Hysterectomy and Sexual Functioning

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Each year more than half a million US women decide to undergo hysterectomy as treatment for chronic, benign gynecologic conditions.1 Although very little has been published about the hysterectomy decision-making process, studies show that hysterectomy patients are concerned about potential negative effects on their sexual functioning.2-6 In fact, 2 studies found that concern about posthysterectomy sexual functioning is the most frequent preoperative anxiety.5,6

Patient concerns about sexual functioning after hysterectomy are not unfounded, since estimates of the percentage of women who report a deterioration in their sex lives after hysterectomy range from 13% to 37%.5,7-10 In addition, it seems plausible that removal of the uterus could have adverse effects on sexual function through 1 or more of the numerous mechanisms that have been suggested. Jewett11 examined the possibility that hysterectomy causes dyspareunia through shortening of the vaginal vault. External orgasms, caused by clitoral stimulation, are not likely to be affected by hysterectomy; however, Hasson12 postulated that internal orgasms, caused by stimulation of nerve endings in the uterovaginal plexus, are hindered by hysterectomy with cervix removal. Finally, vaginal dryness is known to result from estrogen deficiency caused by premenopausal hysterectomy with bilateral oophorectomy.13 But it may also result from premenopausal hysterectomy without bilateral oophorectomy since several researchers have found evidence that hysterectomy hastens ovarian failure and increases menopausal symptoms, including vaginal dryness.14,16

Although some evidence indicates that hysterectomy has a detrimental effect on sexual functioning, other evidence suggests the contrary. The same studies that found that the sex lives of many women deteriorated after hysterectomy also found that 16% to 47% of women reported no change in their sex lives after hysterectomy and that 34% to 70% of women reported improvements in their sex lives after hysterectomy.11-13

Context Women considering hysterectomy often are concerned about its potential effects on their sexual functioning but the effects of hysterectomy on sexual functioning remain unclear.

Objective To examine changes in sexual functioning after hysterectomy.

Design and Setting A 2-year prospective study (Maryland Women’s Health Study) of hysterectomy, which included measures of sexual functioning prior to hysterectomy and at 6, 12, 18, and 24 months after hysterectomy, performed during 1992 and 1993.

Patients Of 1299 women interviewed prior to hysterectomy, 1101 (84.8%) completed the study and provided information about their sexual functioning. Most were between the ages of 35 and 49 years, white, married or living with a partner, and high school graduates.

Main Outcome Measures Frequency of sexual relations, dyspareunia, orgasm, vaginal dryness, and sexual desire.

Results The percentage of women who engaged in sexual relations increased significantly from 70.5% before hysterectomy to 77.6% and 76.7% at 12 and 24 months after hysterectomy. The rate of frequent dyspareunia dropped significantly from 18.6% before hysterectomy to 4.3% and 3.6% at 12 and 24 months after hysterectomy. The rates of not experiencing orgasms dropped significantly from 7.6% before hysterectomy to 5.2% and 4.9% at 12 and 24 months after hysterectomy. Low libido rates also decreased significantly from 10.4% before hysterectomy to 6.3% and 6.2% at 12 and 24 months after hysterectomy. The distribution of women not reporting vaginal dryness in the past month improved significantly from 37.3% before hysterectomy to 46.8% and 46.7% at 12 and 24 months after hysterectomy. Prehysterectomy depression was associated with experiencing dyspareunia, vaginal dryness, low libido, and not experiencing orgasms after hysterectomy.

Conclusions Sexual functioning improved overall after hysterectomy. The frequency of sexual activity increased and problems with sexual functioning decreased.

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Hysterectomy. The mechanisms for improvement in sexual functioning after hysterectomy are as plausible as those for sexual functioning deterioration. Huffman attributed posthysterectomy improvements in sexual functioning to relief from dysmenorrhea caused by excised pelvic pathology. Helstrom et al observed an association between prehysterectomy dysmenorrhea and posthysterectomy sexual dysfunction and interpreted this finding to indicate that relief from dysmenorrhea causes improvements in sexual functioning. Richards reported that patients with increased libido after hysterectomy expressed relief from the fear of conception. Thus, the relationship between hysterectomy and sexual functioning remains unclear because of the apparent contradictory evidence showing both beneficial and detrimental effects.

