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Quality of life and sexuality in disease-free survivors of cervical cancer after radical hysterectomy alone

A comparison between total laparoscopy and laparotomy

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Abstract

The aim of the present study was to evaluate the possible differences between total laparoscopy and laparotomy regarding their impact on postoperative quality of life and sexuality in disease-free cervical cancer survivors who received radical hysterectomy (RH) and/or lymphadenectomy alone and were followed for >1 year.

We reviewed all patients with cervical cancer who had received surgical treatment in our hospital between January 2001 and March 2014. Consecutive sexually active survivors who received RH and/or lymphadenectomy for early stage cervical cancer were enrolled and divided into 2 groups based on surgical approach. Survivors were interviewed and completed validated questionnaires, including the European Organization for Research Treatment of Cancer Quality-of-Life Core Questionnaire including 30 items, the Cervical Cancer-Specific Module of European Organization for Research Treatment of Cancer Quality-of-Life Questionnaire including 24 items (EORTC QLQ-CX24), and the Female Sexual Function Index (FSFI).

In total, 273 patients with histologically confirmed cervical cancer were retrospectively reviewed. However, only 64 patients had received RH and/or lymphadenectomy alone; 58 survivors meeting the inclusion criteria were enrolled, including 42 total laparoscopy cases and 16 laparotomy cases, with an average follow-up of 46.1 and 51.2 months, respectively. The survivors in the 2 groups obtained good and similar scores on all items of the European Organization for Research Treatment of Cancer Quality-of-Life Core Questionnaire including 30 items and Cervical Cancer-Specific Module of European Organization for Research Treatment of Cancer Quality-of-Life Questionnaire including 24 items, without significant differences after controlling for covariate background characteristics. To the date of submission, 21.4% (9/42) of cases in the total laparoscopy group and 31.2% (5/16) of cases in the laparotomy group had not resumed sexual behavior after RH. Additionally, the scores on the FSFI items were comparable between the 2 groups; however, the total FSFI scores were 19.7 and 17.4 for total laparoscopy and laparotomy survivors, respectively, both of which were less than the validated cutoff value of 26.6 for diagnosing female sexual dysfunction.

Disease-free cervical cancer survivors after RH and/or lymphadenectomy were able to cope well, although RH could greatly impair females' sexual function regardless of surgical approach. Moreover, the long-term quality of life and sexual function of survivors seemed to be independent of the surgical approach chosen. Randomized controlled and longitudinal trials with larger populations are needed to better compare these issues between patients receiving laparoscopy and laparotomy.

Abbreviations: EORTC = European Organization for Research Treatment of Cancer, EORTC QLQ-C30 = European Organization for Research Treatment of Cancer Quality-of-Life Core Questionnaire including 30 items, EORTC QLQ-CX24 = Cervical Cancer-Specific Module of European Organization for Research Treatment of Cancer Quality-of-Life Questionnaire including 24 items, FSD = female sexual dysfunction, FSFI = Female Sexual Function Index, QOL = quality of life, RH = radical hysterectomy.

Keywords: cervical cancer, female sexual function, laparoscopy, quality of life, radical hysterectomy, validated questionnaire

1. Introduction

Cervical cancer is the leading gynecological malignancy in developing countries, including China.[1] The majority of patients diagnosed with cervical carcinoma are young to middle aged, and most of them are sexually active. With the earlier diagnoses and more efficient therapies now available, patients with cervical cancer have a longer-term survival than before, with overall 5-year survival rates of >90% for early stage cervical cancer.[2] However, given the long additional life expectancy after diagnosis and treatment, cervical cancer survivors may continue to live with the sequelae of the treatment they receive and the disease itself for longer periods of time. The use of radical hysterectomy (RH) and lymphadenectomy is one of the gold standard treatments for patients with early stage cervical cancer[3]; nevertheless, RH for cervical cancer has been related to a number of late postoperative complications, especially

Editor: Perbinder Grewal.

The authors have no funding and conflicts of interest to disclose.

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Medicine (2016) 95:36(e4787)

Received: 1 September 2015 / Received in final form: 7 August 2016 / Accepted: 13 August 2016

