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Contraception, Menstruation, and Sexuality after Bariatric Surgery: a Prospective Cohort Study

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Abstract

Background Women with a history of bariatric surgery are recommended to avoid pregnancy at least 12 months after surgery. Evidence on the impact of bariatric surgery on contraception, menstrual cycle, and sexuality in the first year postoperative is therefore indispensable.

Objectives The objective of this paper is to prospectively study changes in contraception, menstrual cycle and sexuality in women of reproductive age following bariatric surgery.
Setting The study was conducted in two secondary medical centers and a tertiary academic medical center.

Methods Women attending for bariatric surgery or who recently underwent bariatric surgery completed online questionnaires about contraception, menstrual cycle, and sexual behavior before surgery and 6 and 12 months after surgery.

Results The study included data from 71 women, including 70 and 47 women at 6 and 12 months after bariatric surgery, respectively. Preoperatively, 43.6% (n = 31/71) used a short-acting hormonal contraceptive, the usage of which decreased significantly to, respectively, 32.8% (n = 23/70; p = .031) and 27.7% (n = 13/47; p = .022) 6 and 12 months post-surgery. Usage of long-acting contraceptive methods increased from 26.7% (n = 19/71) preoperatively to 38.6% (n = 27/70; p = .021) and 42.6% (n = 20/47; p = .004) at 6 and 12 months. Combined oral contraceptives (COC) remained used (39.4% preoperatively, 27.1 and 14.9% at 6 and 12 months postoperatively). Menstrual cycle (frequency, pattern, duration of the cycle, and the menstruation itself) and sexual behavior (intimate relationship, frequency of intercourse, and satisfaction) did not differ significantly before and after surgery.

Conclusions Women undergoing bariatric surgery appear to switch their type of contraceptive from oral, short-acting hormonal contraceptives to non-oral, long-acting contraceptives. No changes in menstrual cycle and sexual behavior were shown.

Keywords Bariatric surgery · Contraception · Menstruation · Sexuality

Introduction

The global impact of obesity is well known. Currently, bariatric surgery is the most effective and sustainable intervention for severe obesity [body mass index (BMI) ≥ 40 kg/m2] and the number of bariatric procedures has increased over the last decade, most of the patients being women of reproductive age [1, 2].

In a proportion of patients, subfertility is the main reason why women opt for bariatric surgery [3]. However, it is recommended for women not to become pregnant during the

first 12 to 18 months after surgery [2, 4, 5]. This period is associated with rapid weight loss, poor nutritional status, and postoperative complications, which could impact the pregnancy [2, 4]. A recent retrospective study [6] showed a higher complication rate (of prematurity, neonatal intensive care unit admission, and small for gestational age status) in infants of mothers who underwent bariatric surgery within 2 years prior to giving birth. These risks attenuate over time and approach the baseline population risk within 2 to 3 years after surgery [6]. There is evidence that weight reduction after bariatric surgery improves fertility rates [2, 4, 7]. Concurrently, evidence on contraceptive use and effectiveness is crucial as un- intended pregnancies are not rare after bariatric surgery [2, 8, 9]. The efficacy of combined oral contraceptives (COC) is questioned in the light of reduced absorption capacity and side effects as vomiting and diarrhea due to bariatric surgery [10]. More reliable non-oral contraceptives, such as levonorgestrel intrauterine device (LNG–IUD), are being proposed by health counselors [11]. Despite the need for reliable contraceptives and associated advice and counseling, female patients are not routinely referred to obstetricians after surgery [12, 13]. Bariatric surgeons have been found to be uncomfortable in addressing perioperative contraceptive needs of female bariat- ric patients [12, 14] Studies concerning menstrual cycle and sexuality remain poor.

The majority of the present data tends towards improved fertility after surgical weight loss. But most studies investigated the impact on pregnancy, not on menstrual cycle, or were performed in women with PCOS and consisted of a very small sample size [2].

Data concerning sexual behavior (frequency of intercourse, sexual desire and arousal, orgasm, and satisfaction) after surgically induced weight loss are inconclusive. Some studies show a positive impact on some aspects of sexual behavior while others find no connection between BMI and sexual demeanor [15]. Some studies using behavioral therapy instead of surgery to achieve weight loss found a positive impact of weight loss on sexual behavior. Possibly not only weight loss, but also an increased self-perception and self-confidence could explain this [2]. The evidence on contraceptive use and safety following bariatric surgery is limited in particular small retrospective cohort studies and few pharmacokinetic observational studies [10]; and studies concerning menstrual cycle and sexuality remain poor.

