Correction: Quality of life and sexual functioning after vulvar reconstruction with the lotus petal flap (vol 28, pg 1728, 2018)

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Published in:
International Journal of Gynecological Cancer

DOI:
10.1136/ijgc-2019-IGC.0000000000001340corr1

Publication date:
2019

Quality of Life and Sexual Functioning After Vulvar Reconstruction With the Lotus Petal Flap

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Objective: Resection of (pre) malignant lesions in the vulvoperineal area may result in large defects that cannot be closed primarily. The lotus petal flap technique is widely used for reconstruction. The aim of this study was to evaluate both quality of life (QoL) and sexual functioning of patients who underwent the lotus petal flap procedure, because no data are available on this topic.
Methods: A cross-sectional study was performed on all eligible patients (N = 38) who underwent the lotus petal flap procedure between 2005 and 2016. The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire C30, Female Sexual Function Index, and Body Image Scale were used to evaluate QoL and sexual functioning. The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire C30 and Female Sexual Function Index scores were compared with scores of age-matched healthy women.
Results: Twenty-six patients (68%) responded. The mean (SD) age was 65.5 (16.3) years, and the median follow-up time was 38.5 months (range 16–141 months). Quality of life scores were lower compared with healthy women in the domains physical, role, and social functioning. Sexual activity rates were comparable with healthy women; however, sexual functioning was worse. Although patients were satisfied about their sexual life, pain was reported.
Conclusions: Patients who underwent vulvar reconstructive surgery with lotus petal flaps seem to have a lower QoL compared with healthy women. Patients report more pain during sexual activity but are satisfied about their sexual functioning. These results should be included in preoperative counseling and follow-up of future patients eligible for vulvar reconstruction with a lotus petal flap.

Key Words: Vulvar reconstruction, Lotus petal flap, Quality of life, Sexual functioning, Vulvar cancer

Received May 23, 2018, and in revised form June 28, 2018.
Accepted for publication July 3, 2018.

(*Int J Gynecol Cancer* 2018;28: 1728–1736)

Treatment of vulvar and rectal (pre) malignant disease sometimes includes extensive excision of these tumors, resulting in large defects that cannot be closed primarily. The resulting wound may be reconstructed using a local or regional flap. In vulvar cancer, little is known about the impact of surgical treatment and vulvar reconstruction on quality of life (QoL) and sexual functioning.

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The authors declare no conflicts of interest.

Supplemental digital content is available for this article. Direct URL citation appears in the printed text and is provided in the HTML and PDF versions of this article on the journal's Web site (www.ijgc.net).

ISSN: 1048-891X
DOI: 10.1097/IGC.0000000000001340

Aerts et al[1] reviewed the literature on the impact of vulvectomy in 456 patients and stated that there is an urgent need for studies investigating these factors, with special attention for psychosocial factors (eg, body image), applying validated questionnaires. However, none of these patients underwent the lotus petal flap procedure.

As part of primary treatment, some patients (with both vulvar and rectal carcinoma) receive (neo) adjuvant therapy, which may cause inflammation in the acute phase. In a later phase, (vaginal) fibrosis and edema frequently cause sexual dysfunction due to narrowing of the vaginal introitus, reduced sensation, and loss of elasticity.[2,3] Especially in case of treatment for recurrent disease and/or previous radiotherapy, reconstruction with healthy nonirradiated tissue is often required. However, good results after reconstructive surgery are challenged by the fact that, by definition, the perineal and vulvar area are contaminated. This may delay wound healing. Furthermore, wound dehiscence may occur owing to poor perfusion of the remaining wound edges or tension on the wound borders.