This report presents the sexual functioning outcomes of the Maryland Women’s Health Study, which was designed to measure the outcomes and effectiveness of hysterectomy for benign conditions in terms of operative and postoperative complications, symptoms, psychological functioning, sexual functioning, quality of life, patient satisfaction, and cost. It was a prospective cohort study in which 1299 patients who were scheduled to undergo hysterectomy for benign conditions during 1992 and 1993 were interviewed shortly before surgery and at 3, 6, 12, 18, and 24 months after surgery. The 3- and 18-month posthysterectomy interviews were conducted by telephone. All other interviews were conducted at the patients’ homes. Additional data were collected through medical record abstraction of the hysterectomy hospitalization.

**METHODS**

**Study Population**

At the time of this study, 49 hospitals were performing hysterectomy in the state of Maryland. Based on 1990 state discharge data, the hospitals were stratified according to the annual number of hysterectomies performed, such that large urban hospitals performing many hysterectomies were grouped together and small rural hospitals performing a small number of hysterectomies were grouped together. Within strata, 32 hospitals were randomly selected and invited to participate. Twenty-eight hospitals accepted. All attending gynecologists at each of the 28 hospitals were asked to participate, and 406 (61%) of 663 agreed. The most common reason gynecologists gave for not participating was that they rarely performed hysterectomy.

Participating hospitals provided study staff with surgical postings that listed patients scheduled for hysterectomy. From these lists, the patients of participating physicians were selected, contacted, and asked to participate. Patients were also identified directly through the offices of participating physicians. The majority of patients (65.6%) were identified through the surgical postings, 33.2% were identified through physicians’ offices, and 1.2% were self-referred. This study was approved by the University of Maryland Institutional Review Board as well as the institutional review boards of each of the participating hospitals. All participants provided signed informed consent.

Of the 4858 hysterectomies performed at participating hospitals during the enrollment period, we obtained the names of 1823 patients. Interviewers were unable to locate 219 of these eligible patients. Of the 1604 patients contacted, 81% agreed to participate. The most common reason patients gave for not participating was having had too little time before surgery to complete the prehysterectomy in-home interview required of all participants. Women declining to participate were not significantly different from participants in age, race, or surgical indications, but were significantly more likely to have been scheduled for hysterectomy within a week of their posting date. Study participants were also compared with the total population of 8348 women who underwent hysterectomy in Maryland during the enrollment period, and participants were found to be younger (mean age, 43.3 vs 44.6 years; P.<.001), have a shorter length of stay (mean, 3.4 vs 3.8 days; P.<.001), lower hospital charges (mean, $3226 vs $3721; P = .003), and more likely to be insured by a health maintenance organization (33.7% vs 29.6%; P = .001).

**Data Collection**

Prior to hysterectomy and at 6, 12, 18, and 24 months posthysterectomy, patients were asked, “In the last month, how many times have you had sexual relations?” Patients who reported having sexual relations at least once were then asked in the last month, how frequently had they (1) “experienced pain during sexual relations?” (2) “experienced orgasm during sexual relations?” (3) “experienced vaginal dryness?” and (4) “desired sex?” The response options to the questions concerning dyspareunia, orgasm, and vaginal dryness were, “all of the time,” “most of the time,” “a good bit of the time,” “some of the time,” “little of the time,” and “none of the time.” The response options to the libido question were “every day,” “5-6 days per week,” “3-4 days per week,” “1-2 days per week,” “2-3 days per month,” “1 day per month,” “less than 1 day per month,” and “not at all.” Participants who reported that they had experienced orgasm were asked, “In the last month, how strong has orgasm been for you?” The response options to this question were “very strong,” “strong,” “mild,” or “very mild.” These questions were skipped for patients not reporting any sexual relations in the previous month. The entire survey instrument, including these questions, was extensively pretested and validated.

