Quality of life of women with lower limb swelling or lymphedema 3-5 years following endometrial cancer

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Abstract

Objective: To quantitatively assess and compare the quality of life (QoL) of women with a self-reported diagnosis of lower limb lymphedema (LLL), to women with lower limb swelling (LLS), and to women without LLL or LLS following treatment for endometrial cancer.

Methods: 1399 participants in the Australian National Endometrial Cancer Study were sent a follow-up questionnaire 3–5 years after diagnosis. Women were asked if they had experienced swelling in the lower limbs and, if so, whether they had received a diagnosis of lymphedema by a health professional. The 639 women who responded were categorised as: Women with LLL (n = 68), women with LLS (n = 177) and women without LLL or LLS (n = 394). Multivariable-adjusted generalized linear models were used to compare women's physical and mental QoL by LLL status.

Results: On average, women were 65 years of age and 4 years after diagnosis. Women with LLL had clinically lower physical QoL (M=41.8, SE=1.4) than women without LLL or LLS (M=45.1, SE=0.8, p =.07), however, their mental QoL was within the normative range (M=49.6; SE= 1.1 p =1.0). Women with LLS had significantly lower physical (M= 41.0, SE=1.0, p = .003) and mental QoL (M=46.8; SE=0.8, p <.0001) than women without LLL or LLS (Mental QoL: M=50.6, SE=0.8).

Conclusion: Although LLL was associated with reductions in physical QoL, LLS was related to reductions in both physical and mental QoL 3-5 years after cancer treatment. Early referral to evidence-based lymphedema programs may prevent long-term impairments to women's QoL.

Keywords: endometrial cancer; lymphedema; lower-limb swelling; quality of life

INTRODUCTION

Secondary lymphedema is an accumulation of fluid in body tissues resulting from damage to the lymphatic system. The condition is relatively common after cancer treatment: around one fifth of women will develop upper limb lymphedema (ULL) following breast cancer [1], and up to one third of women report either lower limb swelling or a diagnosis of lower limb lymphedema (LLL) following gynecological cancer treatment [2-5]. People affected by lymphedema following cancer treatment can experience changes in the appearance (e.g., swelling) and function of their upper or lower limb(s); other symptoms include heaviness, aching, tingling, numbness, and pain [4, 6], which may contribute to reduced quality of life (QoL) [5, 7, 8]. While the negative impact of ULL on women's QoL following breast cancer treatment is well known [9-12], comparatively fewer studies have examined the QoL of women with LLL following gynecological cancer treatment.

Treatment (e.g., surgery, lymph node removal, adjuvant pelvic radiation therapy) and patient factors (e.g., obesity) common to gynecological cancer are also strong risk factors for secondary LLL [2, 3, 13, 14]. Women who experience the physical symptoms of LLL, occurring in the legs, feet and groin, may have reduce mobility and independence, contributing to feelings of isolation, distress and hopelessness, increasing pressure on social and intimate relationships [5, 7]. Much of the existing research on LLL following gynecological cancer treatment has focused on short-term QoL outcomes, and results are largely based on small studies [7]. In addition, although endometrial cancer is the most common form of gynecological cancer in developed countries [15], few studies have examined the QoL of women with LLL several years following their endometrial cancer treatment [16].

Furthermore, definitions of what constitutes lymphedema and how to best measure and diagnose it vary (especially at the very early stage). Some people may have symptoms suggestive of LLL following their cancer treatment but will not be diagnosed by a health professional [17]. Studies of breast cancer survivors suggest that arm problems/swelling, which may be undiagnosed ULL, may contribute to reductions in women's QoL [18-20]. The severity of symptoms of lymphedema may also be an important factor influencing QoL [21, 22]. However, there are no studies comparing the impact of diagnosed lower limb lymphedema (LLL) and lower limb swelling without a diagnosis of lymphedema (LLS) on the QoL of women treated for endometrial cancer. The aim of this study was, therefore, to examine the QoL of women treated for endometrial cancer 3-5 years previously, comparing those with and without self-reported secondary LLL or LLS.

METHODS

The cohort of women in this study participated in the *Australian National Endometrial Cancer Study (ANECS),* an Australia-wide, population-based, case-control study conducted between 2005 and 2007 [23]. Briefly, 2231 Australian women aged 18–79 years, who were newly diagnosed with endometrial cancer during this period, were invited to participate. Of these, 1497 (67%) agreed to take part and 1399 were confirmed as eligible and completed a telephone interview with a research nurse. Interviews were conducted around the time of diagnosis to collect information on potential predisposing factors for endometrial cancer.