In the past, skin grafts were used to cover large defects. It carries the risk of (partial) loss of the skin graft, contracture, and vaginal stenosis.[4,5] Several flap transposition techniques for reconstruction have been reported, but little is known about their postoperative outcome and their impact on the QoL and sexual functioning.[6] In our center, the fasciocutaneous lotus petal flap procedure has been used since 2005 for vulvar and perineal reconstruction.[7] The lotus petal flap, first described by Yii and Niranjan,[8] uses local tissue from an area where scars can be easily hidden in the fold of the buttocks or groins. The lotus petal flap technique is useful in numerous situations. The vulvoperineal area has a rich blood supply, making it an ideal donor site for flaps. In addition, application of a lotus petal flap does not impair the form and function of the donor site such as for instance the vertical rectus abdominis musculocutaneous flap does.[9,10]

To our knowledge, no information is available on the sexual functioning and QoL of patients after a vulvar reconstruction using lotus petal flaps. We hypothesize that sexual functioning and QoL will be lower compared with healthy subjects. However, the extent of the problems is unknown. Therefore, in this study, the aim is to evaluate sexual functioning and QoL of patients who underwent a reconstruction with a lotus petal flap as part of surgery for vulvar or rectal disease.

METHODS

Patients

This cross-sectional study included all patients who underwent vulvar reconstruction with the lotus petal flap procedure at the University Medical Center Groningen (UMCG) between January 2005 and January 2016. Patients were excluded when they were unable to fill out the questionnaires owing to inadequate understanding of the Dutch language or in case of cognitive impairment or dementia. The medical ethical committee of the UMCG decided that formal approval for this study was unnecessary. All patients gave written informed consent.

Data Collection and Questionnaires

Data were collected using patient files and questionnaires. Quality of life was evaluated with the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire C30 (EORTC QLQ-C30), which is developed to study general QoL in cancer patients. Quality of life scores were divided into three domains: (1) global health status, (2) functional scales, and (3) symptom scales. High scores in the first two scales correlated with respectively a high level of functioning and high QoL scores. A high score in the symptom scale correlated with a high level of complaints.[11] Cronbach α coefficients for the EORTC QLQ-C30 domains were 0.86 for global health status, 0.68 for physical functioning, 0.54 for role functioning, 0.73 for emotional functioning, 0.56 for cognitive functioning, 0.68 for social functioning, 0.80 for fatigue, 0.82 for pain, and 0.65 for nausea and vomiting.[12]

Sexual functioning and body image were scored by using the Female Sexual Function Index (FSFI) and the Body Image Scale (BIS).[13–16] The FSFI focuses on sexual desire, sexual worries, and satisfaction with sexuality. The domains for sexual function are as follows: desire, arousal, lubrication, orgasm, satisfaction, and pain. A high score indicated a higher level of satisfaction with the sexual functioning.[13,14] For the FSFI domains, the Cronbach α coefficients were 0.92 for desire, 0.95 for arousal, 0.96 for lubrication, 0.94 for orgasm, 0.89 for satisfaction, 0.94 for pain, and 0.97 for the total score.[13,14] The BIS is a cancer-specific measure to assess satisfaction with body image and appearance. A low BIS score indicates less concern with body image.[15,16] For the BIS questionnaire, the Cronbach α coefficient was 0.93.[15] All three questionnaires are validated for the Dutch language. Furthermore, patients scored their satisfaction regarding functional and esthetic outcome on a 10-point Likert scale. A high score indicates a higher level of satisfaction.

Missing items in all questionnaires were handled as recommended in the EORTC scoring manual.[11] Questionnaire domain scores were considered missing in case less than half of the items within a domain were missing. When at least half of the items were available, missing scores were calculated as a mean of the available items within the domain. The Cronbach α coefficients for each questionnaire of the study group are reported in the supplementary data (Table S1, http://links.lww.com/IGC/A810).