**Data Analysis**

The percentage of women reporting sexual relations at least once a month before hysterectomy was calculated and compared with the percentages at 12 and 24 months after hysterectomy. All women who answered the question about sexual activity frequency at each interview stage were included in these comparisons. The comparisons were made using McNemar test. The sexual frequency distributions were positively skewed. The distribu-
tions were log transformed and the geometric mean number of sexual relations per month was compared for the before hysterectomy and after hysterectomy data collection stages using paired t tests.

The distributions of the frequencies of dyspareunia, orgasm, vaginal dryness, and sexual desire and the distributions of orgasm strength before hysterectomy are presented and compared with after hysterectomy distributions. Small differences in the number of patients included in each comparison are a result of patient refusals.

Response options were collapsed to create 4 separate variables indicating whether patients were experiencing a problem with each of the 4 aspects of sexual functioning examined. A problem with dyspareunia was considered as having pain during sex all, most, or a good bit of the time. Similarly, problematic vaginal dryness was defined as experiencing vaginal dryness all, most, or a good bit of the time. Women who desired sexual relations less than once per month were considered to have low libido, and women who reported having orgasm none of the time were categorized as not experiencing orgasms.

Analyses were performed to estimate the relationships between specific problems at 12 months after hysterectomy and each of the following factors: race (white and nonwhite), self-reported menopausal status at hysterectomy (premenopausal vs postmenopausal), prehysterectomy depression (score of ≥26 on a rescaled 100-point Profile of Mood States index),21 partner support (partner in favor of surgery vs partner against, mixed, or of no opinion vs no partner), hysterectomy approach (abdominal vs vaginal vs laparoscopically assisted vaginal hysterectomy), oophorectomy (bilateral vs unilateral vs none), and posthysterectomy hormone replacement therapy [HRT] use (yes vs no). For each problem, experiencing the problem before hysterectomy was the strongest predictor of experiencing the problem 12 months after hysterectomy. Since we were interested in the influence of these factors independent of a patient’s prehysterectomy problem status, the relationships between each factor and each posthysterectomy problem were estimated after adjustment for prehysterectomy problem status. All estimates were also adjusted for age. A separate logistic regression model was used to estimate the relationships between each problem and each factor. For each model, the dependent variable was the presence or absence of the problem, the independent variable was the factor being examined, and the covariates were age and prehysterectomy problem status. Women who were not sexually active prehysterectomy, 12 months posthysterectomy, or both were excluded from these analyses.

RESULTS

Of the 1299 women interviewed before hysterectomy, 1132 (87.1%) completed the 12- and 24-month posthysterectomy interviews. The 167 women who did not complete the study were significantly more likely to be black and had significantly less education and lower annual family incomes. Women not completing the study were also more likely to have a problem with dyspareunia before hysterectomy (25.9% vs 18.5%), but did not otherwise differ in terms of prehysterectomy sexual functioning. Among patients completing the study, 1101 (97.3%) were willing to tell study interviewers whether they had been sexually active in the months before the hysterectomy and at the interviews 12 and 24 months after hysterectomy. The characteristics of these 1101 participants are presented in Table 1. Overall, 71.1% of participants were between ages 35 and 49 years, 67.5% were white, 73.3% were either married or living with a partner, 92.6% had graduated from high school, and 34.1% had an annual income higher than $50 000. Sixty-five percent of the participants underwent abdominal hysterectomy and 44.0% did not have any ovaries removed.

Frequency of Sexual Relations

The frequency of sexual relations increased after hysterectomy. The geometric mean number of sexual relations per month rose from 2.3 before hysterectomy, to 3.1 at 12 months and 2.9 at 24 months after hysterectomy (P<.001 for both prehysterectomy vs posthysterectomy comparisons). Likewise, the percentage of patients who had not been sexually active in the previous month dropped and the percentage of patients having 5 or more sexual relations per month rose (Table 2).

