

# Hysterectomy and sexual (dys)function: An analysis of sexual dysfunction after hysterectomy and a search for predictive factors

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## Hysterectomy and sexual (dys)function: An analysis of sexual dysfunction after hysterectomy and a search for predictive factors

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### ABSTRACT

**Objectives:** : Research about sexual function after hysterectomy is inconclusive. Possible predictive factors for sexual (dys)function are yet to be identified. The aim of this study is to assess the effect of hysterectomy on sexual function in women 3 and 12 months after hysterectomy for benign indications. Furthermore hypothesized predictive factors will be evaluated.

**Study Design:** : A prospective multicentre cohort study with follow-up at 3 and 12 months after hysterectomy was performed. To assess sexual function a short-form FSFI was used, a score  $\leq 19$  means sexual dysfunction). Linear mixed model repeated measure analysis was used to assess changes in sexual function in women who were sexually active at all three measure points (N = 260). Linear mixed model analyses were also used for the predictor analyses.

**Results:** : The FSFI score increased from 20.94 at baseline to 23.81 at 12 months post hysterectomy. The number of women experiencing sexual dysfunction was 86 (33.1%). Women without preoperative sexual dysfunction had a significantly higher FSFI score 4.5 (95% CI 3.5–5.6) one year after the operation than women indicating sexual dysfunction before surgery. Women who were living alone had a significantly higher FSFI score of 2.31 (0.7–4.0) when compared to women who were married or living together.

**Conclusion:** : FSFI score increases significantly after hysterectomy, which indicates a better sexual function after the operation. Sexual dysfunction before hysterectomy (FSFI score  $\leq 19$ ) and being married or living together are predictive factors for a lower FSFI score post hysterectomy.

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### Introduction

#### Hysterectomy

There is a growing interest in the effect of a hysterectomy on sexual function in women. In the Netherlands in 2010 a total of 14 447 hysterectomies were performed [1]. Hysterectomy is one of the most frequently performed major gynaecological surgery in women worldwide [2–4]. 70% of the hysterectomies are performed on benign indication [5]. Hysterectomy can be performed using a vaginal, laparoscopic and abdominal approach or a combination of techniques [6,7].

#### Female sexual dysfunction

Sexual function after hysterectomy can be a concern of women undergoing hysterectomy and may be a cause of anxiety prior to surgery [8]. Female sexual functioning is a complicated process and not fully understood. Female sexual dysfunction (FSD) is defined accordingly to the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV) [9,10]. The definition of the DSM-IV is used because of debate on the definition of female sexual dysfunction as used in the yet published DSM-V.

#### Female sexual dysfunction after hysterectomy

Until present, research remains inconclusive about the effect of hysterectomy on sexual functioning. There are several general hypotheses about how hysterectomy can cause FSD. Hysterectomy results in loss of the uterus, cervix and upper part of the vagina, which reduces vasocongestion and thus may reduce arousal [11]. Another hypothesis is that hysterectomy disrupts the blood

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circulation to the pelvis, which impairs an adequate lubrication-swelling process [12]. It is thought that hysterectomy interrupts nerve supply, causing a reduction of sensibility, which can lead to lack of arousal and lubrication. Also, formation of scar tissue in the upper part of the vagina can prevent full ballooning of the vagina, which could cause diminished arousal. Lastly, absence of the cervix may lead to diminished lubrication [13].

Psychological factors like depression, surgical fear, sexual dysfunction at baseline and negative expectations could be predictive for a worse Female Sexual Function Index (FSFI) score due to an association between physical and psychological factors [14]. We theorise that a state of wellbeing leads to a better FSFI short form score.

## Methods and materials

A prospective multicentre cohort study was performed in one academic hospital and three teaching hospitals in the Netherlands: the Maastricht University Medical Centre+ (MUMC+), The Catharina Hospital (CzE) Eindhoven, the Máxima Medical Centre (MMC) Veldhoven from September 2010 till January 2014, from May 2012 the Orbis Medical Centre (OMC) Sittard-Geleen also participated.

