoyed carressing or to be caressed, whether they sometimes try to avoid sexual activity, after SRS use of erection prosthesis for penetration, frequency of pain during penetration, frequency of orgasm during sexual intercourse (five-point scale from never to almost always, or not applicable), difficulty to achieve orgasm through sexual intercourse (five-point scale from impossible to not difficult).

The self-constructed questionnaire had been subjected to a pilot study in two phases. In a first phase, a draft of the questionnaire was reviewed by a panel of three experts in GID. In a second phase, in-depth, qualitative interviews were set up with five volunteers, all being postoperative transsexual

men. The remarks on both phases were integrated in the final version of the questionnaire.

Surgical Results

Satisfaction with hysterectomy, ovariectomy, mastectomy, phalloplasty, and erection prosthesis was evaluated by the participants on a five-point Likert scale from very unsatisfied to very satisfied. Participants were asked whether they had experienced surgical complications (yes or no), and if so, to give a description of specific complications.

Statistical Analysis

The normal distribution of all variables was tested by the Kolmogorov–Smirnov one-sample test. Variables with a normal distribution were described in terms of mean and standard deviation and in terms of median, first, and third quartiles otherwise. Correlations were calculated with Spearman correlation coefficient. For categorical variables, differences were calculated with χ^2 tests when the conditions were met, otherwise, a Fisher exact test was used. In case of a nonparametric distribution, differences between groups were compared with Mann–Whitney tests. Paired samples for categorical variables were compared with McNemar tests. Internal consistency within a set of items was assessed through Cronbach's alpha metric. For all analysis, valid cases are shown per item, and missing values were excluded.

PASW 18.0 software package (SPSS Inc., Chicago, IL, USA) was used; a *P* value < 0.05 was considered to indicate statistical significance; all *P* values were two-tailed.

Results

Participant's Characteristics

General characteristics are summarized in Table 1.

Table 1 Patient characteristics

	Mean \pm SD	Range
Age (years)	37 (8.2)	22–54
Age at time of SRS (years)	30 (8.2)	16–49
Weight (kg)	68.04 (11.6)	45.0–98.5
Length (cm)	164.74 (6.7)	147.4–183.9
BMI (kg/m ²)	25.17 (3.9)	18.3–34.0
Active smoking (%)	34.7	
Stopped smoking (%)	38.8	
Metaidoplasty (%)	18.4	
Phalloplasty (%)	93.9	
Erection prosthesis (%)	65.3	
Testosterone therapy (%)	100	

Descriptives are presented as mean \pm SD.

SD = standard deviation; SRS = sex reassignment surgery; BMI = body mass index.

Thirteen participants were reported to have one or more chronic disease(s): autoimmune hypothyroidism (*N* = 3), hypercholesterolemia (*N* = 2), obesity (*N* = 2), hypertension (*N* = 3), liver function problems (*N* = 2), migraine (*N* = 2), epilepsy, primary hyperparathyroidism, colitis ulcerosa, psoriasis, Graves's disease, chronic fatigue syndrome, and unspecified disease (*N* = 1).

Current cross-sex hormone substitution was not standardized, even if almost all were treated by the same endocrinologist and consisted of: intramuscular testosterone treatment (parental testosterone esters 250 mg/2 or 3 weeks; *N* = 34; testosterone undecanoate 1,000 mg/12 weeks; *N* = 7) and transdermal testosterone gel (50 mg daily; *N* = 7). One participant used both oral testosterone undecanoate 40 mg (daily) and transdermal testosterone gel 50 mg daily.

Physical and Mental Health

The SF-36 questionnaire was completed by all but two participants (*N* = 47). As shown in Table 2, 3 of the 8 summary scores/subscales were found to be significantly different than those obtained in a

Table 2 SF-36 scores compared with a general Dutch sample [19]

	Transsexual men (<i>N</i> = 47)	Dutch men (<i>N</i> = 976)	Dutch women (<i>N</i> = 976)	<i>P</i> (men)	<i>P</i> (women)
Physical functioning	85.9 (15.0)	85.4 (21.0)	80.4 (24.2)	0.795	0.015*
Role-physical	83.3 (33.2)	78.7 (34.1)	73.8 (38.5)	0.338	0.052
Bodily pain	75.8 (20.8)	77.3 (22.7)	71.9 (23.8)	0.617	0.192
General health	70.9 (19.4)	71.6 (20.6)	69.9 (20.8)	0.807	0.715
Vitality	62.1 (20.7)	71.9 (18.3)	64.3 (19.7)	0.002**	0.475
Social functioning	85.5 (19.5)	86.0 (21.1)	82.0 (23.5)	0.847	0.220
Role-emotional	83.0 (34.1)	85.5 (29.9)	78.5 (35.7)	0.609	0.361
Mental health	72.6 (19.2)	79.3 (16.4)	73.7 (18.2)	0.020*	0.690

Data are presented as mean \pm SD.