Dyspareunia

After hysterectomy the percentage of women experiencing dyspareunia dropped dramatically: from 40.8% before to 18.4% at 12 months and 14.9% at 24 months after hysterectomy (Table 2). Table 3 shows that 84.4% of women experiencing dyspareunia all, most, or a good bit of the time before hysterectomy were not experiencing painful sexual relations this frequently 12 months after hysterectomy. However, an additional 5.4%...
were not sexually active after hysterectomy and may have experienced dyspareunia if they had been sexually active. Table 3 shows that few of the women without frequent dyspareunia and few of the women who were not sexually active before hysterectomy were experiencing frequent dyspareunia 12 and 24 months after hysterectomy.

Although most of the women experiencing dyspareunia before hysterectomy were relieved of this problem after, women who experienced dyspareunia before hysterectomy were more likely to have this problem after hysterectomy than women not experiencing dyspareunia before hysterectomy (odds ratio [OR], 4.47; 95% confidence interval [CI], 2.14-9.33). After adjustment for age and experiencing dyspareunia before hysterectomy, women with prehysterectomy depression were more likely to experience posthysterectomy dyspareunia than women without prehysterectomy depression (OR, 2.28; 95% CI, 1.09-4.76). Race, self-reported menopausal status at hysterectomy, partner support, hysterectomy approach, oophorectomy, and posthysterectomy-HRT use were not significantly associated with problematic dyspareunia 12 months after hysterectomy.

Orgasm

Orgasm frequency increased after hysterectomy (Table 2). Overall, 62.8% of patients were experiencing orgasms before hysterectomy. This figure rose to 72.4% and 71.5% at 12 and 24 months after hysterectomy. This change is consistent with the results in Table 3, which show that approximately two thirds of the women not experiencing orgasms before their hysterectomies were having orgasms 12 months after hysterectomy and few women who were having orgasms before hysterectomy stopped having them after hysterectomy.

The strength of orgasm also rose after hysterectomy (Table 2). Before hysterectomy 44.6% of women were experiencing strong orgasms. This figure rose to 58.4% and 57.3% at 12 and 24 months after hysterectomy.

Not experiencing orgasms before hysterectomy was the factor most highly associated with not experiencing orgasms 12 months after hysterectomy (OR, 11.91; 95% CI, 5.75-24.70). After adjustment for age, and not experiencing orgasms before hysterectomy, bilateral oophorectomy (OR, 2.68; 95% CI, 1.10-6.53) and prehysterectomy depression (OR, 3.31; 95% CI, 1.49-7.38) were associated with

### Table 2. Sexual Functioning Before and After Hysterectomy

<table>
<thead>
<tr>
<th>In the last month, how many times have you had sexual relations? (n = 1101)</th>
<th>Before Hysterectomy, %</th>
<th>12 Months After Hysterectomy, %</th>
<th>24 Months After Hysterectomy, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>None*</td>
<td>29.5</td>
<td>22.3</td>
<td>23.3</td>
</tr>
<tr>
<td>1-2</td>
<td>19.7</td>
<td>16.4</td>
<td>18.1</td>
</tr>
<tr>
<td>3-4</td>
<td>19.9</td>
<td>18.1</td>
<td>17.3</td>
</tr>
<tr>
<td>≥5</td>
<td>30.9</td>
<td>43.1</td>
<td>41.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In the last month, how frequently have you experienced pain during sexual relations? (n = 1100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All, most, or a good bit of the time*</td>
</tr>
<tr>
<td>Some or little of the time</td>
</tr>
<tr>
<td>None of the time*</td>
</tr>
<tr>
<td>Not sexually active</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In the last month, how frequently have you experienced orgasm during sexual relations? (n = 1095)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All, most, or a good bit of the time*</td>
</tr>
<tr>
<td>Some or little of the time</td>
</tr>
<tr>
<td>None of the time*</td>
</tr>
<tr>
<td>Not sexually active</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In the last month, how strong has orgasm been for you? (n = 1087)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong*</td>
</tr>
<tr>
<td>Mild</td>
</tr>
<tr>
<td>No orgasms</td>
</tr>
<tr>
<td>Not sexually active</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In the last month, how frequently have you experienced vaginal dryness? (n = 1090)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All, most, or a good bit of the time</td>
</tr>
<tr>
<td>Some or little of the time</td>
</tr>
<tr>
<td>None of the time*</td>
</tr>
<tr>
<td>Not sexually active</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In the last month, how frequently have you desired sex? (n = 1087)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥1 day per week*</td>
</tr>
<tr>
<td>1 to 3 days per month</td>
</tr>
<tr>
<td>&lt;1 day per month*</td>
</tr>
<tr>
<td>Not sexually active</td>
</tr>
</tbody>
</table>

