

Sexual functioning and psychological well-being after uterine artery embolization in women with symptomatic uterine fibroids

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Objective: To assess the effects of uterine artery embolization (UAE) on psychological and sexual well-being 3 months after treatment.

Design: Prospective study.

Setting: Large teaching hospital in Tilburg, the Netherlands.

Patient(s): 141 Premenopausal women with symptomatic uterine fibroids.

Intervention(s): UAE for symptomatic fibroids.

Main Outcome Measure(s): Changes in scores on a questionnaire concerning sexual well-being (ranging from 0 to 32, a higher score indicating better functioning) and a questionnaire concerning psychological well-being (SCL-90, ranging from 0 to 360, a higher score indicating more emotional and somatic concerns).

Result(s): The total score for sexual functioning showed a statistically significant increase from 20.3 to 22.7, 3 months after UAE, indicating that sexual functioning improved. Thirty-four percent and 37% of women reported an increase in sexual activity and desire. The percentage of women reporting sexual problems of lubrication, orgasm, or pain decreased 7%, 36%, and 14%, respectively. The total SCL-90 score showed a statistically significant decrease from 133 to 116, 3 months after UAE, indicating a decrease in emotional and somatic concerns.

Conclusion(s): Sexual and psychological well-being improved significantly 3 months after UAE in women with symptomatic uterine fibroids. Sixty-eight percent had an increase in the total score for sexual functioning. Problems with sexual functioning were statistically significantly decreased. (Fertil Steril® 2008; ■:■-■. ©2008 by American Society for Reproductive Medicine.)

Key Words: Uterine fibroids, leiomyomas, uterine artery embolization

Uterine fibroids are common benign tumors in women of childbearing age. When fibroids were symptomatic, women used to ask for medical or surgical therapies such as hysterectomy (1). More recently, women are seeking minimally invasive, uterus-sparing therapies such as uterine artery embolization (UAE) and magnetic resonance guided focused ultrasound (MRgFUS) to treat symptomatic uterine fibroids (2, 3). One of the reasons why women want to preserve their uterus is because hysterectomy might have negative effects on sexual well-being (4), although the literature on this issue is not conclusive (5–9). Little is known about sexual functioning after UAE (10–13). Furthermore, the effect of UAE on patients' psychological well-being and the relation to clinical symptoms is unknown.

Our study determined the effects of UAE on sexual and psychological well-being. Sexual functioning, psychological

well-being, and clinical symptoms were assessed before and 3 months after UAE. In addition, possible associations between baseline characteristics, psychological well-being, sexual well-being, and clinical symptoms were assessed.

MATERIALS AND METHODS

Consecutive women awaiting UAE (n = 195) were asked to participate in this prospective study. A total of 165 (85%) women agreed to participate. The treatments were completed between June 2002 and January 2005 at St. Elisabeth Hospital in Tilburg, the Netherlands. The study was approved by the medical ethics committee of St. Elisabeth Hospital, Tilburg, as required by Dutch law. We obtained informed consent from all women.

Included were women with symptomatic uterine fibroids and an indication for hysterectomy who had been treated extensively (medical or surgical) without sufficient clinical result. This also included women with a (latent) wish to conceive who did not, therefore, want hysterectomy. The symptoms were divided into three groups: bleeding problems (menorrhagia, with or without anemia), pain (dysmenorrhea, dyspareunia, abdominal pain, back pain, and leg pain), and

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bulk-related problems (pelvic pressure, urinary frequency, and constipation).

Excluded were postmenopausal or pregnant women, women with already infarcted and/or calcified uterine fibroids (visualized with contrast-enhanced magnetic resonance imaging [MRI] as avascular fibroids), any gynecologic infection, pure adenomyosis (without any fibroid), or thin-stemmed pedunculated fibroids with a stalk diameter less than one third of the fibroid diameter (detected using MR imaging in three orthogonal planes). The latter were excluded because of the possibility of detachment of the fibroid into the abdominal or uterine cavity, and the risk of infection after UAE. Moreover, thin-stemmed pedunculated fibroids can be treated more easily with myomectomy, and thus this is the preferred treatment.