The local Medical Ethical Committee gave approval and all participants gave informed consent. This study was registered at the Dutch Trial Register under number NTR2702.

Baseline characteristics were obtained one week before surgery. Three and twelve months after the surgery participants were asked to fill out questionnaires about their sexual functioning and recovery. Two previous articles on physical and psychological recovery based on this cohort were published [15,16].

### *In- and exclusion criteria*

Patients were informed about the study at their preoperative screening. A week later patients were contacted and asked for participation. Patients were included if they were aged between 18 and 65 years, had good knowledge of the Dutch language, were planned for elective hysterectomy for benign indication and had given written informed consent. All surgical approaches with or without oophorectomy were included. Patients were excluded if they had a history of cancer, illiteracy or cognitive impairment.

### *Data management*

Data were collected prospectively, participants received a reminder by post if they had not returned questionnaires. Validated questionnaires were used and were designed in concurrence with the centre for data and information management, MEMIC Maastricht. When completed, MEMIC scanned and data were provided directly into Statistical Package for the Social Sciences, SPSS format.

If patients did not undergo hysterectomy or if they reported malignancy during the follow-up period they were excluded from the follow-up analysis.

### *Baseline and predictor values*

Patients received the questionnaire and informed consent form with a pre-stamped envelope two weeks prior to hysterectomy. This package consisted of questions about socio-demographic variables, gynaecological history, whether women were sexually active, health behaviour, general health status and comorbidity. Also outcome expectancy, surgical fear, depression, well-being and childhood abuse were investigated. Expectations about the effect of hysterectomy on feelings of femininity and whether hysterectomy would mean a relief or a loss were assessed on basis of two

tailored items [17,18]. The surgical Fear Questionnaire (SFQ) was used to assess surgical fear. The Centre for Epidemiological Studies – Depression (CES-D) questionnaire was used to assess depression [19].

### *Outcome measure*

Sexual function was measured with the FSFI [20]. This is a self-report questionnaire consisting of 19 items, which assessed 6 aspects of sexual functioning in women; desire, arousal, lubrication, orgasm, satisfaction and pain. The psychometric properties of the Dutch version of the FSFI appear to be good [21]. This study used the validated 6-item short form. The score ranges from 2 to 30 points. A higher score means a better sexual function. When the score is  $\leq 19$  we classified it as FSD. This cut-off point has a sensitivity of 96.1 %, a specificity of 90.9 %, and a negative predictive value of 92.6 % [22].

### *Statistical analysis*

Statistical analyses were performed with IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk. We report the baseline data of 428 women that completed all three questionnaires and 260 women who were sexually active at all three time points. Further analyses of sexual function included the sexually active women. Numerical data are presented as mean and standard deviation (SD) and categorical data as number.

Data were checked for normality in terms of skewness and kurtosis and visually by histogram. To quantify average changes in sexual function (FSFI-scores) over the three time points, we used the linear mixed model (LMM) functionality of SPSS with a repeated measures indication, time point as a fixed factor and a random intercept. The optimal covariance structure for repeated measures was based on the Akaike's Information Criterion (AIC). Results are presented as an absolute estimate with 95 %-confidence interval for FSFI-score at 3 and 12 months, relative to the baseline FSFI-score.

To assess the influence of previously reported determinants of sexual function on our estimates for FSFI-score at 12 months follow-up, we performed a multivariate LMM analysis. Potential determinants that were associated with FSFI-score in a univariate analysis at a significance level of  $p < 0.1$  were included in the multivariate model.

## Results

A total of 517 patients were included, who provided informed consent. We obtained baseline data from 486 patients, 428 patients completed all three questionnaires. At baseline 341 of the total 428 patients, (79.7 %) were active at baseline. At 3 months 339 (79.2 %) and at 12 months 296 women (69.2 %) were sexually active.