The aim of this study is to prospectively examine the use of contraceptives together with characteristics of the menstrual cycle and sexual activities in bariatric surgery patients of re- productive age, before, 6 and 12 months following surgery.

Methods

Women between 18 and 45 years old who had planned or had undergone a bariatric procedure were recruited between December 2012 and December 2015 as part of an ongoing multicenter prospective cohort study entitled AURORA (bAriatric sUrgery Registration in wOmen of Reproductive Age; www. aurorastudy.org/en). The methodology of this study is described in detail somewhere else [16].

In short, women within the current study were included at the University Hospitals Leuven and the General Hospitals St- Jan Bruges and St-Niklaas. Inclusion criteria were women aged 18–45 years old having internet connection and email. Infertile women (e.g., women with a hysterectomy or already in menopause) were excluded. There were two periods of recruitment; before surgery or within the first year after surgery. Follow-up of the participants being included before surgery was completely prospective; data from participants included after surgery were partially retrospective for the measurements before surgery and prospective for the measure- ments 6 and 12 months after surgery.

Data on contraception use, menstrual cycle, and sexuality were obtained before surgery and 6 and 12 months after surgery by using questionnaires developed specifically for the study. These were based on the standard care of the Obstetrical and Gynecology department of the University Hospitals Leuven, and are made available in Table 5. Validation of these questionnaires was not deemed necessary, as they are only used for descriptive analysis and not for diagnostic purposes. Questionnaires were sent by email from an online data platform. Questions on contraception included: counseling by a gynecologist, contraceptive method used, and compliance or other related problems. To evaluate menstrual cycle; amenorrhea or oligomenorrhea, the cycles per year, pattern (regular/irregular), length of the menstrual cycle, duration of the bleeding days and intermenstrual blood loss were questioned. If women stated to be in an intimate relationship, participants were asked about their sexual behavior: frequency of intercourse, sexual satisfaction, and sexual problems. Retrospective questions not asked at women recruited postoperative were frequency of sexual intercourse and sexual satisfaction in the preoperative period, since these seem to be too susceptible for recall bias. When multiple contraceptive methods were reported, the method with the highest Pearl Index was recorded. Sociodemographic data were also obtained by email: age (between 18 and 45 year), ethnicity (European, North African, African, Afro- American, Indian, Middle east…), level of education (elementary school, middle school, high school, college, university), professional (student, part time job, full time job, housewife, disabled, job applicant, other), and marital (partner and children, partner and no children, one parent family, living alone, living with parents) state. Participants recruited preoperatively who did not reply to the 6 months postoperative questionnaire were excluded. Participants recruited postoperatively who did not respond to the preoperative questionnaires were excluded as well.

Statistical analyses were performed using SPSS Statistics [23]. Normality of continuous variables was examined using Shapiro-Wilk test. The McNemar test was used for comparison of variables before surgery with 6 and 12 months after surgery. The level of significance was defined as $P < .05$.

This study was approved by the central Ethical Committee of the University Hospitals of Leuven and all local Ethical Committees [16].

Results

Study Population

Figure 1 illustrates the different periods of recruitment and dropouts during the study. Data were obtained from 71 women preoperatively, from 70 women at 6 months postoperatively and from 47 women at 12 months post- operatively. As stipulated in the method section, there were two periods of recruitment. A total of 57 women were recruited before surgery (Inclusion Moment one, IM 1) and 43 women after surgery (Inclusion Moment two, IM 2).

From the 57 women included before surgery, 23 completed the questionnaires 6 and 12 months after surgery; 39 women only completed the questionnaires 6 months after surgery and one woman only the questionnaires 12 months after surgery. In total, 17 women were excluded as no postoperative information was available. As shown in Fig. 1, one woman had an un- intended pregnancy 3 months after surgery. Before sur- gery she used a progestin only pill (POP). The contraceptive method used after surgery was unknown.