**P* < 0.05 level

***P* < 0.01 level

SD = standard deviation

Table 3 Sexual relationship parameters

		N	%
Currently in relationship (N = 49)	Yes	31	(63.3)
	No	18	(36.7)
Sexual orientation (N = 49)	(Mainly) attracted to females	42	(85.7)
	Bisexual	2	(4.1)
	(Mainly) attracted to males	5	(10.2)
Gender of partner (N = 31)	Heterosexual woman	24	(77.4)
	Homo/bisexual woman	4	(12.9)
	Homo/bisexual man	1	(3.2)
	Heterosexual man	0	(0)
	Male-to female transsexual person	2	(6.5)
Frequency of sexual activities with partner (N = 27)	Never	6	(22.2)
	Less than monthly	0	(0)
	Once or twice monthly	13	(48.1)
	Several times weekly	8	(29.6)
	Daily	0	(0)
Sexual satisfaction with partner (N = 28)	Very unsatisfied	3	(10.7)
	Unsatisfied	2	(7.1)
	Neutral	5	(17.9)
	Satisfied	9	(32.1)
	Very satisfied	9	(32.1)

large sample of Dutch-speaking, community-dwelling men or women [19].

Participants who underwent phalloplasty with (N = 32) or without (N = 14) erection prosthesis did not score differently in one of the subscales (data not shown).

Those currently not involved in a relationship (N = 18 or 36.7%) did not score significantly different on physical and mental component summary scores compared with the group currently involved in a relationship (N = 31 or 63.3%) (Mann–Whitney test; $P = 0.522$ and $P = 0.634$). Participants currently in a relationship had a tendency to score higher on social component summary scores (Mann–Whitney test; $P = 0.054$).

If participants were in a relationship, physical functioning, mental health, and general health were not related with sexual satisfaction ($P = 0.848$; $P = 0.239$; $P = 0.758$) whereas vitality was ($r = 0.505$; $P = 0.007$).

Relationship and Sexual Functioning

Data on sexual orientation and relationship characteristics are summarized in Table 3.

The vast majority of the participants who had a stable relationship expressed their satisfaction with their relational and sexual life. When participants felt more sexually satisfied in their current relationship, they more frequently experienced sexual pleasure with their partner ($r = 0.535$; $P = 0.004$) and experienced more sexual arousal and orgasm during sexual intercourse ($r = 0.485$; $P = 0.009$ and $r = 0.400$; $P = 0.035$). Greater sexual satisfaction with the current partner was also correlated with

increasing frequency of communication about sex ($r = 0.412$; $P = 0.029$) and with less frequently avoiding sex ($r = 0.569$; $P = 0.002$).

No difference was observed between participants who underwent phalloplasty with or without erection prosthesis in frequency of getting aroused easily (Fisher exact test; $P = 0.91$), sexual satisfaction with partner (Fisher exact test; $P = 0.12$) and frequency of sexual activities with partner (Fisher exact test; $P = 0.64$).

Sexual Functioning before and after Hormone Therapy

The majority of the participants recalled (N = 31; 64.6%) to masturbate before hormone therapy (data not shown). One participant reported always vaginal involvement during masturbation; whereas most (N = 18) (almost) never included the vagina during masturbation. The others used the vagina half of the time (N = 1) or less than half of the time (N = 8). Three participants did not answer this question.

Use of clitoris and vagina during sexual intercourse before and after hormone therapy (but before SRS) is shown in Table 4. After hormone therapy, use of the clitoris during sexual intercourse did not change significantly (McNemar $P = 0.261$), whereas we found a tendency toward less frequent involvement of the vagina after start of cross-sex hormone therapy (McNemar $P = 0.061$).