Twenty-two women were excluded because they did not meet the inclusion criteria (pedunculated fibroid [n = 9], endometrial carcinoma [n = 1], pure adenomyosis [n = 3], endometritis [n = 1]) or because they had refrained from the embolization treatment (n = 8). Another two women were excluded because they needed additional surgical treatment (both myomectomy) in the follow-up period (3 months after the first embolization). Thus, a total of 141 women were included in the analysis.

All women were examined by a gynecologist, and pelvic MRI was performed at baseline and at 3 months after UAE to confirm the diagnosis of uterine fibroids and to measure the size of the uterus and the dominant fibroid. The formula for a prolate ellipse ($L \times W \times D \times 0,5233$) was used, as described by Orsini et al. (14).

Questionnaires

The women were asked to fill in three questionnaires: a questionnaire concerning sexual dysfunction, the Symptom Checklist 90 (SCL-90), and a symptom-related questionnaire. The questionnaires were sent to the patient and were completed before the embolization treatment and 3 months after treatment.

The questions concerning sexual dysfunctions (Table 1) were selected from the Questionnaire for Screening Sexual Dysfunctions (QSD) (15, 16), a self-report questionnaire used to detect sexual dysfunctions that has been used in several studies (9, 17). Research on the validity of this instrument is available (18). There are questionnaires for different kinds of sexual relationships available: for men and women with a female partner, a male partner, and without a partner. We used the questionnaire for women with a male partner. The QSD consists of 36 questions determining the presence, frequency, and experienced discomfort of sexual dysfunctions. The first 16 questions concern the general perception of the patient's own sexuality and frequency of sexual activity. The next 18 questions concern different types of problems during sexual activity. From the first part, we selected two questions to measure the frequency of desire for sexual contact and the frequency of sexual

TABLE 1

Questions concerning sexual dysfunction.

- How often did you experience sexual desire?
 How often were you sexually active?
 Problems with vaginal lubrication:^a
- How often was your vaginal lubrication less than desired?
 - How often was your vaginal lubrication shorter than desired?
- Problems with orgasm:^a
- How often did you reach an orgasm during sexual activity?
- Problems with genital pain:^a
- How often, before, during, or after sexual activity did you experience pain or an unpleasant sensation in your genital area?

^a A problem was regarded as present when at least one of the questions concerning the problem was scored with "several times," "often," or "every time," with the exception of the question concerning the frequency of orgasm for which a problem was regarded as present when "several times," "sometimes," or "hardly ever" was scored.

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activity measured on a 7-point Likert scale ranging from 0 (hardly ever) to 6 (several times a day), and from the latter part we selected four questions concerning the presence of sexual dysfunctions.

Two questions about vaginal lubrication and one about genital pain were scored on a 5-point Likert scale ranging from 0 (always) to 4 (hardly ever); one question about reaching an orgasm was scored on a 5-point Likert scale ranging from 0 (hardly ever) to 4 (always). These questions were used to identify patients having problems with lubrication, orgasm, or genital pain. These items were selected as they were considered to be influenced most by UAE. We considered a problem to be present when a patient scored at least one of the questions concerning the specific problem with "several times," "often," or "every time," except for the question concerning the frequency of orgasm. In this instance, a problem was considered to be present when "several times," "sometimes," or "hardly ever" was scored.

The last question concerned the patient's degree of satisfaction with her present sexual life (measured on a 5-point Likert scale ranging from 0 (very dissatisfied) to 4 (very satisfied)). These questions were all related to the sexual functioning in the past month.

The seven questions together have a Cronbach's alpha coefficient of 0.68. We also calculated a total score by adding up all scores for each question. The possible score range is 0 to 32. A lower score indicates more problems in sexual functioning. Three months after the UAE, the women were asked

to indicate for each question whether the frequency of experiencing the particular issue had increased, remained equal, or decreased compared with baseline.