From the 43 women recruited after surgery, all of them completed the questionnaires 6 months postoperative; only 23 women completed the questionnaires 6 and 12 months

following surgery. Preoperative data were collected retrospectively from 31 of the 43 women. The main reason to refuse participation and for withdrawal of consent was lack of time (n = 53/134; 39.5%).

Sociodemographic data from the participants are shown in Table 1. The mean age was 31 years. About 90% of the women underwent a laparoscopic Roux-en- Y gastric bypass (LRYGB). Approximately 6% had a sleeve gastrectomy and from 4% it is not known which kind bariatric surgery they had. The mean reported weight loss 6 months following surgery was 34.9 kg (SD = ±7.2) and at 12 months following surgery 43 kg (SD = ±9.6). The majority of the women were multiparous (69%), did not obtain a degree of higher education (62%), and were in part or fulltime employment (73%).

Contraception

The contraceptive methods used at the different moments are shown in Table 2.

Of those women using some contraceptive method, oral contraceptives were used by 40.8% (n = 29/71) of the women preoperatively; there was a significant decrease to 28.5% (n = 20/70; P = .021) at 6, and 19.2% (n = 9/47; P = .003) at 12 months following surgery. Non-oral methods were LNG- IUD, implant, progestin only injection, sterilization, the vaginal ring and condoms. Preoperatively, these methods were used by 38% (n = 27/71) of the women, six months postoperative by 54.3% (n = 38/70; P = .007) and after twelve months by 53.3% (n = 25/47; P = .021) (Table 2).

Short-acting hormonal contraceptive methods declined from 43.6% (n= 31/71) preoperative to 32.8% at six months (n = 23/70; P = .031) and 27.7% at twelve months (n = 13/47; P = .022) after surgery. Simultaneously, a significant increase was seen in the use of long-acting contraceptive methods: these were used by 26.7% (n = 19/71) of the women before surgery and by 38.6% (n = 27/70; P = .021) and 42.6% (n = 20/47; P = .0.004) of the women six and twelve months after surgery.

Thirty-one percent (n = 22/71) of the women had been informed about contraception. Ten out of eighteen women (14%) said they had been informed by their gynecologist pre-operatively and claimed that they were not counseled six months later. Three women (4%) were informed postoperatively (data not shown).

Menstruation

No significant differences were found in menstrual frequency, pattern, cycle and duration before and after surgery (Table 3).

Sexuality

As shown in Table 4, no significant changes were stated in intimate relationship, frequency of sex and sexual satisfaction.

Discussion

Contraception

Contraceptive use preoperatively of the women in the study was comparable to that of the general Belgian population [17]. Despite the fact that these women are a specific subpopulation, this group is considered representative towards contraceptive use in women of reproductive age.

Most studies [1, 9, 18–20], advises a highly effective, non- oral and preferable long-acting contraceptive method to avoid pregnancy at least 12 months post-surgery. After bariatric surgery there is an improvement in fertility rates and the effectiveness of the most used contraceptive, COC, is doubtful due to reduced absorption capacity and side effects such as vomiting and diarrhea [2, 4, 10]. In our study, more women used a non-oral and long-acting contraceptive method postoperatively.

The postoperative usage of oral contraceptives (COC and POP) decreased in the current study, similar to the study of Ginstman et al. [18]. Both studies did not find a significant increase in other contraceptive methods post-surgery, but in our study, there is a shift towards long-acting and non-oral contraceptive methods. The lack of significance might be due to a type II error in this relatively small study sample. No other studies reported data on this finding. We propose several reasons for this tendency. Firstly, probably more women had a gynecological examination and advice on appropriate contraceptive use after bariatric surgery provided by their gynecologist or general practitioner preoperatively compared to 1 year postoperatively, because they had an annual check-up or were counseled for another health problem. Our population may not be representative, as patients may have become more aware of the importance of contraceptive use by completing multiple questionnaires regarding this subject, and subsequently sought medical advice (Table 5).

Secondly, the shift may be a reflection of a general tendency in the Belgian population towards long-acting contraceptive use [17].

As claimed by others [12, 18] and confirmed in this study, obese women attending for bariatric surgery are inadequately counseled considering contraceptive methods. This may be due to the fact that bariatric surgeons do not always feel comfortable in addressing perioperative contraceptive needs of female bariatric patients [12, 14]. This issue requires addressing for two main reasons. Firstly, there is an increased risk of pregnancy in the postoperative period, and secondly due to prolonged immobilization with surgery, there is already an increased risk for venous thromboembolism, and estrogen- containing contraceptives in the perioperative period increase this risk even more [1, 10, 21].