Sexual Arousal, Orgasm, and Masturbation after SRS

Seventeen percent of the participants expressed they were (almost) always easily aroused, whereas

Table 4 Sexual functioning before and after hormone therapy

	Before	After	<i>P</i> *
Use of clitoris during sexual intercourse	(N = 47)	(N = 46)	
Not sexually active	10 (21.3)	9 (19.6)	0.261
No	15 (31.9)	14 (30.4)	
Yes, only touching	6 (12.8)	6 (13.0)	
Yes, stimulation	16 (34.0)	17 (38.3)	
Use of vagina during sexual intercourse	(N = 47)	(N = 44)	
Not sexually active	10 (21.3)	9 (20.5)	0.061
No	21 (44.7)	25 (56.8)	
Yes, only touching	4 (8.5)	5 (11.4)	
Yes, penetration	12 (25.5)	5 (11.4)	

Results are shown as N (%).

*McNemar Test.

50% of the participants were easily aroused half of the time during the past month (Table 5). Sixty-five percent mentioned being aroused (much) faster than before hormone therapy in contrast with two participants (4.4%) who expressed being much slower aroused (data not shown).

Autosexual behavior after SRS was frequent and increased significantly after SRS (McNemar; $P = 0.019$). Based on retrospective findings, 35.4% of the participants expressed to masturbate weekly

to daily before hormone therapy. Seventeen percent masturbated monthly, 12.5% masturbated less than once a month, and 35.4% expressed not to masturbate before hormone therapy. After SRS, 59.6% expressed to masturbate weekly or daily (Table 5).

Almost all were able to attain orgasm by masturbation post SRS. Of those who were sexually active with their partners, only one participant mentioned not being able to achieve orgasm during intercourse, while during masturbation he was (almost) always orgasmic. The majority of the group reported the orgasmic feelings had changed after SRS, describing a higher intensity of the orgasm. Two participants who were anorgasmic before SRS, mentioned to be orgasmic after SRS. In contrast, one participant reported the loss of capacity to achieve orgasm after SRS.

No difference was observed between participants who underwent phalloplasty with or without erection prosthesis in sexual arousal, orgasm, or masturbation after SRS (Table 5).

Surgical Results

Almost all participants were very satisfied with breast removal and hysterectomy/ovariectomy.

Table 5 Sexual arousal, orgasm, and masturbation after SRS in the past 4 weeks

	Total (N = 49)	Erection prosthesis (N = 32)	Phalloplasty No erection prosthesis (N = 14)	<i>P</i> *
Frequency of masturbation (N = 47)				0.80
Never	5 (10.6)	4 (12.9)	1 (7.7)	
Less than monthly	2 (4.3)	2 (6.5)	4 (30.8)	
Monthly	12 (25.5)	5 (16.1)	6 (46.2)	
Weekly	22 (46.8)	16 (51.6)	2 (15.4)	
Daily	6 (12.8)	4 (12.9)	2 (15.4)	
Frequency of getting aroused easily (N = 47)				0.98
(Almost) never	3 (6.4)	2 (6.5)	1 (7.7)	
Less than half of time	10 (21.3)	7 (22.6)	2 (15.4)	
Half of time	23 (48.9)	14 (45.2)	7 (53.8)	
More than half of time	3 (6.4)	2 (6.5)	1 (7.7)	
(Almost) always	8 (17.0)	6 (19.4)	2 (15.4)	
Ability to achieve orgasm through masturbation (N = 43)				0.33
(Almost) never	3 (7.0)	2 (7.1)	1 (8.3)	
Less than half of time	3 (7.0)	0 (0)	2 (16.7)	
Half of time	5 (11.6)	4 (14.3)	1 (8.3)	
More than half of time	3 (9.3)	3 (10.7)	1 (8.3)	
(Almost) always	28 (65.1)	19 (67.9)	7 (58.3)	
Ability to achieve orgasm through sexual intercourse with the partner (N = 28)				0.51
Not applicable (no sex)	5 (17.9)	2 (11.6)	3 (37.5)	
(Almost) never	1 (3.6)	1 (5.6)	0 (0)	
Less than half of time	2 (7.1)	1 (5.6)	1 (12.5)	
Half of time	4 (14.3)	3 (16.7)	1 (12.5)	
More than half of time	4 (14.3)	4 (22.2)	0 (0)	
(Almost) always	12 (42.9)	7 (38.9)	3 (37.5)	
Experience of change in orgasmic feelings after SRS (N = 43)				0.89
Not applicable (no orgasm)	7 (16.3)	5 (17.9)	2 (16.7)	
Yes	28 (65.1)	18 (64.3)	7 (58.3)	
No	8 (18.6)	5 (17.9)	3 (25.0)	

Results are shown as N (%).