Three to five years after their initial interview, women were asked to complete a follow-up mail survey to collect self-report data regarding lymphedema, physical and mental QoL, other aspects of their current lifestyle and supportive care needs [24]. Of the 1399 original ANECS participants, 116 had died. Of the remaining 1283 women, 639 (49.8%) refused to participate, could not be contacted or were too unwell, leaving 644 (50.2%) women who returned a completed follow-up survey. Of these, 639 provided valid data for the questions assessing lymphedema and had not been diagnosed with this condition prior to their diagnosis of endometrial cancer. The study was approved by the Human Research Ethics Committees at the QIMR Berghofer Medical Research Institute and all participating hospitals.

Measures

Lymphedema. A series of questions, with satisfactory face validity, from another Australian study of women with gynecological cancer [13] was used to categorize women into three groups. Women were asked, “Since being treated for endometrial cancer, have you experienced swelling in your legs, feet or groin?” Women who responded “No” were categorized as “without lymphedema or lower limb swelling” (Without LLL or LLS; n=394). Women who responded “Yes” to this question were asked if they had ever been told by a doctor or health professional that they had lymphedema. Those women who responded “No” were categorized as “Lower limb swelling only” (LLS; n=177), while those women who responded “Yes”, were categorized as “Diagnosed lower limb lymphedema” (LLL; n=68).

Women were also asked if anyone had mentioned the possibility of developing lymphedema to them when they were diagnosed or treated for endometrial cancer. Women who responded “Yes” were asked to report who mentioned it, and when this was mentioned (before, during or after treatment). Women in the LLL and LLS groups were asked further questions about the severity of their swelling in the last month (no symptoms, mild, moderate or severe) and the level of difficulty performing daily tasks as a result of swelling (no difficulty, mild, moderate or severe).

Clinical variables. Information on tumor stage at diagnosis, treatment type (surgery, chemotherapy, radiotherapy, brachytherapy, other), and number of lymph nodes examined was abstracted from the diagnostic histopathology reports and medical records of consenting women.

Demographic and personal variables. Marital status, education, employment status, area of residence (urban, rural or remote) and major comorbidities (e.g., heart disease, deep vein thrombosis, rheumatoid arthritis) and common medications prior to diagnosis was self-reported and collected at the initial survey. At follow-up, the woman's current age, comorbidities and weight were also collected. Comorbidities at follow-up were combined with those at the initial survey to form one overall comorbidity score and weight was used to calculate body mass index (kg/m^2) [coded as underweight/normal (<25), overweight (25-29.9), obese (≥30)]. The question, "Is there someone available to you whom you can count on to listen to you when you need to talk?" was used as a proxy for current level of social support (categorized as: none/little, some and all of the time).

Quality of life. The Medical Outcomes Study Short Form-12 (SF-12) Health Survey was used to assess physical and mental QoL [25]. The scale is made up of eight subscales (physical functioning, bodily pain, general health, physical and emotional role limitations, vitality, social functioning, and mental health), which are combined to form two summary scores - physical and mental QoL. Scores range from 0 to 100 and higher scores indicate better QoL. To assess the clinical significance of the findings and to enable comparison with US studies, SF-12 scores were standardized (M = 50, SD = 10) using US general population norms so that a score of 40 and 60 represent one standard deviation (SD) below and above the US population mean on this scale, respectively, suggesting clinically meaningful differences in QoL [26]. The SF-12 has acceptable internal consistency [27], which was also demonstrated in this study with Cronbach's alpha = 0.87 for the physical QoL summary score, and alpha = 0.82 for the mental QoL summary score.

Statistical Analysis

The characteristics (measured at diagnosis) of women who completed the follow-up survey and those who did not (including those who had died) were compared using χ^2 tests for categorical variables, in order to check for participation bias. Following this, unadjusted and multivariable-adjusted generalized linear models compared overall physical and mental QoL and subscale scores of women with LLL, women with LLS and women without LLL or LLS. Pairwise comparisons using a Bonferroni adjustment were conducted when there was a significant main effect for the lymphedema classification variable. For unadjusted models, we also calculated effect sizes (Cohen's *d*) to assess the magnitude of the difference in QoL outcomes between the groups and to make comparisons with other studies. A standardized mean difference of 0.30 to 0.80 reflects a moderate, and more than 0.80, a large effect [28].