Menstruation

The majority of the present data trends towards improved fertility after surgical weight loss [2]. We therefore expected some changes in menstrual pattern; however, this was not seen in our study, perhaps due to the relatively small sample size or the fact that we did not discriminate between women with PCOS and those without PCOS.

Few studies about the impact of surgical weight loss on menstrual pattern and cycle can be found. Most studies investigated the impact on pregnancy or were performed in women with PCOS and consisted of a very small sample size [2]. Obesity or insulin resistance is known to play a key role in PCOS. Therefore, weight loss can decrease menstrual irregularities, achieve a more constant ovulatory pattern, and im- prove fertility [4]. Eid et al. [22] showed an improvement of menstrual irregularities and dysfunction after bariatric surgery. Compared to our study, there was a smaller sample size (24 women), all women had PCOS and it was performed retrospectively. In our study, we did not examine whether women obtained a more regular menstrual pattern, and perhaps were suffering from PCOS preoperatively. This

could explain the difference between both studies. Teitelman et al. found that 71.4% of patients who were anovulatory before surgery regained normal menstrual cycles after surgery. This difference in results could be explained by a difference in definition of irregular menstruations, as they classified all women with a menstrual cycle >35 days, or receiving oral contraceptives, as anovulatory. Furthermore, their study was performed entirely retrospectively. There was also a difference in the studied populations, as the mean preoperative BMI in the group of Teitelman et al. was 52 kg/m2 and the time since surgery was a mean 37.5 months [23].

Sexuality

We could not demonstrate a significant change in sexual activity nor behavior. Some considerations could be made on how the survey has been done. First, frequency of sexual intercourse is very susceptible to recall bias, as respondents often desire to give a socially acceptable answer. Furthermore, frequency is not an adequate indicator of quality. Finally, sex and sexual satisfaction was not defined in the questionnaires and there- fore was free for interpretation.

In the literature, conflicting data of female sexual activity based on weight differences can be found. The 2002 National Survey of Family Growth (NSFG) found that sexual behavior differs little between women of different BMI categories [15]. It was pointed out that clinicians may assume that obese women engage less frequently in sexual contacts. Because of this prejudgment, contraceptive counseling may be approached differently, making these women at risk for unintended pregnancy or sexually transmitted infections.

A prospective study of 29 women [24] demonstrated a significant increase of sexual behavior, especially arousal and desire, 12 months after bariatric surgery. Other studies also point to an improved sexual behavior after surgery [2]. Other studies demonstrated an improvement of sexual behavior after non-surgical weight loss. Women in those studies received behavioral therapy. Even though the degree of improvement correlated with the magnitude of weight reduction, it is possible that behavioral therapy next to weight reduction was a determining factor for this improvement. Weight reduction would make women feel more confident about their weight, but behavioral therapy might have had an impact on the way they feel about their appearance and self-image [2].

Limitations

Although the response rate was quite high, this study consists of a relatively small sample size, with a dropout rate of 34% over 1 year. We chose to also include patients receiving oral contraceptive pills in our analyses of the menstrual cycle in order to increase the sample sizes of the (sub)groups. Furthermore, there may be some selection bias due to the fact that respondents who were more comfortable with the topic may have been more likely to respond to the online questionnaire. There is also a recall bias for some part of the results, due to the retrospective questions that were asked at the wom- en recruited postoperatively. Finally, sexual orientation was not observed within our study, which could affect the number of women needing contraception.

Conclusion

This study addressed changes in contraception, menstrual cycle, and sexuality in women who underwent bariatric surgery. Contraceptive counseling was rare following bariatric surgery. COC usage decreased significantly in the first year following surgery, but did not lead to a significant increase in the usage of a specific other contraceptive method. However, a significant change from oral to non-oral contraceptives and from short-acting to long-acting hormonal contraceptives was found after surgery. Slightly more women appeared to have a regular menstrual pattern and shorter duration of bleeding days, although this was not significant. Sexual behavior and satisfaction remained unchanged after bariatric surgery in these women.