http://dx.doi.org/10.1097/MD.0000000000004787

regarding gastrointestinal disorders, bladder dysfunction, and sexual dysfunction.[4] Of these, sexual dysfunction has been shown to have the most negative impact on quality of life (QOL) for patients with cervical cancer receiving surgical treatment.[5] In addition, QOL may be a prognostic factor to some extent and may influence the survival of patients with cervical cancer.[6,7] RH and lymphadenectomy are traditionally performed via laparotomy, although laparoscopic surgery for cervical cancer treatment has been increasingly popular among gynecological oncologists since Nezhat et al and Querleu[8,9] first described it in the early 1990s. The surgical procedure and resection ranges of laparoscopic RH are generally identical to those of laparotomic RH, although there is a midline abdominal incision made from the pubic symphysis to the supraumbilical area in laparotomic RH. In the past decade, a growing number of studies have reported that laparoscopic procedures are associated with superior surgical outcomes and fewer postoperative complications when compared with laparotomy.[10–12] Over the past decade, some researchers have investigated post-treatment QOL and/or sexual function of cervical cancer survivors, but their results are heterogeneous, using various instruments or enrolling cases receiving various treatments.[4–7] To date, only 1 trial has evaluated and compared sexual function post-RH among female cervical cancer survivors in terms of the surgical approach used.[13] Accordingly, this study investigates the possible differences between laparoscopic and laparotomic procedures regarding their effects on long-term QOL and sexual function of disease-free cervical cancer survivors after surgical treatment alone using validated questionnaires, including the European Organization for Research Treatment of Cancer Quality-of-Life Core Questionnaire including 30 items (EORTC QLQ-C30), the Cervical Cancer-Specific Module of European Organization for Research Treatment of Cancer Quality-of-Life Questionnaire including 24 items (EORTC QLQ-CX24), and the Female Sexual Function Index (FSFI). We hypothesize that the use of laparoscopy to perform RH has a similar influence on long-term post-RH QOL and sexual function among disease-free cervical cancer survivors as laparotomy.

2. Materials and methods

We reviewed the demographic characteristics and surgical statistics of patients with cervical cancer who had received surgery in our department between January 2001 and March 2014. In this study, patients were included if they met the following criteria: 1 received surgery alone of type II to III RH plus lymphadenectomy according to Piver et al[14] via either total laparoscopy or total laparotomy; 2 had no recurrence or second malignant tumor; 3 spoke Chinese as their primary language and showed no evidence of cognitive impairment; 4 were followed for >12 months after RH until April 2015; and 5 agreed to participate in this study. All eligible patients were interviewed by 2 specialized gynecological doctors, signed informed consents, and answered the questionnaires themselves. We excluded patients who received other types of surgery including trachelectomy and type I or IV RH plus lymphadenectomy according to Piver et al,[14] who had preoperative and/or postoperative adjuvant therapy, and who had histologically confirmed recurrence or a second malignant tumor, as well as those who refused to participate in this study or were unable to be contacted. This protocol was approved by the Institutional Research Board of our hospital and the patients' information and data were anonymous and unidentified when analyzed.

QOL was assessed by the standard Chinese versions of the EORTC QLQ-C30 and QLQ-CX24,[15,16] which are scored by linearly transforming all scale and item scores to a 0 to 100 scale with an algorithm recommended by the European Organization for Research Treatment of Cancer (EORTC).[17] The EORTC QLQ-C30 is a psychometrically robust, cross-culturally accepted 30-item questionnaire that includes multi-item subscales and single items and reflects the multidimensionality of the construct of QOL. The subscales and single items of the EORTC QLQ-C30 include the following: a global QOL subscale, 5 functioning subscales (physical, role, emotional, cognitive, and social), 3 symptom subscales (fatigue, nausea and emesis, and pain), 5 single items addressing additional symptoms commonly reported by patients with cancer, and an item about the perceived financial impact of cancer and cancer treatment.[17] The 2 items on the global QOL subscale use a modified 7-point linear analog scales ranging from 1 ("worst") to 7 ("best"); the other items are scored on 4-point Likert-type scales ranging from 1 ("not at all") to 4 ("very much"). All scale and item scores are transformed to the standard 0 to 100 scale using the scoring algorithm recommended by the EORTC.[17] For the functioning and global QOL subscales, higher scores indicate better functioning and QOL, while higher scores on the symptom subscales and single items reflect worse or more problematic symptoms. The EORTC QLQ-CX24, a 24-item questionnaire with multi-item and single-item scales, is designed to assess disease-specific and treatment-specific aspects of QOL in patients with cervical cancer. The scales in the EORTC QLQ-CX24 include 3 multi-item scales (symptom experience, body image, sexual/vaginal function) and 6 single-item scales (lymphedema, peripheral neuropathy, menopausal symptoms, sexual activity, sexual worry, sexual enjoyment). All items are scored on 4-point Likert-type scales ranging from 1 ("not at all") to 4 ("very much"), and all scale and item scores are then also linearly transformed with a standard scoring algorithm to a 0 to 100 scale recommended by the EORTC,[17] with higher scores indicating worse function or more symptoms for all items except for sexual activity and sexual enjoyment.[18]

The standard Chinese version of the FSFI, a 19-item multidimensional questionnaire, is administered to evaluate women's postoperative sexual function.[19] This questionnaire measures 6 domains and includes 2 items on sexual desire (questions 1 and 2), 4 items on sexual arousal (questions 3–6), 4 items on lubrication (questions 7–10), 3 items on sexual orgasm (questions 11–13), 3 items on sexual satisfaction (questions 14–16), and 3 items on pain (questions 17 and 18). The score range for items 1, 2, 15, and 16 is 1 to 5 and is 0 to 5 for the other items, with 0 indicating no sexual intercourse during the past 4 weeks; the individual domain scores are totaled and multiplied by a predetermined factor to weigh each domain equally, with higher scores correlating with better function.[20] The total FSFI score, with a maximum of 36.0, is a sum of the 6 domains, and a total score $\leq$26.6 has been validated as a cutoff value for female sexual dysfunction (FSD).[21] The FSFI questionnaire and the items related to sexual function in the EORTC QLQ-CX24 were administered only to survivors who reported having sexual intercourse in the 4 weeks prior to the interview.