All models were adjusted for current age, BMI, social support and stage of disease at diagnosis and NSAID use in the 5 years prior to diagnosis as these variables were either associated with the outcome or explanatory variable. Other potential demographic, personal and clinical confounders (outlined above) were evaluated but not retained because they did not change age-adjusted parameter estimates by more than 10%, nor alter interpretation of the results.

Additional analyses combining the LLL and LLS groups assessed (i) the relationship between the severity of swelling in the last month (no/mild symptoms versus moderate/severe symptoms) and physical and mental QoL; and (ii) whether this relationship varied according to symptom group by adding a group by severity interaction to the model. All statistical analyses were performed using SAS version 9·1 (SAS Institute Inc., Cary, NC, USA).

RESULTS

Compared to women who did not complete the follow-up survey (n=755), respondents to the lymphedema questions (n=639) were more likely to be middle-aged (75% aged 50-69 years) and slightly better educated (52% attended technical college or had a university degree) and less likely to be obese (43%) (all $p<0.05$). Clinical characteristics were similar between respondents and non-respondents. Respondents were on average 4 years post-diagnosis at time of completing the survey.

Table 1 shows that overall 11% of women reported a physician diagnosis of LLL, and 28% reported LLS. Women with LLL were more likely to have a diagnosis of advanced cancer; to have had more than 15 lymph nodes at initial surgery removed and to have had adjuvant radiation and/or chemotherapy compared to women without LLL or LLS; however, these groups did not differ with respect to their body size. In contrast, women with LLS had similar clinical and treatment characteristics to women without LLL or LLS, but they were more likely to be obese and to have other comorbidities than both women with LLL and women without LLL or LLS (all $p<0.05$).

Most women with LLL or LLS reported leg swelling in the last month (78%), but swelling was more often reported as “severe” by those with LLL (15% vs. 2% respectively, $p<0.001$). Similarly, somewhat more women with LLL reported difficulty performing daily tasks as a result of swelling than women with LLS, but this difference was not statistically significant (21% vs. 15%, with moderate to severe difficulty, respectively, $p=0.5$).

Adjusted mean scores for physical and mental QoL summary scales and subscales are shown in Table 2. Overall physical and mental QoL of all women treated for endometrial cancer was within the normative range. However, women with LLL had clinically lower levels of overall physical QoL, scoring more than half a SD below the mean (effect size = 0.34), and they also scored significantly lower on three of the eight subscales (physical functioning, physical role limitations, and social functioning,) than women without LLL or LLS (all $p<0.05$). Women with LLL scored lowest on the physical functioning subscale, suggesting that they had difficulty participating in moderate activities or climbing several flights of stairs. Women with LLS had significantly lower overall physical and mental QoL and significantly lower scores for all 8 subscales than women without LLL or LLS. Effect sizes comparing women with LLS to women without LLL or LLS were moderate (0.43-0.60) for both physical and mental subscale scores.

Comparisons between the LLL and LLS groups showed no significant differences on physical QoL and mental QoL, although women with LLS tended to score lower on the mental health subscale. When these groups were combined, women who reported experiencing “moderate/severe” swelling in the last month had significantly lower overall physical QoL (M= 37.5, SE = 1.6) than women who reported only mild/no swelling (M= 44.3, SE = 1.1, $p<0.01$), however, there was no association for mental QoL. These results did not vary when women with LLL and LLS were considered separately.

DISCUSSION

We examined the QoL of women who self-reported having secondary LLL or LLS following their treatment for endometrial cancer and compared this to women without LLL or LLS. Overall, 39% of women experienced either LLL (11%) or LLS (28%); these overall estimates are consistent with other studies of self-reported LLL following endometrial cancer [2, 3]. Although physical and mental QoL of the total sample of women with endometrial cancer was within the normative range [29-31], women with LLL or LLS had lower QoL scores. Specifically, women with LLL had meaningful reductions in their physical QoL relative to women without LLL or LLS, adding to existing evidence of the negative impact of lymphedema on women’s physical well being [7, 16]. Mental QoL did not differ significantly between these groups of women and this may be due to the timing of the follow-up survey and women’s access to treatment. On average, women with LLL were diagnosed 1-3 years previously so the majority had been living with the condition for several years [32]. It is possible that intervention and management of the condition facilitated positive emotional adjustment, however, other personal, social and medical factors may also explain these findings and this warrants further research attention [33, 34].