Data Analysis

Follow-up time was calculated in months from date of surgical reconstruction until the date of filling out the questionnaire. For comparison, the results of the EORTC QLQ-C30, FSFI, and BIS questionnaires were stated as mean (SD), because most studies on this subject used the mean for description of EORTC QLQ-C30 and BIS. The scores of the EORTC QLQ-C30 were compared with the Swedish reference data of women aged 60 to 69 years in the general population.[17] The FSFI values were compared with data from the general Dutch population of women aged 60 to 70 years.[18] Comparison of the EORTC QLQ-C30 and FSFI values with the reference data was performed by plotting all values of our study group and the mean values and the 95% confidence intervals of both our study

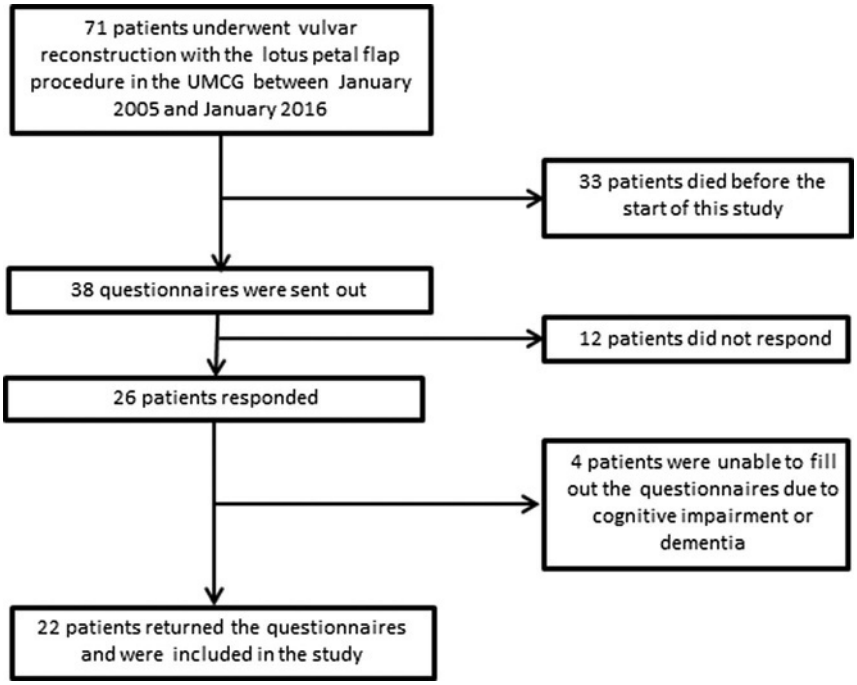

FIGURE 1. Flow chart of the study population.

group and the reference data in one graph. No statistic tests were performed for both questionnaires owing to the small study population. To test correlation between age and results of the questionnaires and between follow-up time and results of the questionnaires, the Spearman rank order correlation coefficient (ρ) was calculated. A P value <0.05 was considered significant. Statistical analyses were performed with IBM Statistical Package for the Social Sciences version 23 (IBM Corp., Armonk, NY).

RESULTS

Patient Characteristics

Between January 2005 and January 2016, 71 patients underwent vulvar reconstruction with the lotus petal flap procedure at the UMCG. Thirty-three of these patients died before the start of this study. Questionnaires were sent out to the remaining 38 patients of whom 26 (68%) responded. Four patients were unable to fill out the questionnaires owing to cognitive impairment or dementia. Twenty-two patients (58%) returned the written consent and the questionnaires (Fig. 1). Indications for resection varied in our study population: vulvar cancer or dysplasia and anal or rectal cancer. Differences between these groups were tested for all questionnaires. Except for diarrhea and emotional functioning in the EORTC QLQ-C30, no differences were found. Because of this and the fact that the operated areas are overlapping, data are presented for the entire study group. The median time between reconstruction and evaluation by questionnaire was 38.5 months (range 15.8–141.4 months). The mean (SD) age at evaluation was 65.5 (16.3) years. Patient, tumor, resection, and reconstruction characteristics are depicted in Table 1.