In addition, the full survey instrument also included background information on patients, such as current marital status, education, medical comorbidities, work status, family income, and medical insurance status. Medical insurance for urban employees presents employees with formal jobs; the New Rural Cooperative Medical System is a type of medical insurance for

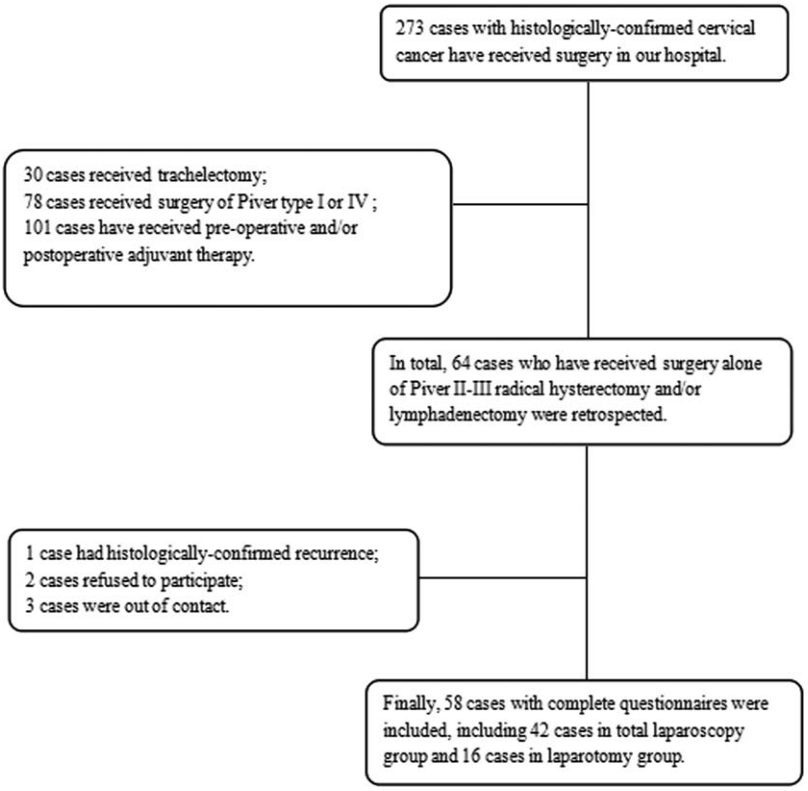

Figure 1. The specific flowchart of this study.

farmers in China, and patients without insurance received care at their own expense.

Statistical analyses were performed with SPSS version 19.0 (SPSS Inc, Chicago, IL). The follow-up time was calculated as the number of months from the date of surgery to the date of being interviewed. Continuous values were compared with Student *t* test or Mann–Whitney *U* test as appropriate. Proportions of categorical variables were analyzed by Pearson χ^2 test or Fisher exact test. General linear models were used to analyze the relationships between demographic and tumor characteristics and QOL/sexual function outcomes. In all analyses, a 2-sided *P*-value <0.05 was considered significant.

3. Results

In total, 273 patients with cervical cancer had received surgery between January 2001 and March 2014 in our hospital. The flowchart of the study is depicted in Fig. 1. However, only 64 patients who received total laparoscopic or laparotomic RH and/or lymphadenectomy only were eligible and reviewed. No patients receiving laparoscopy had conversion to laparotomy. In total, 58 survivors who met the inclusion criteria and agreed to participate in the study were interviewed, including 42 cases of total laparoscopy and 16 cases of laparotomy, with a response rate of 91.3% (42/46) and 88.9% (16/18), respectively.

The demographic characteristics of the patients are described in Table 1. Patients in the total laparoscopy group were significantly younger than those in the laparotomy group, at 42.9 (range, 22–60) years versus 47.1 (range, 27–66) years at diagnosis ($P=0.01$), respectively, and 50.6 (range, 34–65) years versus 55.1 (range, 44–68) years at present ($P=0.005$), respectively. Additionally, the average time since surgery was 46.1 (range, 12–102) months in the total laparoscopy group and 51.2 (range, 14–119) months in the laparotomy group, with no significant difference. Moreover, we divided cases into 3 periods (12–24, 24–60, and >60 months) according to their follow-up time, and the percentages of cases in the 3 periods were similar between the 2 groups.

All patients enrolled were histologically confirmed with cervical squamous carcinoma. The number of lymph nodes dissected and the width of the vaginal cuff were similar between the 2 groups. No significant differences were found in other aspects, including International Federation of Gynecology and Obstetrics stage, distribution of Piver types of RH, and cases with postoperative complications. However, significantly more patients in the total laparoscopy group than those in the laparotomy group had retained unilateral or bilateral ovaries ($P=0.01$) (Table 2).