Women with LLS had similar physical QoL to women with LLL, and had significantly lower physical QoL than women without LLL or LLS. However, in contrast to women with LLL, women with LLS had significantly lower mental QoL than women who were asymptomatic and effect sizes suggested a moderate difference between the groups. Similarly, the score for mental QoL was approaching half a SD below US population norms, suggesting subclinical levels of distress, which should be monitored. Other studies of women with breast [18] and various cancers [35] have also found that those with undiagnosed symptoms are more likely to have reduced long-term QoL than those who have received a formal diagnosis of lymphedema. Notably, a US study of more than 1200 women with breast cancer found that women with arm symptoms without diagnosed ULL, had lower mental well-being on the SF-36 QoL questionnaire, than women without arm symptoms. In contrast, women with diagnosed ULL had similar mental health to women without ULL [18]. People who have symptoms following their cancer treatment and who remain undiagnosed, may find it difficult to cope without an explanation of their symptoms and appropriate treatment advice from health professionals [18, 33].

Consistent with studies of women with ULL following breast cancer [21, 22], women with recent moderate to severe swelling had lower overall physical QoL, but there was no association between the extent of swelling and mental health. Health care factors, such as the quality of provider-patient communication about lymphedema appear important for well-being following cancer, [6, 36] and may better predict long-term mental health outcomes. Researchers have reported that people living with lymphedema after cancer have difficulties finding a health professional who can diagnose and treat the condition [6], and who can also provide adequate information and ongoing support [9, 13, 36]. Women who have had their lymph nodes removed and who have pre-existing conditions, which may place them at higher risk of swelling (e.g., obesity, diabetes, heart conditions), may benefit from information and communication about lymphedema.

Women with LLL differed from women with LLS on health-related characteristics (e.g. were less likely to be obese and to have comorbidities) and on clinical characteristics (e.g., greater stage of disease and more likely to have had adjuvant treatment). Thus, reduced QoL among women with LLS may be related to having edema or other health conditions (e.g. lipedema, heart conditions) rather than having undiagnosed LLL. Obesity was also strongly associated with reduced physical QoL, and slightly attenuated the association between LLS and physical QoL. Because health professionals may find it difficult to diagnose LLL among women who are overweight or obese, QoL reductions in women who are obese and who have LLS may be explained by differences in health care.

Similar to other studies using mailed surveys [37, 38], we had a relatively low response rate (50%) and, therefore, the findings may not relate well to the larger population of women with endometrial cancer. Women who were older and better educated were less likely to respond to the lymphedema questions and because these characteristics are also associated with better mental QoL among women [39, 40], our data may overestimate the levels of distress. In addition, this was a cross-sectional study and because we did not have a measure of QoL at diagnosis, we could not determine whether reduced QoL was directly the result of the LLL or LLS or of pre-existing disparities in QoL. QoL trajectories may also differ for the LLL and LLS groups and future research should longitudinally examine QoL changes. Furthermore, we may have overestimated the number of symptomatic women if women chose not to respond because they felt that they were no longer burdened by disease. On the other hand, because we only asked women about swelling following their cancer diagnosis, it is possible that some women were incorrectly classified as not having LLL. Similarly, while most women will develop symptoms of lymphedema within the first year following their cancer treatment [8, 32], others may be diagnosed several years later and our analysis will not have captured these women.

In conclusion, we show that both LLL and LLS may limit the physical QoL of long-term endometrial cancer survivors, and the mental QoL of women who report experiencing swelling but who are not diagnosed with LLL. Thus, the emotional and physical well-being of women with lymphedema-like symptoms could be managed better through early referral to evidence-based lymphedema intervention programs, such as those of exercise training, bandaging or elevation [8, 41, 42]. Ongoing health care attention may be particularly important given the enormous personal and social costs associated with lymphedema [7, 8].

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Conflict of Interest Statement

The authors have declared that no conflict of interest exists.