Quality of Life

The scores on the different domains and the reference values of healthy women are presented in Figure 2. Our study population showed a decrease on the physical functioning, role functioning, and social functioning scales. The global health status, emotional functioning, and cognitive functioning were comparable. On the symptom scales, the study group reported more fatigue, insomnia, diarrhea, and financial difficulties, but less dyspnea. Complaints of nausea and vomiting, pain, and appetite loss were comparable between our study group and the reference values. The EORTC QLQ-C30 score diarrhea was significantly correlated with age ($\rho = -0.44$, $P = 0.04$), showing more complaints of diarrhea in younger patients.

Sexual Functioning

Nineteen of the 22 patients filled out the FSFI questionnaire of which 10 patients (53%) reported to be sexually active. Figure 3 shows the FSFI scores for the different domains and the total scores for all 10 sexually active patients in the study group and reference data. Two patients (20.0%) scored above the normal sexual functioning border of 26.0.[20] Four patients (40%) reported vaginal penetration in the past 4 weeks. Interestingly, the domain satisfaction showed the highest score of all domains. This score and the desire scores were comparable with the Dutch general population (Fig. 3).[18] All other domains were scored lower in our study group. Within the group of sexually active patients, there was a significant negative correlation between age and the total FSFI score ($\rho = -0.75$, $P = 0.02$) and between age and the FSFI domain orgasm ($\rho = -0.71$, $P = 0.02$), meaning that older patients had lower scores and therefore worse sexual function.

TABLE 1. Patient, tumor, resection, and reconstruction characteristics

	n (%)
Age, y	65.5 (16.3)*
BMI, kg/m^2	24.4 (18.1–40.4)†
ASA	
– Class I	5 (22.7)
– Class II	17 (77.3)
Smoking	
– No	16 (72.7)
– Past	3 (13.6)
– Current	3 (13.6)
Comorbidity	
– Hypertension	18 (81.8)
– Thyroid disease	2 (9.1)
– Diabetes mellitus	1 (4.5)
– Hypertension and diabetes mellitus	1 (4.5)
Disease type	
– Vulvar carcinoma	12 (54.5)
– Rectum carcinoma	4 (18.2)
– Anal carcinoma	2 (9.1)
– Lichen sclerosus	2 (9.1)
– Ewing sarcoma	1 (4.5)
– Morbus Zoon	1 (4.5)
Resection type	
– Partial vulvectomy	11 (50.0)
– Total vulvectomy	3 (13.6)
– APE + posterior exenteration	3 (13.6)
– APE	2 (9.1)
– APE + total exenteration	2 (9.1)
– APE + distal sacrum resection	1 (4.5)
Radiotherapy	
– None	9 (40.9)
– Neoadjuvant	12 (54.5)
– Adjuvant	1 (4.5)
Chemotherapy	
– None	17 (77.3)
– Neoadjuvant	3 (13.6)
– Adjuvant	1 (4.5)
– Neoadjuvant + adjuvant	1 (4.5)
Donor site location	
– Groin	11 (50.0)
– Infragluteal fold	11 (50.0)
No. donor sites	
– One sided	10 (45.5)
– Two sided	12 (54.5)
Complications donor site‡	
– None	16 (72.7)
– Clavien-Dindo class I	5 (22.7)
– Clavien-Dindo class II	1 (4.5)
– Clavien-Dindo class III and higher	0 (0)
Complications acceptor site‡	
– None	9 (40.9)
– Clavien-Dindo class I	8 (36.4)
– Clavien-Dindo class II	1 (4.5)
– Clavien-Dindo class III and higher	4 (18.2)
Multiple resections	6 (27.3)

One of the patients in the vulvar group showed complications unrelated to the recipient or donor site. She became septic based on an intestinal necrosis due through herniation of the small intestines around her colostomy. The ischemic part of the colon was resected. Second, she developed pneumonia with acute respiratory distress syndrome and lung embolism. She fully recovered after a 26-day stay on the intensive care unit.

*In mean (SD).

†In median (range).

‡Clavien-Dindo classification: class I, complication without intervention; class II, complication requiring pharmacological treatment; class III and higher, intervention requiring surgical treatment.[19]

APE, abdominoperineal excision; ASA, American Society of Anesthesiologists classification; BMI, body mass index.

