Upper Arm Disability After Axillary Surgery for Early Breast Cancer Using the Dash© Assessment

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Abstract

Background: Treatment of early breast cancer includes surgical removal of the tumor and evaluation of axillary lymph nodes. Axillary lymph node surgery is associated with upper arm morbidity. The impact of this upper arm limitation has a direct effect on the patient's quality of life. **Objectives:** To quantify the symptoms of upper extremity disability and identify correlations between severity of symptoms and type of axillary surgery. **Methods:** An observational study was performed on 2 groups of patients who had undergone surgery for breast cancer. A retrospective group, which comprised patients who had undergone axillary surgery 2 years prior to the study, and a prospective group of patients who had undergone axillary surgery 6 weeks from study commencement. Data was collected using the DASH® questionnaire and analyzed using SPSS v13®.

Results: All 102 participants reported upper extremity symptoms. The mean DASH score for all participants was 51.7. Participants in the retrospective arm had a higher DASH score of 53; those in the prospective arm had a score of 47.3. There was no correlation between severity of symptoms and type of axillary surgery performed. There is a need to implement targeted rehabilitation services after the primary surgery.

Key words: Early breast cancer, Axillary dissection, DASH score, Upper arm disability

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Introduction

In general, patients with early stage breast cancer undergo primary surgery (breast conserving surgery or mastectomy) to the breast; regional lymph node dissection, with adjuvant treatments composed of chemotherapy or radiotherapy. The state of the axillary lymph nodes has a large bearing on the overall prognosis of the patient. Clinically impalpable nodes in breast cancer undergo sentinel lymph node biopsy to identify nodal metastasis, which, if present will result in axillary lymph node dissection (1,2).

Axillary surgery often results in longstanding upper arm physical impairments and functional limitations (3). Common impairments include pain, lymphedema and upper arm weakness (4). Of these, upper arm disability has been shown to affect quality of life (QOL) the most (5). Upper arm disability is defined as limitation of a previously normal functional upper extremity, extending from the shoulder to the wrist. It is a specific disease entity whose impact has increased in the last 10 years (6,7). Though breast cancer is the most common cancer that affects females in Kenya, current national figures that describe the incidence and degree of post-operative upper arm disability are lacking.

Hack et al. surveyed 222 women who underwent ALND with or without radiotherapy, and reported that 72% experienced arm/shoulder pain, weakness, or numbness. They found that the presently used "pain intensity and affect scales" independently accounted for a statistically significant portion of the variance in QOL (5).

Because options and measurable variables for assessing upper arm disability are numerous, previous studies (6,12-15) have mostly evaluated the patient in either of 3 domains: lymphedema, physical restriction in arm movements, and quality of life (QOL).

The DASH (Disability of the Arm Shoulder and Hand) Outcome Measure is a 30-item self-reporting questionnaire that measures physical function and symptoms in people with any of several musculoskeletal disorders of the upper limb. The tool gives clinicians and researchers the advantage of having a single, reliable instrument that can be used to assess any or all joints in the upper extremity. In most studies, the questionnaire is used to assess effectiveness of treatment to the upper limb. Smoot et al. (17) used the DASH questionnaire in 120 women who had undergone axillary surgery for breast

cancer. The questionnaire was used along with other objective measures such as grip strength using a dynamometer, goniometer measurement of range of movement as well as arm volume changes to establish lymphedema.

In our study, we used this tool as a one-off assessment for each patient. For this study, the DASH questionnaire was not used to assess the effectiveness of an intervention. Instead, we used it because of its validated, non-invasive nature of assessing arm symptoms. We analyzed responses to sections of the questionnaire (domains) which are attributed to particular symptoms such as pain and quality of life.

Methodology

The study was performed in a private urban university teaching hospital. It has a 254-bed capacity, serving a catchment area of approximately 1 million patients.

The study was conducted as a cohort observation study. The 2 cohorts were denoted prospective and retrospective, in relation to the timing of the study. Those who had received surgery before the study were termed retrospective. We considered patients who had surgery up to 2 years prior. Patients whose data were collected after the study begun were grouped as prospective.