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Table 1: Characteristics of endometrial cancer survivors according to lymphedema status 3-5 years post-cancer diagnosis (N= 639)

	Without LLL or LLS (n= 394)	**LLL (n = 68)**	**LLS (n = 177)**	
	N(%)	**N(%)**	**N(%)**	***P***
Current* age *M (SD)*	65.2 (8.4)	65.2 (8.3)	65.4 (9.6)	0.97
Married	273 (70.2)	51 (75.0)	108 (61.7)	0.06
Education				
High School	193 (49.0)	35 (51.5)	80 (45.2)	0.8
Technical College	144 (36.5)	22 (32.4)	70 (39.5)	
University	57 (14.5)	11 (16.2)	27 (15.3)	
Urban area of residence	244 (63.4)	43 (64.2)	115 (65.7)	0.9
FIGO Stage 1 at diagnosis	341 (86.5)	47 (70.1)	149 (84.2)	0.003
Number of nodes examined				
0	188 (49.3)	5 (7.9)	80 (46.2)	<0.001
1-14	138 (36.2)	22 (34.9)	66 (38.2)	
≥15	55 (14.4)	36 (57.1)	27 (15.6)	
Adjuvant chemotherapy	35 (9.1)	19 (28.8)	15 (8.6)	<0.001
Adjuvant radiotherapy	58 (15.1)	18 (27.3)	29 (16.4)	0.05
Adjuvant brachytherapy	60 (15.7)	17 (25.8)	29 (16.4)	0.13
Current* BMI (kg/m^2)				
<24.9	135 (34.4)	24 (35.3)	31 (17.5)	<0.001
25-29.9	109 (27.7)	21 (30.9)	44 (24.9)	
>30	149 (37.9)	23 (33.8)	102 (57.6)	
Comorbidities				
Yes	148 (37.6)	28 (41.2)	86 (48.6)	0.046

*Current at the time of follow-up survey

Note. Numbers may not sum to total because some data missing

Table 2: Adjusted mental and physical quality of life scores among women diagnosed with endometrial cancer 3-5 years earlier: overall and by lymphedema status

SF-12 Summary and Subscales	**All women with endometrial cancer[a] (n= 639)**		**Without LLL or LLS[b] (n= 394)**		**LLL[b] (n= 68)**		**LLS[b] (n = 177)**				***LLL vs. Without LLL or LLS***	***LLS vs. Without LLL or LLS***	***LLL vs. LLS***
	M	***(SD)***	***M***	***(SE)***	***M***	***(SE)***	***M***	***(SE)***	***Effect size**	**^Effect size**	***P#***	***P§***	***P*||**
Physical QoL summary	45.1	(11.8)	45.1	(0.8)	41.8	(1.4)	41.0	(1.0)	0.34	0.54	.07	.0003	1.0
Mental QoL summary	51.4	(9.8)	50.6	(0.8)	49.6	(1.1)	46.8	(0.8)	0.22	0.54	1.0	<.0001	.09
General Health	45.0	(11.3)	44.8	(0.8)	43.3	(1.3)	40.2	(0.9)	0.20	0.59	.55	<.0001	.11
Physical functioning	45.2	(11.8)	44.8	(0.8)	41.1	(1.4)	41.9	(1.0)	0.39	0.43	.03	.01	.86
Role limitations, physical	46.3	(11.3)	46.2	(0.7)	42.6	(1.3)	41.0	(0.9)	0.43	0.66	.03	<.001	.54
Bodily Pain	48.4	(11.2)	48.6	(0.7)	45.9	(1.3)	43.9	(0.9)	0.30	0.59	.13	<.0001	.42
Mental health	50.8	(9.2)	50.2	(0.6)	49.3	(1.1)	46.5	(0.7)	0.18	0.53	.72	<.0001	.06
Role limitations, emotional	48.5	(11.1)	48.0	(0.7)	45.5	(1.3)	43.2	(0.9)	0.38	0.61	.15	<.0001	.29
Social functioning	50.2	(10.0)	49.6	(0.7)	46.6	(1.2)	46.2	(0.8)	0.45	0.53	.04	.0003	.96
Vitality	49.1	(10.2)	48.3	(0.7)	46.8	(1.2)	44.4	(0.8)	0.26	0.60	.50	<.0001	.17

Scores are standardised (*M* = 50; *SD* = 10) using normative data from the general USA population; higher scores indicate better functioning

[a] Unadjusted data

[b] Adjusted for current age, stage, BMI, NSAID, social support

* Effect size based on unadjusted data comparing women with lymphedema (LLL) to women without lymphedema or lower-limb swelling (without LLL or LLS)

^Effect size based on unadjusted data comparing women with lower-limb swelling only (LLS) to women without LLL or LLS

Difference between women with LLL and women without LLL or LLS, with Bonferroni adjustment for multiple comparisons

§ Difference between women with LLS and women without LLL or LLS, with Bonferroni adjustment for multiple comparisons

|| Difference between women with LLL and women with LLS, with Bonferroni adjustment for multiple comparisons