Table 3 presents the outcome scores for the EORTC QLQ-C30 and QLQ-CX24. All survivors had good scores on the functioning and global QOL scales, and no significant differences were found between the 2 groups for all items after correcting for the differences in background characteristics, including age at diagnosis, age at survey, and number of patients retaining ovaries. However, patients in both the laparoscopy and laparotomy groups had low scores on the item pertaining to body image, with an average score of 12.50 and 14.55, respectively.

Up to the time of submission, 21.4% (9/42) of cases in the total laparoscopy group and 31.2% (5/16) of cases in the laparotomy group had not resumed any sexual behavior after surgery; the main causes for not resuming sexual intercourse included lack of sexual partner, fear of recurrence or pain, and low sexual desire caused by treatment. Cases in the total laparoscopy group

Table 1

Sociodemographic characteristics of patients based on surgical approach.

Characteristics	Total laparoscopy group (n = 42)	Laparotomy group (n = 16)	*P*
Age at diagnosis (range), y	42.9 ± 10.1, (22–60)	50.6 ± 9.0, (27–66)	*0.01*
Age at present (range), y	47.1 ± 9.9, (34–65)	55.1 ± 7.6, (44–68)	*0.005*
Follow-up time (range), mo	46.1 ± 25.0, (12–102)	51.2 ± 34.5, (14–119)	*0.59*
Cases with different period of follow-up			*0.69*
Cases followed for ≥12 and ≤24 mo	9 (21.4%)	4 (25%)	
Cases followed for >24 and ≤60 mo	21 (50%)	6 (37.5%)	
Cases followed for >60 mo	12 (28.6%)	6 (37.5%)	
BMI at diagnosis, kg/m^2	23.0 ± 3.0	23.8 ± 2.6	*0.36*
Menopausal status at diagnosis			*0.09*
No	33 (78.6%)	9 (56.3%)	
Yes	9 (21.4%)	7 (43.8%)	
Comorbidities	6 (14.3%)	3 (18.8%)	0.70
Hypertension	3 (7.1%)	3 (18.8%)	0.33
Diabetes	2 (4.8%)	0 (0.0%)	
COPD	1 (2.4%)	0 (0.0%)	
Chronic nephrosis	0 (0.0%)	1 (6.3%)	
Marital status at survey			*0.34*
Married or lived with a partner	38 (90.5%)	13 (81.2%)	
Lived without a partner	4 (9.5%)	3 (18.8%)	
Education level			*0.72*
Low	5 (11.9%)	4 (25.0%)	
Intermediate	24 (57.1%)	7 (43.8%)	
High	13 (31.0%)	5 (31.3%)	
Having children			*0.12*
No	7 (16.7%)	1 (6.3%)	
Yes	35 (83.3%)	15 (93.7%)	
Average number of children (range)	1 (1–3)	1 (1–3)	
Work status			*0.66*
Blue/white collar	14 (33.3%)	2 (12.5%)	
Worker	6 (14.3%)	3 (18.8%)	
Farmer	4 (9.5%)	3 (18.8%)	
Self-employed	4 (9.5%)	1 (6.3%)	
Housewife	14 (33.3%)	7 (43.8%)	
Family monthly income			*0.07*
Very low (≤1000 RMB)	5 (11.9%)	3 (18.8%)	
Low (1000–3000 RMB)	7 (16.7%)	4 (25.0%)	
Intermediate (3000–5000 RMB)	9 (21.4%)	7 (43.8%)	
High (≥5000 RMB)	21 (50.0%)	2 (12.5%)	
Medical insurance status			*0.81*
Medical insurance for urban employees	31 (73.8%)	11 (68.8%)	
New Rural Cooperative Medical insurance	3 (7.1%)	2 (12.5%)	
No insurance	8 (19.0%)	3 (18.8%)	

All results are expressed as mean ± standard deviation or number (%). BMI = body mass index, COPD = chronic obstructive pulmonary disease.

resumed sexual activity 4.2 (range, 1–24) months after the operation, which was significantly earlier than those in the laparotomy group at 6.64 (range, 3–12) months ($P = 0.006$). However, only 64.3% (27/42) and 56.3% (9/16) of the laparoscopy and laparotomy survivors, respectively, who had sexual intercourse within the 4 weeks prior to the interview completed the items related to sexual function on the EORTC QLQ-CX24 and FSFI; no significant differences were found between the 2 groups in age, body mass index, percentage of cases retaining ovaries, or follow-up time. In addition, approximately 33.3% of cases in the total laparoscopy group and 68.8% of survivors in the laparotomy group had ever consulted doctors about post-RH sexuality, whereas only 4.8% of patients with total laparoscopy and 6.3% of laparotomy cases had turned to doctors for help.