Body Image

All 22 patients completed the BIS questionnaire. The mean (SD) total score of the BIS questionnaire was 9.6 (7.3) out of a maximum of 30.0 (Fig. 4). The BIS score was negatively correlated with age ($\rho = -0.48$, $P = 0.02$), meaning that older patients had lower scores and less concern with body image.

Functional and Esthetic Satisfaction Outcome

All 22 patients completed the two questions regarding satisfaction with functional and esthetic outcome. Satisfaction was scored on a Likert scale from 0 to 10, in which a score of 10 correlates with the highest possible satisfaction. The median score on functional outcome was 7 (interquartile range 6–8), and on esthetic outcome was 7 (interquartile range 5–8) (Fig. 5). Satisfaction scores were not significantly correlated with age or follow-up time.

DISCUSSION

In this study, the QoL, sexual functioning, and body image of patients who underwent a vulvar reconstruction using the lotus petal flap technique was evaluated. Quality of life scores seemed overall lower compared with healthy females. In particular, the functioning scales and sexual functioning were lower compared with healthy women.

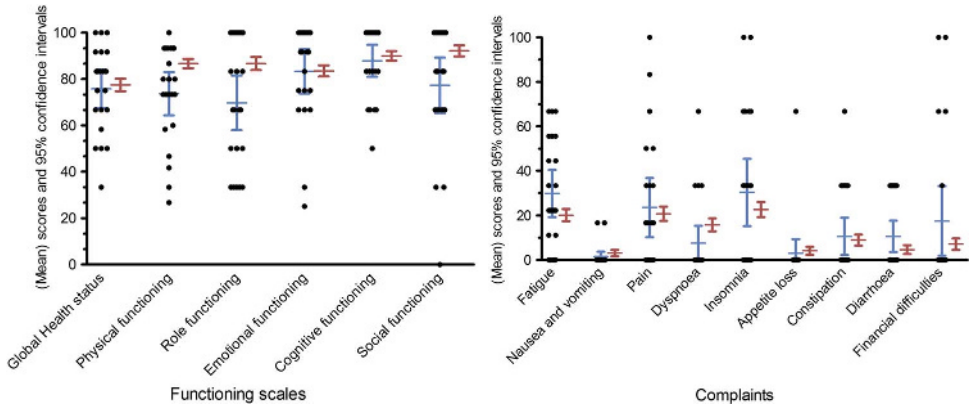

FIGURE 2. EORTC QLQ-C30 scores of study group and references. Quality of life scores of all 22 patients in the study group and both mean and 95% confidence intervals are plotted for study group (left) and reference group (right); women aged 60 to 69 years from Michelson et al (2000).[17] A high score in the functioning scales (left) correlates with a high level of functioning and QoL. A high score in the symptom scales (right) correlates with a high level of complaints. Footnote: One score of study group is missing in the complaint scale financial difficulties.

Quality of Life

Compared with healthy females aged 60 to 69 years, our study group scored significantly worse on physical functioning, role functioning, and social functioning. All other functioning and symptom scores were comparable. Data on QoL after vulvar surgery are scarce.[1,21–23] Oonk et al[22] compared the QoL of a group that underwent sentinel lymph node procedure only with a group that underwent inguinofemoral lymphadenectomy, both after wide local excision for vulvar cancer. The wounds of these patients were closed primarily (without reconstruction with a soft tissue flap). In the present study, EORTC QLQ-C30 scores were worse except for the symptom scales nausea and vomiting, dyspnea, and appetite loss. It is likely that the differences in QoL between that study and our study may be explained by the fact that the excision defects were larger in our study, because the defects could not be closed primarily. Novackova et al[23] studied the QoL of patients who underwent vulvar cancer surgery and inguinofemoral lymphadenectomy 12 months after surgery. Their global health status scores were lower compared with the ones in our study group (64.91 vs 75.76), but their functional scales were comparable or higher. On the symptom scales, only the fatigue, pain, and financial difficulties scored clearly worse by our study group; all other scales scores were better. Likes et al[24] also studied QoL after vulvar excision using the EORTC QLQ-C30. They reported a decrease of QoL with increasing age. It was impossible to compare this with our study group because the subscores were unavailable.

