VAGINAL CHANGES AND SEXUALITY IN WOMEN WITH A HISTORY OF CERVICAL CANCER

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ABSTRACT

Background In women with cervical cancer, treatment causes changes in vaginal anatomy and function. The effect of these changes on sexual function and the extent, if any, to which they distress women are not known.

Methods In 1996 and 1997, we attempted to contact 332 women with a history of early-stage cervical cancer (age range, 26 to 80 years) who had been treated in 1991 and 1992 at the seven departments of gynecological oncology in Sweden and 489 women without a history of cancer (controls) to ask them to answer an anonymous questionnaire about vaginal changes and sexual function.

Results We received completed questionnaires from 256 of the women with a history of cervical cancer and 350 of the controls. A total of 167 of 247 women with a history of cancer (68 percent) and 236 of 330 controls (72 percent) reported that they had regular vaginal intercourse. Twenty-six percent of the women who had cancer and 11 percent of the controls reported insufficient vaginal lubrication for sexual intercourse, 26 percent of the women who had cancer and 3 percent of the controls reported a short vagina, and 23 percent of the women who had cancer and 4 percent of the controls reported an insufficiently elastic vagina. Twenty-six percent of the women who had cancer reported moderate or much distress due to vaginal changes, as compared with 8 percent of the women in the control group. Dyspareunia was also more common among the women who had cervical cancer. The frequency of orgasms and orgasmic pleasure was similar in the two groups. Among the women who had cervical cancer, the type of treatment received had little if any effect on the prevalence of specific vaginal changes.

Conclusions Women who have been treated for cervical cancer have persistent vaginal changes that compromise sexual activity and result in considerable distress. (N Engl J Med 1999;340:1383-9.)

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TREATMENT of women with cervical cancer may result in vaginal abnormalities that interfere with sexual function.[1-11] The reported frequency of abnormalities after surgery, radiotherapy, or both varies considerably: 4 to 100 percent of women have a shortened vagina[1-3,5-10] and 17 to 58 percent have reduced lubrication.[2,5,7,11] However, there are no reliable data on reductions in vaginal elasticity or genital swelling during sexual stimulation. The effects of the vaginal changes on the women's sexuality, as well as any resulting distress, have received little study.

In areas with a high frequency of screening for cervical cancer, the majority of new cases are diagnosed in middle-aged women who have early-stage cancers. These women have an excellent prognosis,[12] and most of them live for many years with the sequelae of the disease and of its treatment. We conducted a study to determine the prevalence of vaginal changes among women who had been treated for cervical cancer and the extent to which these changes affected their sexuality and caused distress.

METHODS

We attempted to enroll all 332 women under the age of 80 years with a history of early-stage (IB or IIA[12]) cervical cancer who had been treated at the seven departments of gynecological oncology in Sweden between January 1, 1991, and December 31, 1992, and who were registered and alive on November 1, 1996. We randomly selected 489 women without cervical cancer, matched for age and region of residence, from the Swedish Population Register, as a control group. Between November 1996 and May 1997, we sent these 821 women a letter explaining the objectives of the study and inviting them to participate in it. Those who did not return the enclosed response form within two weeks were telephoned. Of the 821 women, 708 agreed to be included in the study. They were then sent a questionnaire about vaginal changes and sexual function, to be answered anonymously, and a registration form to be returned separately. All information about treatment was obtained from the women in order to safeguard their anonymity. The study was approved by the Regional Ethics Committee at the Karolinska Institute.

The questionnaire, which was developed on the basis of successive in-depth interviews with patients and clinicians, was similar to our questionnaire on male sexual function.[13,14] It included 136 questions for the women who had cervical cancer and 115 questions for the controls. It was designed to assess the symptoms of sexual dysfunction, such as reduced sexual interest; altered responses to sexual arousal; vaginal shortness and inelasticity; the frequencies of intercourse and orgasm; and orgasmic pleasure. We classified painful intercourse (dyspareunia) according to the location, with "superficial" referring to the introitus, or outermost part of the vagina, and "deep" referring to the apex of the vagina or within the pelvis.