Contribution to Authorship

Author 1 performed the analysis on the results of the study and drafted the manuscript. Author 2, Author 5, and Author 12 have made substantial contributions to the design of the study and have been involved in drafting the manuscript. Author 3 advised in analyses of results and drafting of the manuscript. Author 4, Author 6, Author 7, Author 8, Author 9, Author 10, and Author 11 have been involved in revising it critically for important intellectual content. All authors read and approved the final version.

Compliance with Ethical Standards

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This study was approved by the central Ethical Committee of the University Hospitals of Leuven and all local Ethical Committees.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Conflict of Interest

The authors declare that they have no conflict of interest.

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Fig 1 Time of inclusion and response to data collecting. IM 1, first moment of inclusion was preoperative. Fifty-seven women participated, after 6 months, 17 dropped out and after 12 months, another 15 women dropped out, one woman did not respond at 6 months but she did at 12 months. IM 2, second moment of inclusion was up to 6 months postoperative. Forty-three women completed the questionnaire the first time (at 6 months), 12 women dropped out because there was no preoperative data and 23 of the 31 women still participated at 12 months.

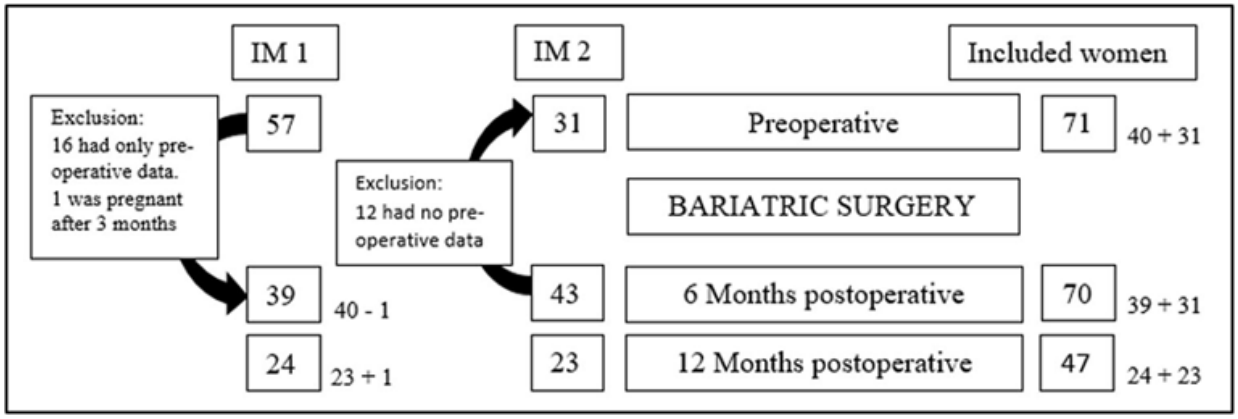

Table 1 Characteristics of the 71 women

Age (years)	31	(18–43)	Marital situation		
			Partner and children	40	(56.3%)
BMI (kg/m^2)			Partner and no children	11	(15.5%)
Preoperative	42.0	(34.4–64.5)	One parent family	8	(11.3%)
6 months postoperative	29.6	(23.7–42.0)	Living alone	6	(8.5%)
12 Months postoperative	26.7	(21.9–36.3)	Living with parents	6	(8.5%)
Type of bariatric surgery			Education		
LRYGB[a]	64	(90.1%)	Elementary school (<12 years)	5	(7.0%)
Sleeve gastrectomy	4	(5.6%)	Middle school (12–15 years)	8	(11.3%)
No data	3	(4.2%)	High school (15–18 years)	31	(43.7%)
			College	24	(33.8%)
Center			University	3	(4.2%)
University Hospital Leuven	7	(9.9%)			
General Hospital St-Jan Bruges	58	(81.7%)	Professional Situation		
General Hospital St-Nikolaas	6	(8.4%)	Student	6	(8.5%)
			Part time job	15	(21.1%)
Ethnicity			Full time job	37	(52.1%)
White European	69	(97.2%)	Housewife	2	(2.8%)
North African	1	(1.4%)	Disabled	6	(8.5%)
No data	1	(1.4%)	Job applicant	4	(5.6%)
			Other	1	(1.4%)
Parity					
Null parity	22	(31%)			
Parity	49	(69%)			