Patients in the total laparoscopy group obtained lower scores on sexual/vaginal function and sexual worry and higher scores for sexual activity and enjoyment than those in the laparotomy group, but they did not significantly differ after controlling for differences in background characteristics. The total FSFI scores were 19.7 and 17.4 in the total laparoscopy group and laparotomy group, respectively, and no significant differences existed between the 2 groups in any of the items or for the total FSFI score after controlling for differences in background characteristics (Table 4).

4. Discussion

Minimal surgical techniques (e.g., laparoscopy) are becoming increasingly popular among gynecologists in the treatment of cervical cancer, and, to some extent, QOL may be a prognostic factor and influence the survival of patients with cervical cancer[6,7]; this makes the assessment and comparison of QOL in research on laparoscopic or traditional laparotomic RH an issue of utmost importance. The main findings of this study were that the choice of surgical approach when performing RH seemed

Table 2

Clinical and surgical data for patients based on surgical approach.

Clinical and surgical data	Total laparoscopy group (n = 42)	Laparotomy group (n = 16)	P
FIGO stage			*0.90*
IA	15 (35.7%)	6 (37.5%)	
IB/IIA <4 cm	27 (64.3%)	10 (62.5%)	
Type of radical hysterectomy			*0.84*
Piver II	30 (71.4%)	11 (68.8%)	
Piver III	12 (28.6%)	5 (31.2%)	
Lymphadenectomy			*>0.99*
No	8 (19.0%)	3 (18.8%)	
Pelvic alone	34 (81.0%)	12 (75.0%)	
Pelvic and para-aortic	0 (0.0%)	1 (6.3%)	
Number of dissected lymph nodes	18.6 ± 6.6	20.7 ± 4.6	*0.26*
Width of vaginal cutoff, cm	3.0 ± 0.9	3.1 ± 0.8	*0.93*
Parametrial length, cm			
Left parametrium	2.7 ± 0.9	2.8 ± 0.4	*0.45*
Right parametrium	2.6 ± 0.8	2.8 ± 0.3	*0.28*
Cases retaining ovaries	26 (61.9%)	4 (25.0%)	*0.01*
One ovary	7 (16.7%)	2 (12.5%)	
Two ovaries	19 (45.2%)	2 (12.5%)	
Cases with postoperative complications	8 (19.0%)	4 (25.0%)	*0.62*

All results are expressed as mean ± standard deviation or number (%). FIGO = International Federation of Gynecology and Obstetrics.

to have little impact on changes in post-RH QOL and sexual function among disease-free cervical cancer survivors after a minimum follow-up of 12 months; additionally, survivors were able to cope well after RH, consistent with the results of previous studies,[5,22,23] and RH greatly impaired females' sexual function.

To our knowledge, no study has evaluated the possible different influences of surgical approach postoperative QOL in cervical cancer survivors, with the exception of several studies enrolling patients undergoing staging surgery via laparoscopy or laparotomy for endometrial cancer.[24] In a randomized trial conducted by the Gynecologic Oncology Group,[24] 802 patients with endometrial cancer were enrolled and completed QOL assessments with the Functional Assessment of Cancer Therapy-General at baseline, at 1, 3, and 6 weeks, and at 6 months postsurgery. The data provided modest support for the QOL advantages of using laparoscopy to stage patients with early endometrial cancer within 6 weeks after surgery, although no significant differences were found in QOL between the 2 groups at 6 months after surgery. Similarly, survivors in this study showed good scores on all items except body image on the EORTC QLQ-C30 and QLQ-CX24 and no significant differences existed in post-RH QOL between the total laparoscopy group and laparotomy group after controlling for background covariates after a 4-year follow-up. Body image that may gradually recover after treatment from its poor status during

Table 3

EORTC QLQ-C30 and QLQ-CX24 scores of patients based on surgical approach.