*Both prehysterectomy vs posthysterectomy comparisons, P<.001.
†Both prehysterectomy vs posthysterectomy comparisons, P<.01.
not experiencing orgasms 1 year after hysterectomy. No other factors were found to be significantly associated with not experiencing orgasms 12 months after hysterectomy.

**Vaginal Dryness**

The overall distribution of vaginal dryness improved after hysterectomy as the percentage reporting vaginal dryness none of the time rose from 3.7% before to 4.6% at 12 and 24 months after hysterectomy (P<.001 for both prehysterectomy vs posthysterectomy comparisons, Table 2). Nonetheless, clinically significant percentages of women experienced both the persistence and development of vaginal dryness; 35.2% of the women with vaginal dryness before hysterectomy experienced persistent vaginal dryness and 8.7% of women not having a problem with vaginal dryness before hysterectomy developed a problem by 12 months after hysterectomy (Table 3).

Prehysterectomy vaginal dryness was highly predictive of posthysterectomy vaginal dryness (OR, 5.95; 95% CI, 3.75-9.47). After adjustment for prehysterectomy vaginal dryness and age, prehysterectomy depression was also associated with posthysterectomy vaginal dryness (OR, 1.65; 95% CI, 1.01-2.70) as was a lack of partner support (OR, 1.86; 95% CI, 1.01-3.45). None of the other factors examined was significantly associated with posthysterectomy vaginal dryness.

**Libido**

The frequency of sexual desire increased significantly posthysterectomy: the percentage of women desiring sexual relations once a week or more increased significantly and the percentage of women desiring sexual relations less than once a month decreased significantly (Table 2). More than 70% of the women with low libido before hysterectomy reported relief from low libido at 12 months after hysterectomy (Table 3). In addition, few women among those who had not reported low libido before hysterectomy and among those who were not sexually active before hysterectomy had developed low libido after hysterectomy (Table 3).

Posthysterectomy low libido was associated with prehysterectomy low libido (OR, 5.06; 95% CI, 2.71-9.43). Prehysterectomy depression was also associated with posthysterectomy low libido (OR, 2.83; 95% CI, 1.28-6.23). None of the other factors examined was significantly associated with posthysterectomy low libido.

### Table 3. Sexual Functioning Outcomes Among Patients With Problems Before Hysterectomy, Without Problems Before Hysterectomy, and Not Sexually Active Before Hysterectomy*

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Total No.</th>
<th>12 Months After Hysterectomy Outcomes</th>
<th>24 Months After Hysterectomy Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Problem Present</td>
<td>Problem Not Present</td>
<td>Not Sexually Active</td>
</tr>
<tr>
<td>Dyspareunia</td>
<td>205</td>
<td>21 (10.2)</td>
<td>173 (84.4)</td>
</tr>
<tr>
<td>No orgasm</td>
<td>83</td>
<td>18 (21.7)</td>
<td>54 (65.1)</td>
</tr>
<tr>
<td>Vaginal dryness</td>
<td>128</td>
<td>45 (35.2)</td>
<td>72 (56.3)</td>
</tr>
<tr>
<td>Low libido</td>
<td>113</td>
<td>20 (17.7)</td>
<td>80 (70.8)</td>
</tr>
<tr>
<td>Dyspareunia</td>
<td>570</td>
<td>13 (2.3)</td>
<td>506 (88.8)</td>
</tr>
<tr>
<td>No orgasm</td>
<td>686</td>
<td>18 (2.6)</td>
<td>618 (90.0)</td>
</tr>
<tr>
<td>Vaginal dryness</td>
<td>641</td>
<td>56 (8.7)</td>
<td>535 (83.5)</td>
</tr>
<tr>
<td>Low libido</td>
<td>655</td>
<td>28 (4.3)</td>
<td>581 (88.7)</td>
</tr>
</tbody>
</table>