We asked about the characteristics of each symptom (frequency, intensity, duration, and quality) and the degree of distress it caused. For example, the question, "Have you noticed during the past 6 months that the moistness of your vagina (lubrication) has not been sufficient for sexual intercourse?" had the following

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possible answers: "Not relevant, I have not engaged in intercourse," "Not at all," "A little," "Moderately," and "A lot." The corresponding distress was assessed on a verbal scale of intensity[15] with the question, "If you have noticed during sexual activity that the moistness of your vagina (lubrication) was diminished during the past 6 months and if this were to persist for the rest of your life, how would you feel about it?" The possible answers were "Not relevant," "It does not distress me at all," "It distresses me a little," "It distresses me moderately," and "It distresses me a lot." Information was also collected on potential confounding and effect-modifying variables, such as level of education, occupation, employment status, prior sexual abuse, concurrent diseases and their treatment, recurrence of cancer, and estrogen-replacement therapy.

In Sweden, the standard treatment for women with early-stage cervical cancer is surgery with or without preoperative intracavitary radiotherapy, the latter at the discretion of the physician responsible. The surgery typically consists of radical hysterectomy and resection of pelvic lymph nodes. Most women with lymph-node metastases are treated postoperatively with external radiotherapy. Women who are not candidates for surgery because of advanced age or concomitant disease are treated with radiotherapy alone.

The responses to the questionnaire were dichotomized, and the results are presented as relative risks, calculated as the proportion of women who had cervical cancer reporting the particular problem divided by the proportion of controls reporting it. Estimated relative risks and associated 95 percent confidence intervals were adjusted for age by the Mantel–Haenszel method.[16,17]

RESULTS

Information was supplied by 256 (77 percent) of the 332 women with a history of cervical cancer and 350 (72 percent) of the 489 controls. Their mean ages at the time of answering the questionnaire were 51 and 52 years, respectively, but the age distribution within the groups varied (Table 1). Among the women who had cervical cancer, the mean age at the time of treatment was 45 years. The proportion of women living alone at the time of the study was higher in the group of women who had cervical cancer than in the control group. The distribution of treatments is shown in Table 1. Fifty-six percent of the women who had cervical cancer were using oral or transdermal estrogen, as compared with 21 percent of the controls. Thirteen women who had cervical cancer reported a recurrence of the cancer, which persisted in 3 of the 13 at the time of the study.

The prevalence of low sexual interest was the same in the two groups (Table 2). Sexual interest was similarly reduced in the women who had cancer (as compared with before the start of treatment) and the control women (as compared with five years previously). However, the degree of distress caused by reduced libido was higher among the women who had cancer. More women who had cancer than controls stated that vaginal lubrication in connection with intercourse was reduced to a moderate or high degree, and the reduction in lubrication caused moderate or much distress among 54 percent of the women who had cancer who reported this problem and 39 percent of the controls. Thirty-six percent of the women who had cervical cancer and 25 percent of the controls reported that genital swelling was absent more than every other time during sexual arousal.

The frequency of vaginal intercourse was similar in the two groups (Table 3). About 30 percent of the women in both groups reported that they had not engaged in intercourse during the previous six months, and twice as many controls as women with cancer reported that they had not had intercourse five years earlier. The proportion of women reporting a high degree of distress due to the decreased frequency of intercourse was higher among the women who had cancer than among the controls.