Scales/items	Overall (n = 58)	Total laparoscopy group (n = 42)	Laparotomy group (n = 16)	P	P*
EORTC QLQ-C30					
Functioning scales					
Physical functioning	90.00 ± 13.07	90.32 ± 12.34	89.58 ± 14.40	*0.85*	*0.91*
Role functioning	86.26 ± 25.34	87.70 ± 21.80	84.38 ± 30.10	*0.64*	*0.35*
Emotional functioning	61.82 ± 14.09	60.41 ± 15.29	63.67 ± 12.34	*0.31*	*0.87*
Cognitive functioning	82.66 ± 22.65	82.14 ± 23.68	83.33 ± 21.59	*0.83*	*0.56*
Social functioning	88.74 ± 18.11	87.30 ± 18.34	90.63 ± 17.93	*0.44*	*0.70*
Global quality of life	72.97 ± 20.45	75.40 ± 20.49	69.79 ± 20.61	*0.36*	*0.26*
Symptom scales					
Fatigue	21.02 ± 22.19	18.52 ± 19.73	24.31 ± 25.41	*0.36*	*0.14*
Nausea and emesis	6.53 ± 18.05	2.78 ± 8.16	11.46 ± 25.62	*0.07*	*0.28*
Pain	12.16 ± 16.85	12.70 ± 17.20	11.46 ± 16.91	*0.81*	*0.98*
Single-item scales					
Dyspnea	15.31 ± 24.17	17.46 ± 24.68	12.50 ± 23.96	*0.49*	*0.79*
Insomnia	31.08 ± 31.85	30.95 ± 33.25	31.25 ± 30.96	*0.98*	*0.76*
Appetite loss	16.21 ± 24.82	12.70 ± 17.96	20.83 ± 31.91	*0.23*	*0.75*
Constipation	22.52 ± 31.75	14.29 ± 21.01	33.33 ± 39.71	*0.02*	*0.22*
Diarrhea	6.76 ± 17.43	3.97 ± 10.93	10.42 ± 23.47	*0.31*	*0.70*
Financial difficulties	17.57 ± 27.15	18.25 ± 29.63	16.67 ± 24.34	*0.85*	*0.99*
EORTC QLQ-CX24					
Multi-item scales					
Symptom experience	8.92 ± 8.60	8.51 ± 9.16	9.47 ± 8.05	*0.72*	*0.50*
Body image	13.66 ± 21.64	12.50 ± 16.40	14.55 ± 25.08	*0.69*	*0.75*
Sexual/vaginal function†	33.52 ± 30.23	23.77 ± 25.91	48.15 ± 30.99	*0.007*	*0.09‡*
Single-item scales					
Lymphedema	9.91 ± 21.18	6.35 ± 15.16	14.58 ± 27.13	*0.15*	*0.50*
Peripheral neuropathy	16.67 ± 24.20	15.08 ± 24.64	18.75 ± 24.25	*0.61*	*0.73*
Menopausal symptoms	8.10 ± 17.28	6.35 ± 15.16	10.41 ± 20.07	*0.41*	*0.48*
Sexual worry†	29.63 ± 37.08	17.28 ± 29.77	48.15 ± 39.97	*0.009*	*0.12‡*
Sexual activity†	21.48 ± 27.67	23.46 ± 27.45	18.52 ± 28.52	*0.56*	*0.54‡*
Sexual enjoyment†	40.74 ± 33.25	48.15 ± 33.76	29.63 ± 30.01	*0.07*	*0.23‡*

All results are expressed as mean ± standard deviation. EORTC QLQ-C30 = European Organization for Research and Treatment of Cancer Quality-of-Life Questionnaire including 30 items, EORTC QLQ-CX24 = Cervical Cancer-Specific Module of the European Organization for Research Treatment of Cancer Quality-of-Life Questionnaire including 24 items.

* After controlling for different background characteristics including age at diagnosis, age at present, and percentages of patients retaining ovaries.

† Items were completed by only participants who had sexual intercourse within the 4 weeks prior to the interview.

‡ After controlling for differences in background characteristics including first postoperative sexual time and number of patients consulting physicians.

Table 4

Details of patients resuming sexual intercourse after surgery based on surgical approach.

Details of females' sexuality	Total laparoscopy group (n = 42)	Laparotomy group (n = 16)	*P*	*P**
Number of patients resuming sexuality after surgery	33 (78.6%)	11 (68.8%)	*0.44*	
First sexual time after surgery (range), mo	4.2 ± 2.3 (1–24)	6.6 ± 2.8 (3–12)	*0.006*	
Number of patients consulting doctors	14 (33.3%)	11 (68.8%)	*0.02*	
Number of patients asking for help	2 (4.8%)	1 (6.3%)	*0.81*	
Number of patients completing the questionnaire†	27 (64.3%)	9 (56.3%)	*>0.99*	
Age at diagnosis†	42.6 ± 9.4	48.4 ± 10.0	*0.12*	
Age at present†	46.9 ± 9.4	53.6 ± 7.8	*0.06*	
BMI at diagnosis†	23.0 ± 2.9	23.0 ± 2.9	*0.96*	
Cases retaining 1 or 2 ovaries†	18 (66.7%)	3 (33.3%)	*0.12*	
Follow-up time (range), mo†	49.8 ± 26.3 (12–102)	54.2 ± 42.6 (14–119)	*0.78*	
Cases with different period of follow-up†			*0.43*	
Cases followed for ≥12 and ≤24 mo	5 (18.5%)	3 (33.3%)		
Cases followed for >24 and ≤60 mo	12 (44.4%)	2 (22.2%)		
Cases followed for >60 mo	10 (37.0%)	4 (44.4%)		
FSFI†				
Desire	2.56 ± 0.75	2.06 ± 0.68	*0.08*	*0.14*
Arousal	2.93 ± 0.91	2.56 ± 0.98	*0.31*	*0.43*
Lubrication	3.87 ± 0.90	3.61 ± 0.80	*0.50*	*0.75*
Orgasm	3.36 ± 0.76	3.04 ± 0.81	*0.29*	*0.72*
Satisfaction	3.36 ± 0.81	2.48 ± 0.29	*0.06*	*0.21*
Pain	3.67 ± 1.15	3.70 ± 0.93	*0.93*	*0.26*
Total scores	19.73 ± 4.48	17.44 ± 2.99	*0.16*	*0.31*

Data are expressed as mean ± standard deviation or number (%). BMI = body mass index, FSFI = Female Sexual Functional Index.