Baseline characteristics are provided for the patients who completed all three questionnaires and for the 260 patients who were sexually active at all three measure points, see Table 1. These data show that almost one third of the patients needed psychological support and one fifth of the patients were classified as depressed according to the CES-D before their hysterectomy. Most patients expected the hysterectomy to be a relief. Vaginal hysterectomy is the most performed procedure and bleeding problems were the most prevalent indication.

Table 2 shows the prevalence of sexual dysfunction and the mean FSFI scores at all three measure points of women that were sexually active at all the measurements.

The number of patients experiencing sexual dysfunction halves at 3 and 12 months as compared to before hysterectomy, mean FSFI score increases over time.

**Table 1**  
Baseline characteristics.

Baseline measures		Baseline sample (N = 428)	Patients who were sexually active at all three measurements (N = 260)
Centre	MUMC+	121 (28.3 %)	75 (28.8 %)
	CzE	154 (36.0 %)	89 (34.2 %)
	MMC	115 (26.9 %)	74 (28.5 %)
	OMC	38 (8.9 %)	22 (8.5 %)
Age at day of surgery (years)		46,9 (7,1)	46,2 (6,9)
Native country: The Netherlands		401 (93.7 % [1])	246 (94.6 % [1])
Marital status: married or living together		363 (84.8 % [2])	235 (90.4 % [1])
Employment: Paid job		308 (72.0 % [2])	203 (78.1 %)
Education	No education	11 (2.6 %)	2 (0.8 %)
	Lower education	54 (12.6 %)	28 (10.8 %)
	Intermediate education	249 (58.2 %)	149 (57.3 %)
	Higher/university education	113 (26.4 %)	80 (30.8 %)
	Missing data	1 (0.2 %)	1 (0.4 %)
General health	Very poor/ poor	5 (1.2 %)	3 (1.2 %)
	Moderate	77 (18.0 %)	40 (15.4 %)
	Very good/ good	345 (80.6 %)	217 (83.5 %)
	Missing data	1 (0.2 %)	0
Body Mass Index (kg/m <sup>2</sup> )		26,5 (4,9)	26,3 (4,8)
Psychological problems needing support		122 (28.5 % [3])	70 (26.9 % [1])
Menstruation at baseline	Yes, regular cycle	149 (34.8 %)	94 (36.2 %)
	Yes, irregular cycle	173 (40.4 %)	102 (39.2 %)
	No	98 (22.9 %)	59 (22.7 %)
	Missing data	8 (1.9 %)	5 (1.9 %)
Ever pregnant		353 (82.5 % [8])	222 (85.4 % [4])
Number of pregnancies		2,4 (1,2)	2,4 (1,1)
Number of vaginal deliveries		1,9 (1,0)	2,0 (1,0)
Smoking	Yes	97 (22.7 %)	59 (22.7 %)
	No	171 (40.0 %)	92 (35.4 %)
	Stopped	156 (36.4 %)	108 (41.5 %)
	Missing data	4 (0.9 %)	1 (0.4 %)
Expectation about hysterectomy	A relief	319 (74.5 %)	192 (73.8 %)
	Neutral	92 (21.5 %)	59 (22.7 %)
	A loss	10 (2.4 %)	6 (2.3 %)
	Missing data	7 (1.6 %)	3 (1.2 %)
Expectation of less femininity after hysterectomy	Not at all	356 (83.2 %)	224 (86.2 %)
	A bit less	57 (13.3 %)	31 (11.9 %)
	Rather much less/ very much less	10 (2.3 %)	4 (1.6 %)
	Missing data	5 (1.2 %)	1 (0.4 %)
Surgical fear short term (0–40)		16,0 (9,9)	15,5 (9,8)
Surgical fear long term (0–40)		9,3 (8,6)	9,3 (8,5)
Depression according to CES-D with cut-off $\geq 16$		102 (23.8 % [2])	52 (20.0 % [2])
Sexually abused		83 (19.4 % [7])	51 (19.6 % [3])
Physically abused		51 (11.9 % [3])	28 (10.2 % [1])
Indication hysterectomy (more than 1 possible)	Leiomyoma	139 (32.5 %)	78 (33.9 %)
	Prolapse	74 (17.3 %)	44 (16.9 %)
	Menorrhagia/ Metrorrhagia	207 (48.4 %)	126 (48.5 %)
	Dysmenorrhea	27 (6.4 %)	14 (5.4 %)
	Endometriosis/Adenomyosis	23 (5.4 %)	16 (6.2 %)
	Abdominal pain	26 (6.1 %)	18 (6.9 %)
	Cervical dysplasia	24 (5.6 %)	14 (5.4 %)
	Other	25 (5.8 %)	16 (6.2 %)
Hysterectomy type	Total	402 (93.9 %)	246 (94.6 %)
	Subtotal	23 (5.4 %)	13 (5.0 %)
	Missing data	3 (0.7 %)	1 (0.4 %)
No oophorectomy		397 (92.8 % [2])	240 (92.3 % [2])
Surgical approach	Median lower abdominal incision	23 (5.4 %)	10 (3.8 %)
	Pfannenstiel	51 (11.9 %)	32 (12.3 %)
	Vaginal	175 (40.9 %)	108 (41.5 %)
	Laparoscopic assisted Vaginal hysterectomy	92 (21.5 %)	51 (19.6 %)
	Total laparoscopic hysterectomy	87 (20.3 %)	59 (22.7 %)
Sexually active at baseline		341 (79.7 % [17])	NA
	FSFI total score at baseline	20,5 (6,7)	NA