The SCL-90 is a multidimensional self-report inventory designed to evaluate emotional and somatic concerns (19). The questionnaire consists of 90 items with a 5-point response scale ranging from “symptom absent” to “symptom very often present.” The patient has to indicate to what extent she suffered from a particular concern in the past week. The questionnaire consists of eight subscales: agoraphobia, fear, depression, somatic concerns, insufficiency of thought and action, distrust and interpersonal sensitivity, hostility, and sleep disturbances. Every subscale can be scored separately. The scores of all subscales can also be summed to obtain a total score. The total SCL-90 score ranges between 0 to 360. A higher score indicates more emotional and somatic concerns. The questionnaire has a good validity and reliability (20, 21).

The third questionnaire was a homemade inventory of symptoms leading to UAE. Women were asked if they suffered from menorrhagia, dysmenorrhea, abdominal pain (apart from during menstruation period), pelvic pressure, dyspareunia, constipation, urinary frequency, back pain, or leg pain. These symptoms were selected as being the most reported symptoms by women with symptomatic uterine fibroids. For each of nine items, women could indicate whether the symptom was present or not. This questionnaire has a good internal consistency with a Cronbach's alpha coefficient of 0.72. Three months after the UAE, women had to indicate whether their symptoms had worsened, had improved, or were unchanged. We calculated the percentage of symptoms that improved for each woman.

Embolization Procedure

The UAE was performed after selective catheterization of the left uterine artery and guiding the catheter into the right uterine artery by means of the Waltman loop maneuver (22). Bilateral embolization was intended in all women. Spasms were treated with tolazoline or nitroglycerin. In women who desired future pregnancy, embolization was performed on two sides at the same time to limit radiation exposure to the ovaries. We used calibrated trisacryl gelatin microspheres (CTGM) (Embosphere and Embogold; Biosphere Medical, Roissy, France), size 500–900 microns. The angiographic embolization endpoint was a complete occlusion of branches to the perifibroid plexus, with sluggish flow in the ascending segment of the uterine artery, and leaving the main uterine artery, cervicovaginal branches, and utero-ovarian anastomoses patent.

Women were hospitalized for one night for clinical observation. Before the procedure, antibiotics (2 g cefazolin) were administered intravenously. Pain was controlled by administering 10 mg of morphine intramuscularly and a 100-mg suppository of a nonsteroidal anti-inflammatory drug (NSAID) or a patient-controlled analgesia pump. We used 4 mg of ondansetron to treat nausea. Women were advised

to refrain from sexual intercourse for a period of 6 weeks after UAE.

Statistical Analysis

Univariate analyses were used to determine the distribution of each baseline and outcome measure. Paired-samples *t*-test was used to calculate the changes in continuous variables between baseline and 3 months after UAE. When there was a skewed distribution, the nonparametric Wilcoxon signed rank test was used. Multiple regression was used to investigate associations between baseline and imaging factors and outcome measures 3 months after UAE. The variables included were age, number of fibroids, volume of the uterus and the dominant fibroid, total SCL-90 score, total score on the sexual dysfunctions questionnaire, and the total number of symptoms at baseline. $P < .05$ was considered statistically significant. Data were analyzed using SPSS 12.0 software (SPSS Inc., Chicago, IL).

RESULTS

Of the 141 women who agreed to participate, all of the questionnaires were completed by 118 (83.7%) women at baseline, and by 107 (75.9%) women after 3 months. The mean age of the participating women was 42.7 years (range: 24 to 54 years). Ninety percent of the women was white, 6% black, and 4% Asian. All women received medical treatment before UAE (oral contraceptives, progestatives, gonadotropin-releasing hormone analogs, levonorgestrel-containing intrauterine device, iron supplements, analgesics, or hemostatic agents); (hysteroscopic) myomectomy was performed in 11%, and endometrial ablation in 1.4%.