The aims of the study were to determine the occurrence of upper extremity disability in patients with breast cancer undergoing axillary dissection; second, we set out to quantify upper arm disability using the DASH questionnaire using the disability score of patients who had undergone axillary dissection.

Our null hypothesis was that patients receiving treatment for early breast cancer do not experience significant disability in upper extremity dysfunction after axillary surgery for breast cancer.

Data were collected using a questionnaire, which collected patient-specific variables. A DASH questionnaire was then administered to the patient to respond to, in the presence of the principal investigator. Data were analyzed in SPSS v 13 and associations of means (using Student *t* test) were calculated.

In the prospective arm, patients were seen at the surgical outpatient clinic preoperatively and informed about the study. They were then recruited after giving consent. Patient information was entered after 6 weeks postoperative.

In the retrospective part of the study, patients who had undergone axillary surgery up to 2 years prior to the study were contacted from a pre-existing hospital. The patients who responded filled the DASH questionnaire at a face-to-face interview with the PI. The principal investigator also attended monthly cancer support groups within the institution where patients were also informed about the study and recruited into the retrospective arm after consenting.

Ethical approval was obtained from the institutional Ethics Review Board prior to starting the study. Permission to use the DASH© questionnaire for this study was granted by the Institute for Work and Health (IWH) group as per copyright agreement.

A study number was assigned to each patient to ensure anonymity. Participation in the study was entirely voluntary. Informed consent was sought from the patient at the time of administering the questionnaire.

The inclusion criteria were: Patients with early stage (stage I-II breast cancer) who had undergone axillary surgery (sentinel lymph node biopsy as well as axillary lymph node clearance) in conjunction with breast conserving surgery or modified radical mastectomy. They were above the age of 18 years. They were not pregnant.

Because the DASH questionnaire does not have a validated Swahili version available, the study participants were required to be English speaking. This also required the principal investigator to be present at the time of completing the DASH questionnaire.

Exclusion criteria included patients with previously coexisting musculoskeletal disorders and patients involved in an on-going clinical trial.

Continuous and categorical data were collected from both groups including age and type of surgery (whether breast conserving or modified radical mastectomy). The DASH questionnaire was filled at the interview, with the primary investigator present to take the patient through the form.

Patient follow-up was continued as per department protocol (in the prospective group). Appropriate referrals were made to respective departments such as physiotherapy and counselling. Often, the patient's DASH score informed these referrals.

Using a two-sided significance level to yield a power of 80%, the estimated sample size was 102.

The DASH questionnaire consists of a series of domains that pertain to ADL that would be affected by: heaviness of the limb (ascribed to lymphedema), pain, peripheral neuropathy and quality of life. Scores from these particular questions were totalled separately and analyses drawn from those figures.

DASH score calculation: as per the DASH questionnaire

DASH Scoring Formula =

([(sum of n responses)/*n*] -1* (25)

where *n* represents the number of completed items.

Data analysis

Data was input into SPSS V.13 on completion of the study. Descriptive statistics (proportions and means) were used to describe the demographic characteristics of the participants. Other variables (type of surgery, whether sentinel lymph node biopsy or axillary lymph node dissection) were tabulated. The differences in the proportions were estimated using chi-square tests, and a p-value of 0.05 used for significance.

The primary data analysis was to determine any association between the disabilities to the type of surgery (whether SLNB or ALND). A logistic regression model was used to determine this association. Further analysis was carried out to determine the associations between components of the DASH questionnaire and the total DASH® score to attempt to further characterize the type of disability experienced by the patient.

Results

A total of 102 participants were enrolled into this study: 75 (73.5%) were in the retrospective arm and 27 (26.5%) in the prospective arm. Table 1 shows the distribution of procedures the participants underwent.

Table 1. Distribution of procedures

	Study arm	
	Retrospective (%)	Prospective (%)
Breast conserving surgery (BCS)	9(56.2)	7 (43.8)
Modified radical mastectomy (MRM)	66(76.7)	20(23.3)
Sentinel lymph node biopsy (SLNB)	11(52.4)	10(47.6)

The mean DASH score for all participants was 51.7 (SD=17.3). Participants in the retrospective arm had a higher DASH score of 53 (SD=17.7) than those in the prospective arm at 47.3 (SD=15.9). This difference was however not statistically significant (p=0.128; Student t-test). There was no association between the MRM procedure and the selected DASH domain disabilities of quality of life (QOL), neuropathy and lymphedema (Table 2).