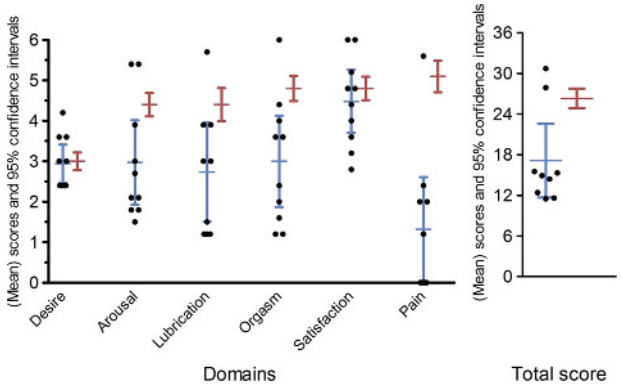

FIGURE 3. FSFI scores of study group and references. The FSFI scores for all 10 sexually active patients of the study group and both mean and 95% confidence interval are plotted for the study group (left) and the reference group (right); women aged 60 to 70 years from Lammerink et al (2017).[18] A high score indicates a higher level of satisfaction with the sexual functioning. Footnote: The total score of 1 patient could not be reported because the score of the domain lubrication was missing.

Sexual Functioning

More than half of the patients (53%) of our study group were sexually active after vulvar reconstruction with the lotus petal flap technique. This is comparable with the reported rate of 48% sexually active woman aged 60 to 70 years by Lammerink et al.[18] Only 40% of those patients also had vaginal penetration in the past four weeks. In Table 2, we present relevant studies that used the FSFI questionnaire in vulvar cancer patients and

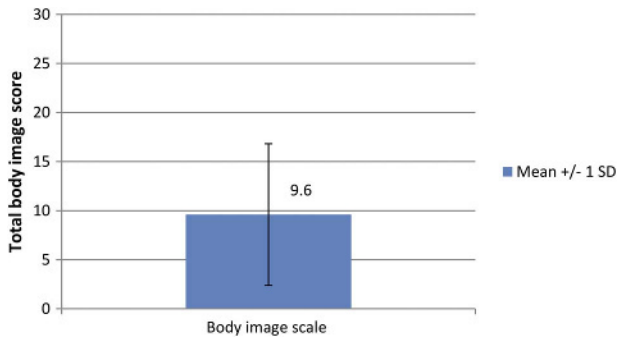

FIGURE 4. BIS total score of study group. A low BIS score indicates less concern with body image.

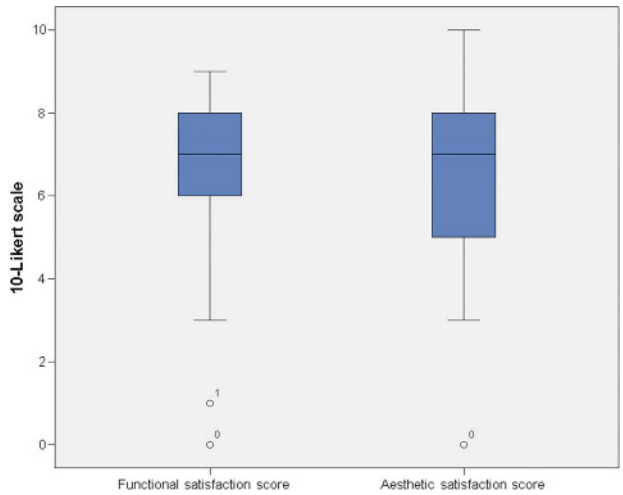

FIGURE 5. Satisfaction scores of study group. A high score indicates a higher level of satisfaction.