Values are presented as median (range) or number (%)

[a] LRYGB means laparoscopic Roux-en-Y gastric bypass

Table 2 Contraceptive methods used before and after surgery

Contraceptive	Preoperative, *n* = 71 *n* (%)	6 months postoperative, *n* = 70 *n* (%)	Sign[1]	12 months postoperative, *n* = 47 *n* (%)	Sign[2]
Longer-acting contraceptives			*P* < .05		*P* < .01
LNG IUD[a]	13 (18.3)	15 (21.4)	*P* = NS	8 (17.0)	*P* = NS
Implant	1 (1.4)	2 (2.9)	*P* = NS	2 (4.3)	*P* = NS
Progestin only injectable	1 (1.4)	4 (5.7)	*P* = NS	4 (8.5)	*P* = NS
Sterilization	4 (5.6)	6 (8.6)	*P* = NS	6 (12.8)	*P* = NS
Short-acting hormonal contraceptives			*P* < .05		*P* < .05
Any oral contraceptive	29 (40.8)	20 (28.5)	*P* < 0.05	9 (19.2)	*P* <0.01
Combined oral contraceptives	28 (39.4)	19 (27.1)	*P* < .05	7 (14.9)	*P* < .01
Progestin only pill	1 (1.4)	1 (1.4)	*P* = NS	2 (4.3)	*P* = NS
Vaginal ring	2 (2.8)	3 (4.3)	*P* = NS	3 (6.4)	*P* = NS
Morning after pill	0 (0)	0 (0)	/	1 (2.1)	/
Orther contraceptives					
Condoms	6 (8.5)	8 (11.4)	*P* = NS	2 (4.3)	*P* = NS
None	15 (21.1)	12 (17.1)	*P* = NS	12 (25.5)	*P* = NS

NS stands for not significant

[1] Preoperative contraceptives vs. 6 months post-surgery contraceptives, using McNemar test [2] Preoperative contraceptives vs. 12 months post-surgery contraceptives, using McNemar test [a] LNG IUD means levonorgestrel

Table 3 Menstruation frequency, pattern and menstruation before and after surgery

Menstruation	Preoperative, *n* = 71 of 70 (%)	6 months postoperative, *n* = 70 (%)	Sign[1]	12 months postoperative, *n* = 47 (%)	Sign[2]
Frequency	*n* = 71				
≥ 8×/year	45 (63.4)	46 (65.7)	*P* = NS	34 (72.3)	*P* = NS
< 8×/Year	11 (15.5)	12 (17.1)	*P* = NS	5 (10.6)	*P* = NS
Amenorrhea	15 (21.1)	12 (17.1)	*P* = NS	8 (17,0)	*P* = NS
Pattern	*n* = 70				
Very regular (within 3–4 days)	30 (42.9)	27 (38.6)	*P* = NS	20 (42.5)	*P* = NS
Regular (within 5–7 days)	9 (12.9)	15 (21.4)	*P* = NS	11 (23.4)	*P* = NS
Irregular	16 (22.9)	16 (22.9)	*P* = NS	8 (17.1)	*P* = NS
Amenorrhea	15 (21.4)	12 (17.1)	*P* = NS	8 (17.0)	*P* = NS
Cycle	*n* = 70				
≤ 24 days	7 (10.0)	10 (14.3)	*P* = NS	6 (12.8)	*P* = NS
25–31 days	36 (51.4)	32 (45.7)	*P* = NS	26 (55.3)	*P* = NS
32–39 days	4 (5.7)	4 (5.7)	*P* = NS	3 (6.4)	*P* = NS
≥ 40 days	0	4 (5.7)	/	3.(6.4)	/
To irregular	8 (11.4)	8 (11.4)	*P* = NS	1 (2.1)	*P* = NS
Amenorrhea	15 (21.4)	12 (17.1)	*P* = NS	8 (17.0)	*P* = NS
Duration of menstruation	*n* = 71				
< 3 days	8 (11.3)	8 (11.4)	*P* = NS	7 (14.9)	P= NS
3–4 days	23 (32.4)	33 (47.1)	*P* = NS	22 (46.8)	*P* = NS
5–7 days	23 (32.4)	15 (21.4)	*P* = NS	10 (21.3)	*P* = NS
> 7 days	2 (2.8)	2 (2.9)	*P* = NS	0	/
Amenorrhea	15 (21.1)	12 (17.1)	*P* = NS	8 (17.0)	*P* = NS