* After controlling for background differences including first postoperative sexual time and number of patients consulting physicians.

† Data refer to patients having sexual intercourse within the 4 weeks prior to the interview.

treatment is a component of QOL. Some studies suggest that patients with rectal, gastric, head, and neck cancers have decreased body image,[25,26] and body image is often not completely recovered even 5 years after treatment.[26] Moreover, body image is significantly associated with survival in patients with cervical cancer.[27] In a cross-sectional study, Lee et al[28] compared QOL and sexuality with the EORTC QLQ-C30, EORTC QLQ-CX24, and FSFI between healthy women and propensity score–matched cervical cancer survivors who had received different types of treatment or surgery and were followed for 5 to 211 months, and they found that cervical cancer survivors had an average score of 73.1 for body image, which substantially differed from the 12.5 and 14.55 scores of the total laparoscopy and laparotomy groups, respectively, identified in our study. However, in another study enrolling 115 Chinese outpatients with cervical cancer who received surgery and/or chemoradiotherapy, Hua et al[16] found that patients had an average body image score of 16.43. In addition, Kornblith et al[24] found that patients with endometrial cancer receiving laparoscopy and laparotomy had an average score of 10.5 and 10.1, respectively, regarding their body image presurgery, which was not a significantly difference; however, 6 months postsurgery, the body image scores of patients in both the laparoscopy and laparotomy groups increased to 22.2 and 20.8, respectively, which was a significant difference ($P < 0.001$). Possible reasons for these findings and differences may be as follows. First, the questionnaire included only 3 concise questions to measure body image and thus the quantitative or detailed measurement of body image may have been a bit limited. Additionally, Chinese women who have cervical cancer often have a low social status and family monthly income, tend to focus mainly on the fact that they have cancer, and seem to be sensitive toward the loss of their uterus and/or ovaries. Moreover, at the time of analysis, all survivors with cervical cancer in this study had been followed for >2 years. A review[29] concluded that the QOL of gynecological cancer survivors was most negatively affected from the time of diagnosis to the completion of treatment and that it typically improved after treatment for 6 to 12 months before stabilizing, which may partly explain the similar body image scores in the total laparoscopy and laparotomy groups, although different results were found in the study by Kornblith et al.[24]

Sexuality is an important aspect of QOL, and FSD is a very prevalent and multifaceted problem that continues to be well under-recognized among patients with cervical cancer,[19,30,31] especially Asian patients.[32] In the present study, we found that the total FSFI scores of the 2 groups were <26.6, the validated cutoff value to diagnose FSD,[21] which suggests that RH heavily compromised females' sexual function regardless of surgical approach. Similar results were found in another study in which the total FSFI scores for cervical cancer survivors were 10.80 and 21.95 for the laparoscopy and laparotomy groups, respectively, both of which were significantly lower than the 30.75 score reported by the control group of healthy women.[11] In addition, other previous studies have obtained similar results and concluded that cervical cancer survivors exhibit disruptions in sexual function after RH.[4,33–36] As sexual function in women is determined by several different psychological, cultural, ethical, sexological, organic, and neurological factors,[13] different explanations could be provided for impairments in post-RH sexual function observed among cervical cancer survivors. Persistent changes in vaginal anatomy and function caused by treatment may cause pain or bleeding during intercourse, and the damage to peripheral nerves and small vessels may influence vaginal lubrication and genital swelling.[30] Similarly, the removal of tissue and formation of adhesions in vagina caused by surgery result in the perception of vaginal shortness and inelasticity and can also negatively influence females' sexuality.[4] Moreover, histological studies have provided evidence of a neurogenic etiology of postoperative morbidity, and nerve-sparing RH could confer better sexual function outcomes than

classical RH.[33] However, all patients in this study received classical RH. In addition, the surgical removal of ovaries, which may result in a postmenopausal status with low hormone concentrations or hormonal deficiencies, also has negative effects on females' postoperative sexuality.[30] In this study, more than half of the patients have retained 1 or 2 ovaries, but we do not know whether they received postoperative hormone replacement therapy. Furthermore, anxiety and worry about postoperative sexual performance could be another factor causing impairment in sexual function among cervical cancer survivors.[34] Cultural literature could also negatively influence sexual function, especially in Chinese people.[32,35] In this study, approximately 75.9% of the cases had resumed sexual intercourse after surgery, which was much lower than the 92.4% reported in other countries.[30] Moreover, 52.1% (25/58) of the survivors had consulted doctors about postoperation sexual activity and behavior, but only 5.2% of cases asked physicians for help when experiencing sexual problems. As China is a traditional and conservative country, it is natural for Chinese women to be less open and more passive when discussing sexuality. In particular, FSD is treated as a taboo by most women and especially by patients with cervical cancer in such a conservative culture.