Numbers are mean (SD) or number (%), [missing data] MUMC+: Maastricht University Medical Centre+, CzE: Catharina hospital Eindhoven, MMC: Máxima Medical Centre, Veldhoven, OMC: Orbis Medical Centre, Sittard-Geleen, FSFI: Female Sexual Function Index NA: not applicable.

Table 3 shows the effect of time on the FSFI scores, using linear mixed models. Baseline is used as intercept. The FSFI score increases significantly in time when comparing baseline to 12 months after the hysterectomy from 20.94 at baseline to 23.81 at 12 months post hysterectomy. However, there is no significant increase in FSFI score from 3 months to 12 months after surgery.

We made a prediction model for the FSFI score. Psychological problems needing support, expectation about hysterectomy, expectation about femininity, surgical fear long term, sexually abused, incision type, hospital, general health, pain before the hysterectomy and CPSP at 3 and 12 months were, according to bivariate analyses, were not significant and therefore excluded

**Table 2**

Prevalence of sexual dysfunction and mean FSFI score at baseline, 3 and 12 months of women who were sexually active at all 3 measure points (N = 260).

	Before hysterectomy	3 months post hysterectomy	12 months post hysterectomy
Sexual dysfunction (FSFI $\leq$ 19)	86 (33.1 %) [8]	45 (17.3 %) [6]	44 (16.9 %) [15]
FSFI score	20.9 (6,6)	23.5 (5.1)	23.9 (4.8)

Numbers are mean (SD) or number (%), [missing data].

FSFI: Female Sexual Function Index.

**Table 3**

Linear mixed model univariate analysis FSFI score in sexual active women (N = 260).

	FSFI Score (estimate)	95 %-Confidence Interval	
		Lower bound	Upper bound
Baseline*	20,9	20,1	21,7
3 months post hysterectomy	+2,6	1,8	3,3
12 months post hysterectomy	+2,9	2,1	3,6

FSFI: Female Sexual Function Index.

\* Reference.

from the final multivariate analysis. The multivariate analysis is presented in Table 4. Women without sexual dysfunction had a significantly higher FSFI score 12 months after hysterectomy. Women living alone had significantly higher FSFI scores than married women or those living together. In the multivariate analysis surgical fear short term, having a paid job, positive wellbeing, depression, and a history of physical abuse did not significantly influence the FSFI score.

## Discussion

The primary objective of this study was to assess the effect of hysterectomy on overall sexual function. The number of patients experiencing sexual dysfunction halved after hysterectomy. Furthermore, we found a significant increase in FSFI short form score in women who were sexually active at all three measure points after hysterectomy.