Twenty-six percent of the women who had cancer

TABLE 1. CHARACTERISTICS OF THE WOMEN WITH A HISTORY OF CERVICAL CANCER AFTER TREATMENT AND THE CONTROLS.*

CHARACTERISTIC	WOMEN WITH CANCER	CONTROLS
Total identified in registries	332	489
Total answering the questionnaire — no. (%)	256 (77)	350 (72)
Age — no. (%)		
25–40 yr	52 (20)	102 (29)
41–60 yr	149 (58)	137 (39)
61–81 yr	54 (21)	111 (32)
Not indicated	1 (<1)	0
Age at time of study — yr	51±0.77	52±0.80
Age at time of treatment — yr	45±0.78	—
Marital status — no. (%)		
Married or living with a man	165 (64)	258 (74)
Has a partner but lives alone	24 (9)	22 (6)
Single	49 (19)	35 (10)
Widowed	15 (6)	32 (9)
Not indicated	3 (1)	3 (1)
No children — no. (%)†	28 (11)	46 (13)
Level of education — no. (%)		
Primary school	94 (37)	104 (30)
Secondary school	106 (41)	134 (38)
University	50 (20)	104 (30)
Not indicated	6 (2)	8 (2)
Employment status — no. (%)		
Employed	157 (61)	193 (55)
On sick leave	25 (10)	17 (5)
Unemployed	9 (4)	15 (4)
Retired	44 (17)	97 (28)
Other‡	13 (5)	20 (6)
Not indicated	8 (3)	8 (2)
Treatment — no. (%)		
Surgery alone	93 (36)	—
Surgery and intracavitary radiotherapy	57 (22)	—
Surgery and external radiotherapy	24 (9)	—
Surgery and intracavitary and external radiotherapy	55 (21)	—
Radiotherapy alone	22 (9)	—
Not indicated	5 (2)	—
Ongoing hormonal therapy — no. (%)		
None	83 (32)	248 (71)
Systemic	143 (56)	74 (21)
Local	28 (11)	26 (7)
Not indicated	2 (1)	2 (1)

*Plus–minus values are means ±SE. Percentages may not add to 100 because of rounding.

†Information on children was not provided by eight women with a history of cancer and two controls.

‡Other included housewives, women on maternity leave, and students.

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TABLE 2. LIBIDO AND AROUSAL IN THE WOMEN WITH A HISTORY OF CERVICAL CANCER AND THE CONTROLS.

VARIABLE	WOMEN WITH CANCER (N=256)	CONTROLS (N=350)	AGE-ADJUSTED RR (95% CI)*
	no./total no. responding (%)		
Little or no interest in sex in previous 6 mo	100/245 (41)	140/339 (41)	1.0 (0.9–1.2)
Sexual desire less frequent than once per mo in previous 6 mo	158/248 (64)	220/335 (66)	1.0 (0.9–1.1)
Reduced sexual desire in previous 5 yr	134/249 (54)	196/336 (58)	0.9 (0.8–1.1)
Moderate or much distress if reduced sexual desire persists†	64/134 (48)	46/196 (23)	1.8 (1.3–2.4)
Aroused in less than half of sexual situations in previous 6 mo‡	44/177 (25)	42/249 (17)	1.5 (1.1–2.2)
Vaginal lubrication less than every other time in previous 6 mo‡	50/180 (28)	37/254 (15)	2.0 (1.4–3.0)
Vaginal lubrication moderately or very insufficient in previous 6 mo‡	46/177 (26)	27/248 (11)	2.5 (1.6–3.8)
Moderate or much distress if reduced lubrication persists†	67/125 (54)	43/110 (39)	1.2 (0.9–1.6)
Regular use of lubricants for intercourse in previous 6 mo‡	28/174 (16)	20/247 (8)	2.0 (1.2–3.4)
Genital swelling less than every other time when sexually aroused in previous 6 mo‡	62/171 (36)	62/246 (25)	1.4 (1.1–1.9)
Moderate or much distress if reduction in genital swelling persists†	48/94 (51)	27/102 (26)	1.8 (1.2–2.6)

*RR denotes relative risk, and CI confidence interval.

†Respondents included only women with the symptom.