*Fisher exact test comparison phalloplasty with or without erection prosthesis
SRS = sex reassignment surgery

Table 6 Satisfaction with surgical results

	Hysterectomy/ ovariectomy (N = 49)	Mastectomy (N = 49)	Phalloplasty (N = 46)	Erection prosthesis (N = 32)
Very unsatisfied	0.0	4.1	0.0	3.6
Unsatisfied	0.0	0.0	2.2	14.3
Neutral	4.1	2.0	8.9	14.3
Satisfied	4.1	2.0	31.1	46.4
Very satisfied	91.8	91.8	57.8	21.4

Data are presented as %.

Two men, however, were very dissatisfied because of disfiguring thoracic scars (Table 6).

The vast majority of participants who had undergone phalloplasty expressed they were very satisfied or satisfied with the surgical results. Twenty-five participants reported having one or more postoperative complications after phalloplasty. Most frequently they suffered from urethrostenosis (N = 13), infections at the ent or donor site (N = 7), and fistulization (N = 11).

Participants who experienced complications after phalloplasty (N = 25) did not score differently on following parameters of sexual outcome: frequency of sexual activities with partner, frequency of masturbation, frequency of getting aroused easily, and difficulty to achieve orgasm through masturbation and sexual intercourse (data not shown). Furthermore, they did not score differently on general sexual satisfaction with partner (χ^2 tests; $P = 0.955$). Satisfaction with phalloplasty was also not correlated with sexual satisfaction with the partner ($r = -0.48$; $P = 0.818$).

Of the participants who had undergone erection prosthesis, 67.8% was very satisfied or satisfied. Half of the participants (N = 16) suffered from one or more postoperative complications such as incorrect positioning (N = 3), a non-functioning prosthesis (N = 5), infection (N = 6), and or leakage (N = 3).

Experiencing complications of an erection prosthesis was not associated with differences on frequency of sexual activities with partner, frequency of masturbation, frequency of getting aroused easily, difficulty to achieve orgasm through masturbation and sexual intercourse (data not shown). Also, they did not score differently on general sexual satisfaction with partner (Fisher exact test; $P = 0.688$). However, satisfaction with erection prosthesis was correlated with a greater sexual satisfaction with the partner ($r = 0.538$; $P = 0.026$).

Furthermore, transsexual men with prosthesis had a tendency to experience more pain during

penetration than participants who underwent phalloplasty without erection prosthesis (Fisher exact test $P = 0.057$).

Discussion

General Physical and Mental Health

In accordance with the current data, most published follow-up studies on transsexual men indicate a satisfying quality of life after SRS [8,9,14–16,20–22]. Generally, most scored well on self-perceived health in our study. We did find significant differences in vitality and mental health summary scores as compared with a reference Dutch sample of community dwelling men, but in comparison with a sample of community dwelling women, this difference did not remain significant. This is in accordance with a previous study from our research group [20], where no differences on psychological complaints between both transsexual women and transsexual men and a reference Belgian population (men and women) were found.

Transsexual men scored significantly better on self-perceived physical functioning than community-dwelling women, possibly because of testosterone effects [23].

Participants currently involved in a relationship had a tendency to score better on social functioning in comparison with participants without relationship, consistent with previous studies [24,25].

Relationship and Sexual Functioning

In general, most participants reported an improvement in sexual well-being. The vast majority described an increase in sexual arousal and in frequency of masturbation after SRS. These observations are in line with the findings from De Cuypere et al. [9] and Cohen-Kettenis et al. [15] but differ from Smith et al. [16] who found that adolescent transsexual men (mean age 21 years) did not masturbate frequently after SRS. Nevertheless, these authors also reported an increase, or

at least no change, in frequency of self-stimulation after SRS. The increase in masturbation could be related to an increase in sexual desire because of relief of their gender dysphoria or to the effect of testosterone therapy. Currently, there is no evidence to confirm the presumed association between testosterone and sexual desire in transsexual men. In line with previous studies, most transsexual men were able to attain orgasm [9,11–16]. Comparison of our results with other literature is difficult as most of our participants underwent phalloplasty, a surgical technique that is not easily available. Furthermore, most of the previous studies did not report the possibility of orgasm by way of sexual stimulation or used different rating scales.