*All data are number (percentage) of women.

**Not Sexually Active Before Hysterectomy**

Of the 1101 participants, 325 (29.5%) were not sexually active in the month before the prehysterectomy interview. Among these 325 women, 141 (43.4%) and 148 (45.5%) were sexually active in the months before the 12- and 24-month posthysterectomy interviews. Few of the women who were not sexually active before hysterectomy were experiencing sexual functioning problems 12 months after hysterectomy (Table 3).

### COMMENT

**Frequency of Sexual Relations**

This study and several other studies found increases in sexual activity after hysterectomy. Prospective studies by Lambden et al and Gath et al found that the percentage of patients reporting increased sexual frequency (21% and 56%, respectively) was significantly greater than the percentage reporting decreased sexual frequency (12% and 17%, respectively). In contrast, Kilku observed nonsignificant decreases in sexual activity after hysterectomy. Increased sexual activity after hysterectomy may be the strongest evidence of a positive effect of hysterectomy on sexual function-
ing. This is because improved sexual functioning and increased sexual enjoyment are the most obvious explanations for increased sexual relations after hysterectomy.

**Dyspareunia**

Although a few studies have found that women with prior hysterectomy report high rates of dyspareunia, many more studies have found that hysterectomy is associated with improvements in dyspareunia. In fact, the decline in the rate of dyspareunia observed in this study, from 18.6% before hysterectomy to 4.3% at 12 months and 3.6% at 24 months after hysterectomy, is very similar to the decline observed in the Maine Women’s Health Study. In that study, the percentage of women reporting that they experienced dyspareunia very often fell from 32% before hysterectomy to 5% 1 year after hysterectomy. Likewise, prospective research conducted by Kilkku et al found that the percentage of patients with dyspareunia fell from 31%, 40%, and 56% before hysterectomy to 16%, 9%, and 10% at 1 year after hysterectomy, respectively. Taken together these prospective studies provide strong evidence that hysterectomy is associated with improvement in dyspareunia.

**Orgasm**

Many researchers have expressed concern that hysterectomy causes less frequent and/or weaker orgasms. The mechanisms postulated for these effects include: (1) the formation of dyspareunia-causing scar tissue in the vaginal cuff, (2) the elimination of sexual arousal and cervical movement during orgasm, and (3) the necessity of the cervix for internal orgasm. These hypotheses are biologically plausible. However, the majority of patients in this study do not appear to have been negatively affected, since among women experiencing orgasms prior to hysterectomy 83.3% were experiencing orgasms of equal or greater frequency 12 months after hysterectomy and 84.6% were having orgasms of equal or greater strength 12 months after hysterectomy. Moreover, 65.1% of the women who were not experiencing orgasms before hysterectomy were having them 12 months after hysterectomy.

The orgasm outcomes of this study are consistent with the outcomes of a retrospective study conducted by Dennerstein et al, which found that 75% of women who had a hysterectomy reported no change or an improvement in their ability to achieve orgasm, while 25% reported a deterioration. The prospective Maine Women’s Health Study did not examine the frequency of orgasm directly but did report that problems with enjoyment of sexual relations decreased significantly 12 months after hysterectomy. Two other prospective studies of hysterectomy found that the frequency of orgasm does not change after hysterectomy. In contrast to these studies and to our results, Kilkku et al found that the percentage of hysterectomy patients having infrequent orgasm rose from 29.7% before hysterectomy to 46.7% a year after total hysterectomy, while there was no significant increase in infrequent orgasm among supravaginal amputation patients. Unfortunately, we were not able to examine sexual functioning in hysterectomy patients keeping their cervixes since only 15 of the patients in this study underwent supracervical hysterectomy.