healthy women. For comparison reasons, we noted both the mean and median score of our study group in Table 2. The sexual activity rate in our study group is relatively high compared with any other study performed in vulvar cancer patients using the FSFI questionnaire.[21,24–26] In a large study of Lindau et al[27] on healthy adults from the United States, 39.5% of the female age group 65 to 74 years reported to be sexually active. This is also lower compared with our study group with a comparable mean age.[27] However, in the two studies that reported total FSFI scores in vulvar cancer patients, these scores were higher than in our study group.[21,25] Also, the total FSFI scores and all subdomains of our study group were worse than those of healthy Dutch women reported by Ter Kuile et al[14] (mean 17.1 vs 31.2). However, the women reported by Ter Kuile et al[14] are younger in our study group (mean age 65.5 vs 27.1 years). Our study ($\rho = -0.75$, $P = 0.02$) and several other studies showed that age is negatively related with sexual functioning.[24–26] Furthermore, it has been shown that only 20% of the preoperatively sexually active women resumed intercourse after radical vulvectomy and primary closure in a group patients aged 65 years and older.[28–30] For these reasons, it is relevant to compare our data with elder healthy women. As mentioned previously, the number of sexually active women in this study is comparable with the general Dutch population.[18] All sexual functioning scores are lower in our study group. Although the domains desire and satisfaction are almost comparable, when looking at the FSFI subdomains, our study group scores lowest on the domain pain (0.0), meaning that patients experience pain. The domain satisfaction scored highest within our study group (4.6). This domain scored higher compared with vulvar cancer patients with primary closure; however, it was still lower compared with healthy women from Ter Kuile et al[14] and the control group from De Melo Ferreira et al.[25] Also, a high satisfaction on the 10-point Likert scales on esthetic and functional satisfaction was seen. Of the other subdomains, the desire scores of our study group were higher than those in the other studies involving vulvar cancer patients.[25,26]

Regarding sexual function, Sadovsky et al[31] advises to inform patients and their partners preoperatively on possible changes in sexual function and to manage postoperative sexual dysfunction like those in patients without cancer. Postoperatively, the focus of clinicians should be on reviewing and managing (psycho) sexual adverse effects. As shown, patients do have sex after vulvar reconstruction and are satisfied about their sexual functioning but experience pain doing this. Pain seems to be an important issue in this patient group, and therefore, consultation of a sexologist during follow-up, and when needed a pelvic floor physiotherapist, should be considered.

Body Image

Because of the lack of data on body image after vulvar surgery, Barlow et al[32] interviewed 10 women after treatment for early-stage vulvar cancer. They found that many women maintain their body image; however, women with the most radical and multiple procedures showed a lower satisfaction with body image. Hazewinkel et al[26] scored the body image using the BIS questionnaire after local excision. Their score was lower compared with the scores of our study group (5 vs 9.6), which means that their group had less concern with their body image. We found that older patients have less concern with body image. The mean age of Hazewinkel et al's[26] study group was just slightly older compared with our study group (68 vs 65.5 years).

Strengths and Limitations

This study is the first to show data on QoL and sexual functioning of patients undergoing a vulvar reconstruction using the lotus petal flap technique. In this study, validated questionnaires were used. The response rate in this questionnaire study was 68%, and the follow-up time was long with a median of 38.5 months. Because it is the first study to present data on sexual function and QoL for patients undergoing a lotus petal flap technique, we feel that this study has a high value for both clinicians and patients. However, this study does have some limitations. First, patients were evaluated at one single point in time and no preoperative questionnaire data were available for this analysis. Therefore, no comment on how parameters changed over time can be made. Also, the number of included patients is limited, owing to the scarcity of patients who underwent this procedure. However, this patient cohort is the largest ever presented on this subject. Furthermore, some patients underwent several surgeries in the vulvoperineal area because of recurrent disease. This might have led to a recall bias because it might be hard to determine which of the surgeries has led to a certain symptom or problem.