Our data suggested that total laparoscopic RH similarly and negatively influenced females' postoperative sexual function when compared to laparotomic RH, which was consistent with the only other available study specifically designed to compare sexual function after RH in cervical cancer survivors based on surgical approach (laparoscopy vs laparotomy).[13] However, Maurizio et al[13] reported lower total FSFI scores and scores for each scale among patients receiving laparoscopy than in those receiving laparotomy, although without significant differences; these findings conflicted with our results. Previous literature has suggested that radiotherapy is associated with worse sexual function than RH,[4,22,36] and that the combination of RH and pelvic irradiation would result in more severe and prolonged sequelae regarding sexuality than RH alone in patients with cervical cancer.[30,31] Therefore, the fact that more patients received both surgery and radiotherapy in the laparoscopy group than in the laparotomy group may be an important factor contributing to the differences in results. Moreover, the great number of postmenopausal patients, fewer cases retaining ovaries, and fewer patients receiving postoperative hormone replacement therapy in the laparoscopy group could also partly explain the differences.

In a trial using the McCoy scale to evaluate changes in sexuality, Ellström et al suggested that there were no significant differences between the laparoscopy and laparotomy groups regarding sexuality 1 year after hysterectomy for benign gynecological diseases.[37] Studies have suggested that patients with cervical cancer receiving laparoscopic RH or traditional laparotomic RH undergo a similar extent of surgery with similar parametrial width, vaginal cutoff, and lymph node yields.[38] As the same tissues are removed, after a long-term healing process, the anatomic situation of patients undergoing RH via different surgical techniques should be the same with the exception of the laparotomic scar. Furthermore, no significant differences were found between the 2 groups regarding age, menopausal status at diagnosis, body mass index, ovaries retained, or other background characteristics. Hence, all the factors listed earlier could explain the similar influence of surgical approach on post-RH sexual function among cervical cancer survivors.

The single-center nonrandomized design was the primary limitation of our study. Moreover, given the lack of preoperative assessment of sexual function and QOL, we do not know whether differences in presurgery QOL or sexual function existed between the 2 groups. However, Kimlin et al found that patients reported high levels of distress and depression when newly diagnosed with cervical cancer and preparing for surgery.[35] Therefore, we anticipated that many patients would decline participation at this critical time because of the stress of the situation. Instead, we decided that retrospective information would provide more complete and at least valid data without inconveniencing patients prior to their surgery. In addition, the relatively small study population could influence the interpretation of the results. However, the small size was partially due to the strict inclusion criteria. Moreover, we did not enroll survivors' partners or assess their relationship status, which would consistently influence females' postsurgical sexual adjustment; a poor or absent partner relationship may have been a frequent reason for the declines in sexual function after surgery. Finally, we enrolled survivors with various follow-up periods, ranging from 12 to 118 months, and the time-related changes in postoperative adjustment to life were unknown. However, in a population-based survey with 291 cervical cancer survivors followed for 2 to 10 years postdiagnosis, Ida et al found that the health-related QOL of 2- to 5-year survivors were similar to those of the 6- to 10-year survivors.[5] In addition, when disease-free cervical cancer survivors were categorized into 3 groups according to their follow-up time ($\leq$4, 5–9, and $\geq$10 years), a multivariate analysis showed no differences between groups in long-term QOL.[30] Additionally when we divided cases into 3 groups ($\geq$12 and $\leq$24, $>$24 and $\leq$60, and $>$60 months) based on follow-up time, the percentages of cases in the 3 groups were distributed similarly between the 2 surgical approach groups.

This article benefits from several strengths. First, it was the first study to assess and compare differences in QOL and sexual function according to surgical approach in a long-term follow-up by enrolling disease-free cervical cancer survivors who had received only surgery. In addition, the global response rate in our study was 90.5% (58/64), which was relatively higher than the 60% to 69% response rate of other studies[5,36]; a lower response rate may result in a higher selection bias, as patients who participate may have a better QOL or sexual function than those who are unreachable or refuse to participate. Another strength was the use of standardized valid measurements, such as the Chinese version of the FSFI, EORTC QLQ-C30, and EORTC QLQ-CX24, as a few studies used self-designed questionnaires or nonvalid measurements.[4] Furthermore, in the present study, patients received total laparoscopic RH, as vaginal incisions were also sutured via laparoscopy. Therefore, it was not affected by laparoscopic-assisted vaginal procedures or vaginal-assisted laparoscopic procedures.

5. Conclusion

In conclusion, disease-free cervical cancer survivors are able to cope well after surgical treatment, although the RH procedure can greatly impair females' sexual function. The long-term QOL and sexual function of survivors seem to be independent of the surgical approach chosen. Randomized controlled and longitudinal studies with larger populations are needed to better compare the effects of laparoscopy to laparotomy regarding these issues.

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