At baseline, the volume of the uterus and the dominant fibroid were 559 mL (± 461 standard deviation [SD]) and 261 mL (± 314 SD), respectively. The number of fibroids was one fibroid in 41% of women, two fibroids in 12%, three fibroids in 9%, and four or more fibroids in 38%. The procedure was performed bilateral in 138 (97.9%) of the women. Three months after UAE, the volume of the dominant fibroid and the uterus were statistically significantly reduced compared with baseline 167 mL (± 234 SD) ($P < .0005$) and to 377 mL (± 338 SD) ($P < .0005$), respectively.

Fifty percent of the women were nulliparous, and the majority of women had no wish to become pregnant in the future (68%). Sixteen percent were actively trying to become pregnant, and another 16% had a possible desire for future pregnancy.

Sexual Dysfunctions Questionnaire

At baseline, the mean total score on the sexual dysfunctions questionnaire was 20.3 (± 4.8 SD). This was statistically significantly increased 3 months after UAE to 22.7 (± 4.1 SD, $P < .0005$), indicating that sexual functioning had improved. Sixty-eight percent of the women scored higher 3 months after UAE compared with baseline. All scores on the seven

items about sexual functioning showed a statistically significant increase, except for the question about whether vaginal lubrication was less than desired (was unchanged) (see the first three columns of Table 2). The frequency of sexual activity and satisfaction with sexual functioning increased the most.

At baseline, 19% of the women had had a problem with lubrication, 47% with orgasm, and 28% with pain. Figure 1 shows the change in the percentage of women reporting sexual problems. There was a statistically significant decrease in the percentage of women reporting a problem with lubrication, orgasm, or pain ($P=.007$, $P=.002$, and $P=.024$, respectively) 3 months after UAE. As shown in the last three columns of Table 2, women indicated for each question if the frequency of the particular issue increased, remained equal, or decreased 3 months after UAE in comparison with baseline. The frequency of sexual desire, sexual activity, and satisfaction all increased after UAE. For the other issues, the results were less obvious, and most women did not report a change compared with baseline. When we considered only the women reporting an increased frequency of sexual activity ($n = 33$) compared with baseline, the results are more clear. Lubrication increased in 31%, the duration of lubrication increased in 29%, the frequency of reaching an orgasm increased in 44%, pain was reduced in 42%, and satisfaction increased in 74%.

Symptom Checklist 90

At baseline, the total SCL-90 score was 133 (± 41 SD). Three months after UAE, this score showed a statistically significant decrease to 116 (± 31 SD) ($P<.0005$). Concerning the subscale scores, there was a statistically significant reduction in the scores for agoraphobia, fear, somatic concerns, insufficiency of thought and action, distrust and interpersonal sen-

sitivity, hostility, and for sleep disturbances ($P<.005$ for all of these subscales). Only the subscale depression did not statistically significantly change after UAE.

Symptom List

The symptoms reported by women at baseline were menorrhagia in 86%, urinary frequency in 67%, dysmenorrhea in 58%, back pain in 53%, abdominal pain in 45%, pelvic pressure in 42%, leg pain in 35%, constipation in 33%, and dyspareunia in 32%. The median number of symptoms women reported was five. At 3 months after UAE, the total number of symptoms had decreased in all women. Menorrhagia was improved in 91%, urinary frequency in 76%, dysmenorrhea in 77%, back pain in 75%, abdominal pain in 86%, pelvic pressure in 97%, leg pain in 73%, constipation in 75%, and dyspareunia in 79%.

Regression Analysis

Multiple regression was used to examine the relationship between the total sexual dysfunction score, total SCL-90 score and subscales, and clinical symptoms. We corrected for age, volume of the uterus and the dominant fibroid, and the total number of fibroids. At baseline, we found a statistically significant association ($P=.001$) between the total SCL-90 score and the total score on the sexual dysfunctions questionnaire. Women who scored higher on the SCL-90 (indicating a higher level of physical and emotional concerns), reported lower sexual well-being. Three months after UAE, the association between the two questionnaires was still statistically significant ($P=.006$). The total SCL-90 score at baseline was not related to the total sexual dysfunctions score after 3 months, indicating that the baseline level of emotional and somatic concerns does not predict the outcome in sexual functioning 3 months after UAE. When we divided the total SCL-90 score

TABLE 2

Sexual functioning at baseline and at the 3-month follow up.