NS stands for not significant

1 Preoperative vs. 6 months post-surgery

2 Preoperative vs. 12 months post-surgery, both using McNemar test

Table 4 Intimate relationship, frequency of sex, and satisfaction with sex life before and after surgery

Sexuality	Preoperative, *n* = 71 of 40	6 months postoperative, *n* = 70	Sign[1]	12 months postoperative, *n* = 47 (%)	Sign[2]
Intimate relationship	*n* = 71	*n* = 70		*n* = 47	
Yes	56 (78.9)	58 (82.9)	*P* = NS	37 (78.7)	*P* = NS
No	15 (21.1)	12 (17.1)	*P* = NS	10 (21.3)	*P* = NS
Frequency of Sex	*n* = 40	*n* = 68		*n* = 47	
Not in an intimate relationship	8 (20.0)	12 (17.6)	*P* = NS	10 (21.3)	*P* = NS
≤ 1×/month	0	1 (1.5)	/	4 (8.5)	/
2–3×/month	9 (22.5)	14 (20.6)	*P* = NS	9 (19.1)	*P* = NS
1×/week	12 (30.0)	23 (33.8)	*P* = NS	11 (23.4)	*P* = NS
2–3×/week	9 (22.5)	8 (11.8)	*P* = NS	10 (21.3)	*P* = NS
> 3–4×/week	2 (5.0)	7 (10.3)	*P* = NS	3 (6.4)	*P* = NS
Satisfaction	*n* = 36	*n* = 65		*n* = 43	
Strongly disagree	4 (11.1)	6 (9.2)	*P* = NS	3 (7.0)	*P* = NS
Disagree	3 (8.3)	2 (3.1)	*P* = NS	5 (11.6)	*P* = NS
Neutral	5 (13.9)	17 (26.2)	*P* = NS	7 (16.3)	*P* = NS
Agree	14 (38.9)	18 (27.7)	*P* = NS	12 (27.9)	*P* = NS
Strongly agree	10 (27.8)	22 (33.8)	*P* = NS	16 (37.2)	*P* = NS

NS stands for not significant

1 Preoperative vs. 6 months post-surgery

2 Preoperative vs. 12 months post-surgery, both using McNemar test

Table 5

A comprehensive overview of the used questionnaires (translated from Dutch)

Contraception use Questionnaire

1. Were you referred to an obstetrician/gynaecologist for counselling/explanation/assistance regarding contraceptives?

2. Are you currently using a contraceptive?

Were you using a contraceptive prior to surgery?

3. Which contraceptive(s) do you currently use? Which contraceptive(s) did you use prior to surgery?

4. What is or are the brand name(s) of the contraceptives you use?

5. Do you sometimes you forget to take a pill?

6. How often do you forget to take a pill?

Menstrual cycle Questionnaire

Have you had a menstrual period in the last 6 months?

Have you had a menstrual period in the last 6 months prior to your surgery?

2. How many menstrual periods do you have on average per year (= 12 months)?

How many menstrual periods did you have on average per year (= 12 months) prior to surgery?

3. How would you describe the pattern of your menstrual cycle?

How would you describe the pattern of your menstrual cycle prior to surgery?

4. What is the usual time span (in days) between two menstrual periods?

What was the usual time span (in days) between two menstrual periods prior to surgery?

5. How long do your menstrual bleedings last (= number of days of bright red blood loss)?

How long did your menstrual bleedings last

(= number of days of bright red blood loss) prior to surgery?

6. Do you sometimes have bleeding in-between your menstrual bleedings?

Did you sometimes have bleeding in-between your menstrual bleedings prior to surgery?

7. Do you have pain during menstrual periods (e.g. abdominal cramps)?

If so, do you take painkillers for this?

8. Have you ever undergone treatment for reduced fertility (e.g. fertility medication)?

What kind of treatment?

Sexuality Questionnaire

1. Are you currently in an intimate relationship?
2. How often, on average, do you have sexual intercourse with your partner?
3. Are there any difficulties or problems during intercourse? Please specify