CONCLUSIONS

In this study the QoL, sexual function, body image, and satisfaction of patients who underwent a vulvar reconstruction using the lotus petal flap technique was evaluated. General QoL of these patients is relatively good compared with healthy females; however, their physical, role, and social functioning are significantly lower. Sexually activity rates after vulvar reconstruction are comparable with the general Dutch population. Sexual functioning is impaired compared with healthy women. Patients reported more pain during sexual activity but are satisfied about their sexual functioning. The desire scores are comparable with healthy women. Patients are satisfied with their body image, and the esthetic and

TABLE 2. Overview of studies involving vulvar cancer patients or healthy women using the FSFI questionnaire

	Patient Group	No. Patients	Mean Age, y	Sexually Active, %	FSFI Total Score (Median/Mean)		FSFI Domains – Desire – Arousal – Lubrication – Orgasm – Satisfaction – Pain (Median/Mean)	
Study group	Vulvar disease (n = 7) and rectal/anal disease (n = 3) treated with excision and vulvar reconstruction using lotus petal flap	10	65.5	45.5 (10/22)	14.9	17.1	2.7 2.4 3.0 3.0 4.6 0.0	2.9 3.0 2.7 3.0 4.5 1.1
De Melo Ferreira et al (2012)[25]	Vulvar cancer treated with vulvectomy and inguinofemoral lymphadenectomy	28	66.9	21.4	18.8		2.4 2.4 3.6 1.8 3.2 5.0	
	Age-matched control group of healthy women	28	66.9	32.1	21.4		2.4 3.6 3.0 2.8 4.8 3.2	
Hazewinkel et al (2012)[26]	Vulvar cancer survivors; less extensive treatment: local excision (and sentinel node)	46 (N varies per domain from 13–46)	68	NR		NR		2.0 2.9 3.8 4.2 3.6 4.8
	Vulvar cancer survivors; extensive treatment: local excision and inguinofemoral lymphadenectomy	30 (N varies per domain from 5–30)		NR		NR		1.9 2.1 3.3 4.2 4.4 4.2

Lammerink et al (2017)[18]	Healthy Dutch women	654	48*	69	26.1†	26.3†	3.0†	3.0†	
							4.4†	4.4†	
							4.8†	4.4†	
							4.8†	4.8†	
							4.8†	4.8†	
							6.0†	5.1†	
Lavoué (2013)[21]	Vulvar Paget or VIN, skinning vulvectomy with split-thickness skin graft	10/13	70*	30 (3/10); mean age, 34 y		26.1		NR	
Likes et al (2007)[24]	A vulvar excision greater than 1 cm and sexual activity within the last year before the excision	43	47.5	NR	NR			NR	
Ter Kuile et al (2009)[14]	Healthy women	108	27.1	98		31.2			4.0
									5.3
									5.7
									5.1
									5.4
									5.7

*Median age.
†Age group 60 to 70 years.
NR, not reported; VIN, vulvar intraepithelial neoplasia.

functional result of the reconstruction. These data will assist in the preoperative counseling for patients undergoing vulvar reconstruction because of surgery for (pre)malignant disease. During follow-up, attention for sexual functioning and QoL is important. We recommend, based on our clinical experience, that low-threshold consultation of a sexologist or pelvic floor physiotherapist should be offered.

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Correction: *Quality of life and sexual functioning after vulvar reconstruction with the lotus petal flap*

Hellinga J, te Grootenhuis NC, Werker PM, *et al*. Quality of life and sexual functioning after vulvar reconstruction with the lotus petal flap. *Int J Gynecol Cancer* 2018;28:1728–36. doi: 10.1136/ijgc-2019-IGC.0000000000001340

In this paper, joint first authorship should have been listed for authors J. Hellinga and N.C. te Grootenhuis.

Int J Gynecol Cancer 2019;**29**:1230. doi:10.1136/ijgc-2019-IGC.0000000000001340corr1