	Baseline	3 months	P value	Compared with baseline (%)		
				Increased	Unchanged	Decreased
Frequency of sexual desire ^a	2.8 (1.4)	3.2 (1.2)	.01	34	62	4
Frequency of sexual activity ^b	2.1 (1.3)	2.7 (1.4)	<.0005	37	57	6
Lubrication less than desired ^b	3.4 (1.0)	3.6 (0.8)	.14	16	75	9
Duration of lubrication shorter than desired ^b	3.4 (1.0)	3.7 (0.8)	.03	13	80	7
Frequency of orgasm ^c	2.6 (1.3)	3.0 (1.1)	.001	19	76	5
Pain in genital area ^b	3.0 (1.2)	3.4 (1.0)	.005	6	70	24
Satisfaction ^d	2.1 (1.4)	2.7 (1.1)	<.0005	34	58	8

^a Measured on a 7-point Likert scale ranging from 0 (hardly ever) to 6 (several times a day).

^b Measured on a 5-point Likert scale ranging from 0 (always) to 4 (hardly ever).

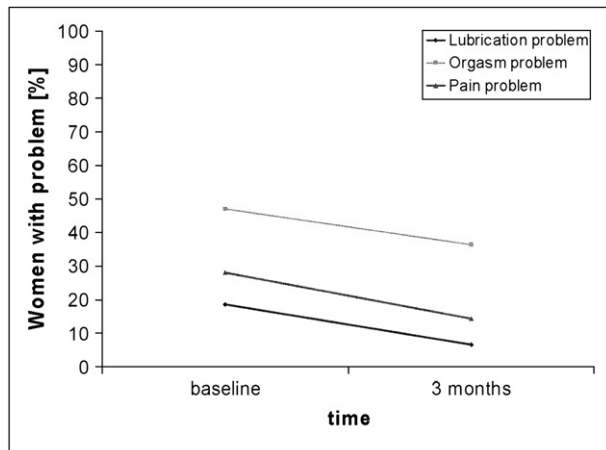
^c Measured on a 5-point Likert scale ranging from 0 (hardly ever) to 4 (always).

^d Measured on a 5-point Likert scale ranging from 0 (very dissatisfied) to 4 (very satisfied).

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FIGURE 1

Percentage of women with sexual problems.



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in subscales, we found no relation with sexual functioning between any of the subscales at baseline or 3 months after UAE.

The total number of symptoms at baseline and the symptom improvement percentages after 3 months were not associated with sexual functioning at baseline or at 3 months after UAE. The total SCL-90 score at baseline was statistically significantly ($P < .0005$) associated with the number of symptoms reported at baseline. The more symptoms women reported, the higher the total SCL-90 score, indicating a higher level of physical and emotional concerns. Three months after UAE, we found no association between the total number of symptoms at baseline or the percentage improvement of symptoms at 3 months and the total SCL-90 score. Age, the number of fibroids, and the volume of the dominant fibroid and the uterus were not found to predict scores on SCL-90 or the sexual dysfunction questionnaire at baseline or at 3 months after UAE.

DISCUSSION

We determined the effects of UAE on sexual and psychological well-being and on clinical symptoms before and 3 months after UAE. We found a statistically significant improvement in sexual functioning, psychological well-being, and physical symptoms 3 months after UAE in women with symptomatic fibroids. We found a relation between sexual and psychological well-being. Better sexual well-being was associated with better psychological well-being.