‡Respondents included only sexually active women.

reported a reduction in the length of the vagina during intercourse, as compared with 3 percent of the controls. The percentages were similar for reduced elasticity of the vagina during intercourse. These changes in the vagina caused distress for approximately twice as many of the women who had cervical cancer who reported vaginal changes as of the controls; with all the women included in the analysis, the relative risk for women who had cervical cancer as compared with controls was 3.4. The proportion of women with a history of cancer who reported moderate or much distress due to vaginal changes (shortness or inelasticity) declined with age (25 to 40 years, 16 of 52 women [31 percent]; 41 to 52 years, 32 of 108 [30 percent]; 53 to 64 years, 10 of 52 [19 percent]; and 65 to 80 years, 4 of 43 [9 percent]).

Approximately half the women in both groups reported infrequent orgasms (less than twice per month), and 7 percent of the women in both groups reported that they had not achieved orgasm in the previous six months despite being sexually active. Nine percent of the women in each group reported little or no orgasmic pleasure.

Superficial or deep dyspareunia was more common among the women who had cervical cancer than among the controls at the time of the study, whereas it was uncommon in both groups five years earlier. Vaginal bleeding during intercourse was also more prevalent among the women who had cervical cancer. Vaginal shortness was associated with superficial and deep dyspareunia, whereas reduced elasticity and lubrication were associated with superficial dyspareunia only (data not shown). Fifty-seven percent of the women who had cervical cancer and 36 percent of the controls reported moderate or much distress at the prospect of having persistent problems with intercourse.

Treatment with surgery alone was associated with increased risks of insufficient vaginal lubrication, vaginal shortness, and reduced vaginal elasticity (Table 4). As compared with surgery alone, intracavitary or external radiotherapy or both in addition to or instead of surgery had a small effect, if any, on the risks of reduced vaginal lubrication, reduced genital swelling, vaginal shortness, or vaginal inelasticity.

Sixteen percent of all the women reported that they had been subjected to sexual abuse (Table 5). Among these women, 31 percent of the women who had cervical cancer and 22 percent of the controls reported that the sexual abuse had a moderate or strong impact on their current sexuality.

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TABLE 3. VAGINAL INTERCOURSE, ORGASM, AND PROBLEMS DURING INTERCOURSE IN THE WOMEN WITH A HISTORY OF CERVICAL CANCER AND THE CONTROLS.

VARIABLE	WOMEN WITH CANCER (N=256)	CONTROLS (N=350)	AGE-ADJUSTED RR (95% CI)*
	no./total no. responding (%)		
Frequency of vaginal intercourse			
Less than twice per mo in previous 6 mo	158/247 (64)	192/330 (58)	1.1 (1.0–1.3)
None in previous 6 mo	80/247 (32)	94/330 (28)	1.2 (1.0–1.5)
Less than twice per mo 5 yr ago	90/246 (37)	133/329 (40)	1.0 (0.8–1.2)
None 5 yr ago	20/246 (8)	49/329 (15)	0.6 (0.4–1.0)
Moderate or much distress if decreased frequency persists†	70/140 (50)	62/179 (35)	1.4 (1.1–1.8)
Vaginal changes in previous 6 mo			
Moderate or substantial reduction in length of vagina during intercourse‡	52/197 (26)	8/240 (3)	8.1 (4.4–14.9)
Moderate or substantial reduction in elasticity of vagina during intercourse‡	45/195 (23)	9/246 (4)	6.7 (3.6–12.5)
Moderate or much distress if vaginal changes persist			
All women	62/243 (26)	25/332 (8)	3.4 (2.2–5.2)
Women reporting vaginal changes	62/127 (49)	25/97 (26)	1.8 (1.3–2.6)
Orgasm in previous 6 mo‡			
Less than twice a month	99/177 (56)	125/251 (50)	1.1 (0.9–1.3)
None but sexually active	12/177 (7)	18/251 (7)	1.0 (0.5–2.0)
Little or no orgasmic pleasure	16/170 (9)	22/237 (9)	1.0 (0.5–1.8)
Problems during intercourse			
Moderate or much superficial dyspareunia in previous 6 mo‡	31/196 (16)	5/246 (2)	8.5 (3.5–18.6)
Moderate or much superficial dyspareunia 5 yr ago‡	10/200 (5)	11/278 (4)	1.4 (0.6–3.3)
Moderate or much deep dyspareunia in previous 6 mo‡	24/196 (12)	6/245 (2)	5.2 (2.4–11.4)
Moderate or much deep dyspareunia 5 yr ago‡	10/206 (5)	8/281 (3)	1.9 (0.8–4.5)
Vaginal bleeding during intercourse at least every other time in previous 6 mo‡	14/177 (8)	1/246 (<1)	20.6 (4.8–88.7)
Moderate or much distress if problems persist†	76/133 (57)	52/143 (36)	1.6 (1.2–2.0)