Table 2. Association between MRM and selected scores in the DASH scores

Selected score	*n*	Mean	SD	Mean difference	P value
Dash score					
MRM	86	51.57	17.66	0.992	0.834
BCS	16	52.67	15.94		
QOL					
MRM	86	8.36	5.418	0.510	0.703
BCS	16	8.87	4.973		
Neuropathy					
MRM	86	4.30	2.042	-0.216	0.646
BCS	16	4.56	2.25		
Lymphedema					
MRM	86	26.12	11.67	0.877	0.775
BCS	16	25.25	8.75		

Similarly, no association was seen between SLNB procedure and the selected DASH domain scores (Table 3).

Table 3. Association between SLNB and selected scores in the DASH scores

Selected score	*n*	Mean	SD	Mean Difference	P value
Dash score					
SLNB	21	49.14	14.48	–3.255	0.445
ALND	81	52.39	18.08		
Lymphedema					
SLNB	21	23	8.23	–3.76	0.446
ALND	81	26.76	11.89		
Neuropathy					
SLNB	21	4	1.944	–.432	0.396
ALND	81	4.43	2.312		
Pain					
SLNB	21	4.38	1.80	–594	0.318
ALND	81	4.97	2.54		
Quality of life					
SLNB	21	7.28	2.84	–1.455	0.228
ALND	81	8.74	5.28		

Discussion

The DASH questionnaire offers a useful objective tool of assessing upper arm disability. Aasheim et al. (32) established that the normal population would have an average score of up to 22 (the higher scores from older patients). Thus, any score above that is considered indicative of upper arm limitation.

From our study, the mean DASH score was high; most patient scores were within a 50–60 range. The highest DASH score of 100 was from a long-term survivor who had more severe grade lymphedema with significant upper extremity impairments.

Results from our study indicate that patients who had undergone axillary dissection surgery had a high DASH score. These results support Johansen et al. who demonstrated a higher disability in a subgroup of axillary dissection patients (35).

While the DASH questionnaire is most commonly used for describing improvement in upper interventions as a before and after tool, we used it as a one-off assessment tool in our study. We also used it to assess the scores given for individual impairments (particularly quality of life, neuropathy and lymphedema). The choice of evaluation these domains was based on similar studies that describe these are the most common concerns for breast cancer survivors. While the use of DASH (total) scores is validated, our study of the individual component scores is not validated. Nevertheless, the scores will help in the design of future studies required.

We analyzed responses on the DASH questionnaire that enquired about: upper arm heaviness (questions 6-16) neuropathy (question 26 and 27,) pain (question 24 and 25) and quality of life (questions 22, 23, 29, 30) as the main symptoms following axillary surgery.

While correlations between the domains of neuropathic symptoms, pain and quality were not significant, the temporal effect may cause an increase in the number of symptoms picked by this data tool.

Because the interviews were conducted based on the availability of the patients, most of the non-responders had cited unavailability to participate in the study. This markedly reduced the timely accrual of data.

Patients on the retrospective arm were significantly more in number than those enrolled in the prospective arm. This was probably due to the higher number of cancer survivors that were reachable either by phone or at the clinic.

Because the nature of the administration of the questionnaire face to face, the Hawthorne effect may have come into play. It was necessary to administer the questionnaire in this manner as some of the respondents were not familiar with the DASH questionnaire format.

In conclusion, most post-breast cancer treatments undergo challenges associated with neuropathic symptoms. Further studies are necessary to define interventions on the same.