Our findings concerning sexual functioning are comparable with the scarce literature available on this subject. Hehenkamp et al. (10) compared changes in sexuality between women undergoing hysterectomy or UAE in a randomized trial. After 6 months, they found a significant reduction in sexual discomfort in the UAE group as well as a significant

improvement in sexual pleasure. The frequency of sexual activity also increased. Sexual well-being 6 months after UAE was reported as improved or the same compared with baseline in most women. Smith et al. (11) also found a significant improvement in sexual functioning after UAE.

The improvement in sexual functioning we found in our study was small but statistically significant. We do not have an explanation for this minor improvement, but we do know that sexual well-being is influenced by many factors. The improvement might be due to a decrease in physical symptoms (i.e., menorrhagia, fatigue caused by anemia, and pain); but improvement in psychological factors (i.e., body-image, depression) are likely to be influential as well. There were also women who scored lower on the questionnaire concerning sexual dysfunctions, indicating more problems. Factors that also may influence sexual functioning in a negative way are life stress in general, stress in relation to the partner, bad general health, and financial worries. However, these factors are complex and unknown, so we chose not to correct for them. Therefore, it is difficult to determine whether a change in sexual functioning (either positive or negative) can completely be assigned to UAE. The change in sexual functioning might be more pronounced when corrections are made for these items.

One of the reasons why women opt for UAE instead of hysterectomy is because they are worried that hysterectomy might have a negative impact on their sexual well-being. Masters and Johnson (23) suggested that the uterus plays a role in the physiology of the vaginal orgasm, and thus hysterectomy might have a negative effect on orgasm by eliminating the uterine contribution. Also, after hysterectomy the local nerve supply and anatomical relations of the pelvic organs are considered to be disrupted. During UAE, there is a risk of unintended nontargeted embolization of cervicovaginal branches. This may lead to ischemia or local infarction of cervical and vaginal tissue. Innervation of this area is carried out by the uterovaginal plexus. Theoretically, as suggested in a case report by Lai et al. (24), embolization of the cervicovaginal branches could lead to an alteration of perceived sensations from the pelvic organs, causing impairment in achieving orgasm, pain, and less lubrication. However, there is no evidence to support this theory.

Although there were significant reductions in problems with lubrication, orgasm, and pain, even after UAE the percentages were still quite high, with 7% of women having a problem with lubrication, 36% with orgasm, and 14% with pain. This is in contrast with the percentages that Roovers et al. (9) reported about sexual well-being after hysterectomy. They used the same questionnaire, but they did ask women whether the issue was considered as bothersome. At baseline, we found a much higher (50%) percentage of women with an orgasm problem compared with the Roovers study (30%). We chose to objectively assess the percentage of women with a problem by asking how often they experienced it; Roovers et al. (9) assessed it subjectively by asking to what extent a woman suffered from it.

Compared with baseline, there was an increase in frequency of sexual desire and sexual activity and satisfaction. Most of the other issues remained equal to baseline. When we selected only patients who reported an increased frequency of sexual desire, the change in results was more obvious. Thus, women with an increase in sexual activity showed better results on the different issues. This might be due to the fact that for women who have a higher frequency of sexual activity it is easier to determine whether each issue improved.

We used the SCL-90 to determine emotional and physical well-being. Three months after UAE, there was a statistically significant improvement compared with baseline. The SCL-90 is a reliable questionnaire to determine psychological well-being, but its length (90 items) is a disadvantage. Although the symptom list we used was a homemade questionnaire, it had good internal consistency.

A limitation of this study is that we did not include a control group. This might have been useful, especially to investigate the changes in sexual and psychological well-being in a healthy population and to compare them with a symptomatic population. Another limitation was the lack of some general characteristics among our study population, such as social status, marital status, general health, and financial worries, as these might influence psychological and sexual well-being.

We conclude that sexual and psychological well-being and clinical symptoms all statistically significantly improved 3 months after UAE in women with symptomatic uterine fibroids. Furthermore, there was a statistically significant relation between sexual and psychological well-being. Although in theory UAE might have a detrimental effect on sexual well-being, we did not find it in this study.

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