*RR denotes relative risk, and CI confidence interval.

†Respondents included only women with the symptom.

‡Respondents included only sexually active women.

Thirty-four percent of the women who had cervical cancer who were of childbearing age reported moderate or much distress because of the infertility that resulted from treatment. Eleven percent reported that their infertility had a moderate or strong negative effect on their sexuality. Seventeen percent of the women with a history of cervical cancer who had undergone a hysterectomy reported that they missed having a uterus "moderately" or "a lot."

Thirty-two percent of the women who had cervical cancer and 25 percent of the controls reported little or no satisfaction with their present sexuality. When asked about how they would feel if their sexual problems persisted for the rest of their lives, 39 percent of the women who had cervical cancer and 34 percent of the controls with such problems reported that they would experience a moderate or high level of distress.

DISCUSSION

We found that women who had been treated for cervical cancer had changes in their vaginal anatomy and function that had negative effects on their sexual function. The changes included decreased lubrication and genital swelling during arousal and reductions in perceived vaginal length and elasticity during intercourse. Furthermore, a large proportion of the women indicated that they were distressed by these changes and their effects on sexual intercourse.

Although numerous studies have documented the distress associated with the loss of a breast, changes in the vagina have been neglected in this respect. A Medline search performed in mid-1998 with the combined terms "cancer," "breast," and "distress" yielded 197 references. In contrast, a search in which the term "vagina" was substituted for "breast" yielded only two references. One might assume that vaginal

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TABLE 4. AGE-ADJUSTED RELATIVE RISKS OF VAGINAL CHANGES AND REDUCED INTEREST IN SEX IN PREVIOUS SIX MONTHS.*