Overall, studies examining the effects of hysterectomy on orgasm are not consistent, and there is evidence of both beneficial and detrimental effects. In this study, symptoms such as dyspareunia and pelvic pain decreased dramatically after hysterectomy. This symptom relief may have led to increased sexual enjoyment and increased orgasm frequency. Furthermore, in terms of sexual functioning, the improvements due to symptom relief may have outweighed any lost sensation due to removal of the cervix.

**Vaginal Dryness**

Many women experiencing vaginal dryness before hysterectomy were no longer experiencing it after hysterectomy. On the other hand, many women without vaginal dryness before hysterectomy began experiencing it after hysterectomy. Schofield et al conducted a mail survey of 175 women who had undergone hysterectomy 2 to 10 years previously and reported similar results. In that study, none of the women with vaginal dryness before hysterectomy reported that their hysterectomies had worsened the vaginal dryness, and many even attributed improvements in vaginal dryness to their hysterectomies. At the same time, 25 (69%) of the 36 women with newly acquired vaginal dryness attributed it to their hysterectomies. The results of Poad and Arnold are also comparable: 44% of patients reported less lubrication after hysterectomy, and 56% reported the same or more.

Among premenopausal patients, bilateral oophorectomy is the most obvious explanation for post hysterectomy increases in vaginal dryness. However, even after adjustment for prehysterectomy menopausal status and posthysterectomy-HRT use, bilateral oophorectomy was not associated with posthysterectomy vaginal dryness (OR, 1.30; 95% CI, 0.77-2.20). This may have been because 88% of the premenopausal women undergoing concomitant bilateral oophorectomy were taking HRT 12 months after hysterectomy. In addition, it is possible that hysterectomy without bilateral oophorectomy causes vaginal dryness by hastening ovarian failure. Oldenhave et al found that compared with women whose uteri are intact, women with prior hysterectomy and no bilateral oophorectomy were more likely to have vaginal dryness.

**Libido**

The results of Utian are frequently cited as evidence that hysterectomy reduces libido. In that study, “libido was considered to be normal if patients were having regular intercourse and achieving satisfaction therefrom.” Because we defined libido quite differently (in terms of sexual desire), the results of Utian are not comparable to ours. Other re-
searchers defined libido as “the desire for sexual relations” and “sexual interest/desire” rendering their results more comparable to ours.

The results of 4 retrospective studies using comparable definitions indicate that hysterectomy has a negative impact on libido; estimates of the percentage of patients who experienced a reduction in libido after hysterectomy ranged from 32% to 46%, while estimates of the percentage of patients who experienced an increase in libido ranged from 16% to 23%. Similarly, a clinical trial of hysterectomy vs conservative surgery found that while approximately one quarter of patients reported increased sexual interest after hysterectomy, another quarter reported decreased sexual interest. A prospective study by Kilkku et al found that the frequency of weak or absent libido did not change significantly after hysterectomy. In contrast, 2 prospective studies, the Maine Women’s Health Study and the study by Lambden et al, found that interest in sexual activity increased significantly after hysterectomy. Likewise, we found that the frequency of sexual desire increased after hysterectomy, indicating that hysterectomy had a positive impact on libido. In summary, the results of this study and 2 other prospective studies do not support the findings of retrospective studies indicating that hysterectomy has a negative impact on libido and indicate that libido may actually increase after hysterectomy.