The majority of previous studies have focused on orgasm as the postoperative outcome of excellence for sexual health. We could indeed confirm that the ability to attain orgasm is correlated with sexual satisfaction, but other factors such as sexual communication and frequency of sexual activities were shown to be as important.

Sexual Functioning before and after Hormone Therapy

Little is known about the sexual activities of transsexual persons before cross-sex treatment, and we have the clinical impression that often a hypo-sexual status is assumed. This is in contrast with our retrospective findings, indicating that the majority is sexually active before and after starting cross-sex hormone therapy. Interestingly, more than a quarter expressed to have used the vagina for penetration before starting hormone therapy. These findings reveal that sexual functioning plays an important role in the lives of many transsexual persons, even before any hormonal intervention. Therefore, during the diagnostic phase of transition, special attention should be given toward sexual practices and expectations, sexual functioning, and the expected changes after starting sex reassignment therapy [9,10].

Surgical Results

In accordance with other studies, our data showed that transsexual men were mostly satisfied with the surgical results.

At our center, metoidioplasty is often seen as an intermediate stage in SRS, and because of the easy access to the phalloplasty procedure, most of them chose to proceed with phalloplasty afterward. Comparison of both groups for sexual outcome was therefore impossible in this cohort.

In this study, we found no differences between participants who underwent phalloplasty with or without erection prosthesis on self-perceived quality of life, sexual satisfaction with partner, frequency of sexual arousal, orgasm, and masturbation after SRS. Participants with erection prosthesis had a tendency to experience more pain during penetration. During phalloplasty, the free forearm flap is connected with two nerves, one of two dorsal clitoral nerves for erogenous sensation and the ilioinguinal nerve for proprioception. The latter is probably responsible for pain during intercourse. Pain may also be explained by an exaggerated pressure of the erectile device on the free forearm flap or by irritation of the pubic bone at the place of fixation during intercourse. However, this pain is counterbalanced by the extra stimulus over the clitoral nerve because the phallus will be more sensitive when stretched over the cylinder of the erectile device. Nevertheless, the results of our study challenge the need for an erection prosthesis, especially in the light of the high complication and reintervention rates [26,27]. However, previous research found that sexual expectations were more met in participants with an erection prosthesis [9]. We believe that the choice for erection prosthesis should be determined individually, considering both patients' sexual expectations, especially the desire of the patient or the couple to have penetrative sexual activity, and possible complications.

Although more than half of the participants experienced one or more postoperative complications, most of them were (very) satisfied with their surgical outcome. Comparison of participants with or without complications did not reveal significant differences in sexual outcome or sexual satisfaction. However, surgical satisfaction with erection prosthesis was correlated with sexual satisfaction. This is in line with earlier results indicating that the rating of the surgical result does not only depend on the occurrence of complications or the aesthetic result, but postoperative satisfaction extends also to other aspects related to long-term improvement on quality of life and change in social role [5,9,10,28].

A first limitation of our study is the selection bias of our sample. As in all follow-up studies, participants who agreed to this study may have a more favorable outcome than those who refused to participate. Nevertheless, the response rate is relatively high with 64% of those contacted willing to participate in a study that required a full-day hospital visit. The cross-sectional design of the study

is a second limitation. The nature of the design implies that we could not compare data before hormone therapy and SRS with data from later treatment phases. Items on preoperative sexual functioning were therefore investigated by participants' recollection about their sexual history, which may be influenced by later events. Also, Belgium has a rather tolerant society, and there is well-organized health insurance available for most, which may account for the positive results on quality of life. We are aware that this is not always the case in other countries. Finally, postoperative sexual functioning is partly dependent on the quality of life and satisfaction with surgery, and may thus differ from center to center.

Conclusions

In conclusion, the data of the current study confirm the findings from other retrospective follow-up studies, indicating that most transsexual men generally have a good quality of life and experience a satisfactory sexual functioning after sex reassignment surgery.

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