VARIABLE	CONTROLS (N=350)	WOMEN WITH CANCER				
		SURGERY ALONE (N=93)	INTRACAVITARY RADIOTHERAPY AND SURGERY (N=57)	SURGERY AND EXTERNAL RADIOTHERAPY (N=24)	SURGERY AND INTRACAVITARY AND EXTERNAL RADIOTHERAPY (N=55)	RADIOTHERAPY ALONE (N=22)†
Vaginal lubrication moderately or substantially insufficient — no./total no. (%)	27/248 (11)	18/73 (25)	10/43 (23)	2/13 (15)	12/36 (33)	2/9 (22)
Relative risk for women with cancer vs. controls (95% CI)	1.0	2.8 (1.6–4.9)	2.1 (1.0–4.3)	1.4 (0.4–5.2)	3.3 (1.8–6.2)	1.5 (0.4–5.3)
Relative risk for other treatments vs. surgery alone (95% CI)	—	1.0	0.9 (0.4–1.6)	0.5 (0.1–2.2)	1.2 (0.7–3.3)	0.6 (0.2–2.2)
Genital swelling less than every other time when sexually aroused — no./total no. (%)	62/246 (25)	24/69 (35)	14/40 (35)	5/13 (38)	12/36 (33)	4/10 (40)
Relative risk for women with cancer vs. controls (95% CI)	1.0	1.5 (1.0–2.2)	1.3 (0.8–2.1)	1.5 (0.8–2.8)	1.3 (0.8–2.1)	1.2 (0.6–2.6)
Relative risk for other treatments vs. surgery alone (95% CI)	—	1.0	1.0 (0.6–1.7)	1.0 (0.5–2.3)	0.9 (0.5–1.6)	1.0 (0.4–2.4)
Moderate or substantial reduction in length of vagina — no./total no. (%)	8/240 (3)	15/78 (19)	13/48 (27)	4/14 (29)	15/45 (33)	2/9 (22)
Relative risk for women with cancer vs. controls (95% CI)	1.0	6.1 (2.6–14.1)	8.5 (3.1–23.8)	9.9 (3.6–27.2)	10.8 (4.3–27.4)	7.4 (2.0–27.3)
Relative risk for other treatments vs. surgery alone (95% CI)	—	1.0	1.4 (0.7–2.8)	1.6 (0.7–4.0)	1.8 (0.9–3.3)	1.1 (0.3–3.8)
Moderate or substantial reduction in elasticity of vagina — no./total no. (%)	9/246 (4)	15/77 (19)	11/48 (23)	2/14 (14)	14/45 (31)	2/8 (25)
Relative risk for women with cancer vs. controls (95% CI)	1.0	7.1 (3.1–16.7)	6.1 (2.4–15.3)	4.8 (0.9–24.2)	10.9 (4.1–28.5)	4.5 (1.1–19.3)
Relative risk for other treatments vs. surgery alone (95% CI)	—	1.0	1.1 (0.6–2.3)	0.6 (0.1–2.6)	1.7 (0.9–3.2)	1.1 (0.3–4.0)
Little or no interest in sex — no./total no. (%)	140/339 (41)	32/91 (35)	22/56 (39)	11/23 (48)	18/51 (35)	16/21 (76)
Relative risk for women with cancer vs. controls (95% CI)	1.0	1.0 (0.7–1.3)	1.0 (0.7–1.4)	1.1 (0.8–1.7)	1.0 (0.7–1.4)	1.4 (1.1–1.9)
Relative risk for other treatments vs. surgery alone (95% CI)	—	1.0	1.1 (0.7–1.6)	1.2 (0.7–2.1)	1.0 (0.6–1.5)	1.7 (1.2–2.4)

*Only women whose age was known were included in the analysis. The information on all variables except little or no interest in sex is restricted to sexually active women. For each variable, the total number is the total number of women who responded to the question. CI denotes confidence interval.

†This category included women who received external or intracavitary radiotherapy or both.

changes would affect sexual function at least as much as the loss of a breast. An obvious reason for the predominant interest in the breast is that, in developed countries, breast cancer is more common than cancer of the female genital organs.[18] Nevertheless, the paucity of literature on the effect of vaginal changes is noteworthy, and it may not be irrelevant to speculate about nonscientific reasons. For men, female breasts may have aesthetic as well as sexual value, which may influence research policies in academic medicine, where male investigators predominate.

Vaginal changes that may restrict coital pleasure include those that cause pain or bleeding during intercourse, those that interfere with the pleasure of feeling penile penetration and movement, and anatomical changes that interfere with achieving orgasm. The prevalence of dyspareunia was high among the women with a history of cancer whom we studied, and this disorder may be related to various changes in the vagina. In our study, disease status did not explain the relation between the specific vaginal changes and dyspareunia, and it is unlikely that the women with dyspareunia had pain because sexual activity reminded them of their cancer. Damage to peripheral nerves and small vessels as well as hormonal deficiencies and fibrosis may influence vaginal lubrication and genital swelling. Surgical removal of tissue, adhesions within the pelvis, and fibrosis may contribute to the perception of vaginal shortness and inelasticity.

The differences between the two study groups with respect to orgasmic frequency and pleasure were small, indicating that the physical changes induced by cervical cancer and its treatment do not influence this aspect of sexuality. An intact clitoris may be sufficient for satisfactory orgasm, and our data indicate that the absence of the uterus has little effect in this regard.