The total FSFI score almost increased with 3 points, which is clinically relevant. Bleeding problems was the most prevalent indication for surgery, we believe that surgery which resolves this is perceived as relief and therefore improves sexual function.

Our study showed that marital state and sexual function at baseline are significant predictive values for the final FSFI score. Women who had sexual dysfunction at baseline have lower FSFI short form scores after hysterectomy than women with a normal sexual function.

A surprising finding was that women who were married or living together had significant lower FSFI scores than women who

were living alone. A possible explanation is that women and their partners find it harder to break through fixed patterns, whereas women who are living alone might be more confident after surgery and therefore have a better sexual function.

The improvement in overall sexual function is in accordance with previous studies [13–16]. The short-form of the FSFI was used while other studies used the complete FSFI. Differences in total score between the FSFI short form and the complete form are minimal. The short form shows adequate sensitivity and specificity [22].

Previous studies showed that preoperative sexual problems, negative expectations and depression are predictive values for a worse sexual function after hysterectomy.

In our study existence of sexual problems are indeed a predictive value for a lower FSFI score. However, we did not find that neither negative expectations nor a depression at baseline had significant influence on the FSFI score post hysterectomy.

Previous studies suggest that a healthy relationship, good general health, no severe life stress and no financial worry may contribute advantageous for sexual function after the hysterectomy [15,20].

The strength of this study was the large prospective cohort who were evaluated at three different measure points. A linear mixed model repeated measure analysis was used to analyze every individual alone and adjust for their individual differences. We performed one of the first large studies that evaluated predictors for FSFI score after hysterectomy. Earlier suggested predictors were hypothetical and not fully confirmed by research.

**Table 4**

Linear mixed model, final multivariate analysis (N = 247).

Reference is 12 months post hysterectomy FSFI score 20.60 [18.2–23.0]	FSFI Score (estimate)	95 %-Confidence Interval	
		Lower bound	Upper bound
Married/living together	Reference		
Living alone	<b>2.31</b>	<b>0.7</b>	<b>4.0</b>
Paid job	Reference		
No paid job	–0.6	–1.8	0.6
Depression according to CES-D (score $\geq$ 16)	Reference		
No depression according to CES-D (score <16)	0.01	–1.4	1.4
Physical abused	Reference		
Not physical abused	1.2	–0.3	2.8
Sexual dysfunction at baseline according to FSFI short form (score $\leq$ 19)	Reference		
No sexual dysfunction at baseline according to FSFI short form (score >19)	<b>4.5</b>	<b>3.5</b>	<b>5.6</b>
Surgical Fear short term	–0.1	–0.1	0.0
Low positive wellbeing according to W-BQ12 (score <8)	Reference		
High positive wellbeing according to W-BQ12 (score $\geq$ 8)	–0.5	–1.6	0.6

Women who were sexual active at baseline, 3 and 12 months post hysterectomy were analyzed. This may have created selection bias and a more positive outcome. However, it is debatable if questions about sexual function are reliable when women are not sexual active.

This study revealed insight in sexual function before and after a hysterectomy. With the results of this study gynaecologists are better prepared for questions from their patients and can counsel their patients better.

ore research is needed, our population was a heterogeneous population with pre- and postmenopausal women and presence of concomitant procedures as bilateral salpingo-oophorectomy and removal of the cervix. A more homogeneous population would be favourable for further research.

## Conclusion

This study shows that the prevalence of sexual dysfunction halves and FSFI score significantly increases after hysterectomy, which indicates a better sexual function. Predictive factors for a worse FSFI score post hysterectomy are sexual dysfunction before hysterectomy (FSFI score  $\leq 19$ ) and being married or living together.

FSFI: Female Sexual Function Index, CES-D: Centre for Epidemiological Studies – Depression, W-BQ12: 12-item well-being questionnaire. Significant Estimates in bold.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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