Depression

Our results indicate that women with prehysterectomy depression did not experience as much improvement in sexual functioning after hysterectomy as women without prehysterectomy depression. In contrast to our findings, Helstrom et al did not observe an association between prehysterectomy psychiatric complaints and sexual desire after hysterectomy. The findings of Gath et al are consistent with the findings of this study in that the frequency of sexual relations and enjoyment of sexual relations were associated with psychiatric morbidity as measured by the Present State Examination.

In addition to sexual functioning, prehysterectomy depression was associated with poor outcomes of hysterectomy in terms of symptoms such as bleeding, pelvic pain, back pain, activity limitation, sleep disturbance, fatigue, abdominal bloating, and urinary incontinence. Overall, the relationship between prehysterectomy depression and posthysterectomy outcomes is complicated and requires further research since many (28% in this study) patients undergoing hysterectomy are depressed and may not experience the same level of problem relief. Additionally, future research should include evaluations of whether treatment of prehysterectomy depression could improve posthysterectomy outcomes.

Strengths and Limitations

This study has several distinct strengths compared with other studies examining the effect of hysterectomy on sexual functioning. Many of the previous studies are retrospective and, as a result, may be affected by recall bias in which patients, particularly those with posthysterectomy problems, idealize their prehysterectomy sexual functioning. In addition, previous prospective studies have been much smaller than the present study. We followed up more than 1100 patients. In contrast, the previously conducted prospective studies have included a maximum of 418 patients, less than half the number included in this study.

In terms of limitations, this is an uncontrolled comparison of sexual functioning before and after hysterectomy and, generally, causal inferences cannot be made from such studies. However, this group of patients was essentially followed for 4 different 6-month periods, (just prior to hysterectomy to 6 months, 6 to 12 months, 12 to 18 months, and 18 to 24 months after hysterectomy) and the only dramatic changes in sexual functioning occurred during the period that included hysterectomy. Moreover, Carlson et al followed up patients who were undergoing medical management of abnormal bleeding, uterine fibroids, and pelvic pain for 1 year and observed no significant changes in enjoyment of or interest in sexual activity. Thus, it seems reasonable to attribute the observed changes to hysterectomy.

A more problematic concern is that patients were interviewed shortly before hysterectomy, a time during which sexual functioning may have been negatively affected by anxieties about the upcoming surgery. If so, the results of this study may overestimate the positive effects of hysterectomy on sexual functioning. One method of dealing with this issue would have been to ask patients about their sexual functioning before they decided to have hysterectomy; however, this would have introduced the possibility of recall bias, which plagues so many of the retrospective studies. Ideally, the effects of hysterectomy on sexual functioning would be examined within a large prospective study allowing for (1) examination of sexual functioning before the onset of benign gynecologic conditions, (2) estimation of the impact of benign gynecologic conditions on sexual functioning, and (3) comparisons of posthysterectomy sexual functioning to sexual functioning before and after the onset of benign gynecologic conditions.

Conclusions

Although there are many plausible mechanisms that could account for the observed improvements in each aspect of sexual functioning, it is also possible that women simply feel better after hysterectomy and that sexual functioning improves along with overall health status and quality of life. This theory is supported by the fact that the women in this study were highly symptomatic before their hysterectomies and reported improvements not only in sexual functioning but also in many other aspects of health and well-being. Freedom from vaginal bleeding and fear of pregnancy may also account for some of the observed improvements.
It is important that these data not be interpreted to indicate that hysterectomy improves sexual functioning in healthy women. The majority of patients in this study had identifiable gynecologic pathology,37 and it is likely that the sexual functioning problems experienced before hysterectomy were a result of these gynecologic disorders. With this in mind, it is not surprising that removal of an unhealthy uterus would improve sexual functioning. In contrast, we can see no reason to believe that removal of a healthy uterus would improve sexual functioning.

Overall, this study found substantial improvements in sexual functioning after hysterectomy; significantly more women were sexually active after hysterectomy and for each sexual functioning problem the rate of relief was higher than 60% and the rate of development was lower than 10%. Thus, the results of this study indicate that women undergoing hysterectomy are likely to experience a good outcome in terms of sexual functioning.

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**REFERENCES**