The percentage of women who had initiated sexual intercourse regularly was similar in the two groups. We did not determine the predictors of this variable, and we do not know whether some women, for in-

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TABLE 5. EFFECTS OF SEXUAL ABUSE, INFERTILITY, AND OTHER PROBLEMS ON SEXUAL FUNCTION.

VARIABLE	WOMEN WITH CANCER (N=256)	CONTROLS (N=350)	AGE-ADJUSTED RR (95% CI)*
	no./total no. responding (%)		
Sexual abuse in past			
Yes	44/250 (18)	50/332 (15)	1.3 (0.7–2.4)
Sexuality moderately or substantially affected†	15/49 (31)	11/50 (22)	1.4 (0.7–2.8)
Infertility			
Moderate or much distress because of infertility†	48/142 (34)	—	—
Moderate or substantial effect on sexuality‡	19/166 (11)	—	—
Miss having uterus moderately or substantially†	40/230 (17)	—	—
Other problems			
Feel less feminine in past 5 yr	62/245 (25)	60/326 (18)	1.4 (1.0–1.9)
Feel moderately or much less attractive in past 5 yr	58/244 (24)	47/335 (14)	1.7 (1.2–2.4)
Little or no satisfaction with partner as friend†	15/193 (8)	14/268 (5)	1.2 (0.6–2.5)
Little or no satisfaction with partner as lover†	19/171 (11)	31/244 (13)	0.8 (0.4–1.4)
Little or no satisfaction with present sexuality	74/232 (32)	82/322 (25)	1.2 (0.9–1.6)
Moderate or much distress if sexual problems persist†	53/137 (39)	59/172 (34)	1.2 (0.9–1.6)

*RR denotes relative risk, and CI confidence interval.

†Respondents included only women reporting the symptom or situation.

‡Respondents included only sexually active women.

stance, have intercourse primarily to satisfy their partners, rather than to satisfy themselves. It is reasonable to assume that pain during sex and possibly also bleeding reduce pleasure for women. One interpretation of our findings is that the frequency of intercourse is not an appropriate measure of the effect of treatment on sexual function in women with cancer.

Many of the women who had cancer had probably been castrated as a result of surgical removal of the ovaries, a disturbed blood supply due to surgery, or radiotherapy. Castration lowers serum testosterone and estrogen concentrations. Apart from the women who underwent radiotherapy alone, libido did not differ among the women according to the treatment they received. We have no information on serum hormone concentrations, but our data suggest that ovarian hormones have minor effects, if any, on libido and the frequency of intercourse in women treated for cervical cancer.

A probable mechanism for some of the vaginal changes associated with the treatment of cervical cancer is reduced estrogen secretion. Lubricants and systemic and, to a lesser degree, local estrogen therapy, which increase lubrication, were used more often by the women who had cervical cancer than by the controls. In addition, psychological and sociological factors probably have an important role in sexual behavior. The women in the two groups reported a similar level of satisfaction with their partners, but more of the women who had cancer were single, suggesting that some relationships end as a consequence of cervical cancer. Our findings confirm the observation that infertility may be a major problem,[19] but only a small proportion of women in our study associated infertility with compromised sexuality. The majority of women reported little or no distress due to the loss of the uterus.

We used an anonymous questionnaire that was answered at home. This method probably results in fewer investigator-derived errors than, for example, a personal interview or an identifiable questionnaire.[20,21] Sweden maintains population-based registers that allowed us to avoid potential problems of selection. In addition, our study was national, and an effort was made to minimize noncompliance.

Physicians caring for women with cervical cancer should discuss possible disease- and treatment-related vaginal changes that may affect sexual function and should address this topic before and after treatment. We found that there was no age above which sexual function was not important to the women in our study, and efforts to prevent vaginal changes, or to relieve them after therapy, should therefore be considered for women of all ages.

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