References

1. Sclafani S. Baron R. Sentinel lymph node biopsy and axillary dissection: added morbidity of the arm, shoulder and chest wall after mastectomy and reconstruction. Cancer J. 2008; 14(4): 216-22.
2. Beaulac S, McNair L, Scott T, et al. Lymphedema and quality of life in early stage breast cancer. Arch Surg. 2002; 137(11): 1253-7.
3. Erwetz M, Jensen A. Late effects of breast cancer treatment and potentials for rehabilitation Acta Oncol. 2011; 50: 187–93
4. McNeely M, Binkley J, Pusic A et al. A prospective model of care for breast cancer rehabilitation: Postoperative and post-reconstructive issues. Cancer. 2012; 118(8): 2226–36.
5. Hack T, Cohen L, Katz J, et al. Physical and psychological morbidity after axillary lymph node dissection for breast cancer. J Clin Oncol. 1999; 17:143-9.
6. Hayes S, Johansson K, Stout L, et al. Upper-body morbidity after breast cancer: Incidence and evidence for evaluation, prevention, and management within a Prospective Surveillance Model of Care. Cancer. 2012; 118(8):2257-63
7. Engel J, Kerr J, Schlesinger-Raab A, et al. Predictors of quality of life of breast cancer patients. Acta Oncol. 2003; 42:710-8.
8. Johansson K, Holmström H, Nilsson I, et al. Breast cancer patients' experiences of lymphedema. Scand. J. Caring Sci. 2003; 17(1):35-42.
9. Bafford A, Gadd M, Gu X, et al. Diminishing morbidity with the increased use of sentinel node biopsy in breast carcinoma. Am J Surg. 2010; 200(3): 374-7.
10. Lucci A, McCall LM, Beitsch PD, et al. Surgical complications associated with sentinel lymph node dissection (SLND) plus axillary lymph node dissection compared with SLND alone in the American College of Surgeons Oncology Group Trial Z0011. J Clin Oncol. 2007; 25(24):3657-63.
11. Rietman J, Dijkstra P, Hoekstra H, et al. Late morbidity after treatment of breast cancer in relation to daily activities and quality of life: A systematic review. Eur J Surg Oncol. 2003; 29(3):229-38.
12. Kärki A, Simonen R, Mälkiä E, et al. Impairments, activity limitation and participation restrictions 6 and 12 months after breast cancer operation. J Rehabil Med. 2005; 37(3):180-8.
13. Kwan W, Jackson J, Weir L, et al. Chronic arm morbidity after curative breast cancer treatment: prevalence and impact on quality of life. J Clin Oncol. 2002; 20(20):4242-8.
14. Hayes S, Rye S, Battistutta D, et al. Upper-body morbidity following breast cancer treatment is common, may persist longer-term and adversely influences quality of life. Health Qual Life Outcomes. 2010; 8:92.
15. Schmitz K, Speck R, Rye S, et al. Prevalence of breast cancer treatment sequelae over 6 years of follow-up: The Pulling Through Study. Cancer. 2012; 118(8): 2217-25
16. Gosselink R, Rouffaer L, Vanhelden P, et al. Recovery of Upper Limb Function After Axillary Dissection. J Surg Oncol. 2003; 83(4):204-11.
17. Smoot B, Wong J, Cooper B, et al. Upper extremity impairments in women with or without lymphedema following breast cancer treatment. J Cancer Surviv. 2010; 4(2):167-78.
18. The DASH Outcome Measure. http://www.dash.iwh.on.ca/about-dash. Retrieved Feb 2019.
19. Sanghani M, Balk E, Cady B. Impact of axillary lymph node dissection on breast cancer outcome in clinically node negative patients: A systematic review and meta-analysis. Cancer. 2009; 115(8): 1613-20.
20. Nairobi Cancer Registry http://www.kncr.org/nairobi-cancer-registry-report_2014/ (last retrieved March 2019
21. Aasheim T, Finsen V. The DASH and the QuickDASH instruments. Normative values in the general population in Norway. J Hand Surg Eur Vol. 2014; 39(2): 140-4.
22. Hayes S, Rye S, Battistutta D, et al. Prevalence of upper-body symptoms following breast cancer and its relationship with upper-body function and lymphedema. Lymphology. 2010; 43(4): 178-87.
23. Stubblefield M, Custodio C. Upper-extremity pain disorders in breast cancer. Arch Phys Med Rehabil. 2006; 87: S96-9.
24. Hawthorne effect: What is Hawthorne effect? MBA Learner 2018-02-22.