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Effect of pain catastrophizing on quality of life of breast cancer patients

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Abstract

Aim: This study was conducted to investigate the effects of surgical methods and pain catastrophizing on quality of life (QoL) in the postoperative period of patients who had surgery for breast cancer.

Patients and Methods: The study included 72 female patients with an average age of 52 years. For the evaluation of pain catastrophizing, the patients were divided into two groups based on the cut-off value determined for Turkish society in pain catastrophe scale (PCS-TR) form. The first group consisted of the patients who had PCS < 17 (n = 45) and the second group had the patients who had PCS ≥ 17 (n = 27). The patients were also classified based on the applied surgical treatment. Group I consisted of the patients who underwent breast conserving surgery (BCS) (n = 34) and the Group II included the patients who had modified radical mastectomy (MRM) (n = 38). Short Form (SF-36) was used to evaluate the QoL of the patients. Based on their answers to questions in SF-36 form, effects of PCS and surgical treatment on QoL were compared.

Results: The QoL of patients with PCS < 17 was significantly higher than those with PCS ≥ 17 ($p < 0.05$). Also, the surgical treatment method had no significant effect on QoL ($p > 0.05$).

Conclusion: Our findings showed that catastrophizing caused a deterioration in QoL of patients who underwent surgical treatment for breast cancer, while surgical treatment modality had no effect.

Keywords: Breast cancer, Mastectomy, Pain catastrophizing, Quality of life, Short Form-36

Introduction

Breast cancer is the most common invasive cancer among women worldwide. It is also the second leading cause of cancer related deaths in women after lung cancer. Major treatment modality is surgery. Use of new generation chemotherapy drugs and radiotherapy after surgical treatment has led to a decrease in recurrence rates and a prolonged life expectancy, which brought to the fore the deterioration in patient's Quality of life (QoL) after cancer treatment (Merino et al., 2018; Sert et al., 2013). Modified radical mastectomy (MRM) or breast conserving surgery (BCS) are performed as the surgical treatment methods of breast cancer. In MRM, pectoralis major muscle is protected while the entire breast and axillary lymph nodes are removed. BCS, on the other hand, is the surgical approach in which tumor and a certain amount of surrounding healthy tissue (large local excision, lumpectomy) is excised, and axillary lymph nodes involving breast is sampled. Sentinel lymph node biopsy (SLNB) can be applied alone or with axillary lymph node dissection (ALND) upon the involvement of axillary lymph nodes during BCS. Both surgical methods either radical or breast conserving, can cause upper extremity morbidities. There are reports in the literature that the QoL is functionally compromised in more than half of patients who were operated for malignant lesions of breast (Buyukakincak et al., 2013; Lovelace, McDaniel & Golden, 2019). There are many studies which found that the deterioration in QoL is due to psychological and functional reasons related to the surgical treatment method. However, there are also publications which reported that the surgical treatment modality has no effect on QoL (Ernst, Voogd, Balder, Klinkenbijl & Roukema, 2002;

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Kement et al, 2011; Morimoto et al., 2003). The deterioration in QoL could be the result of anatomical and physical changes arising from surgical treatment method as well as due to psychosocial reasons.

The catastrophizing by the individual has a significant effect on the deterioration of the QoL in the postoperative period (Pavlin, Sullivan, Freund & Roesen, 2005; Suren et al., 2014a). Catastrophizing is defined as the exaggeration of events, thinking the worst possible outcome and overreacting. The "pain catastrophe scale" (PCS) was introduced by Sullivan et al. (1995) for evaluation and scoring of a person's catastrophizing. Studies showed higher level of deterioration in the QoL of individuals with high PCS scores in the postoperative period. In addition, it was found that the perception and rating of pain is 7-33% higher and the amount of analgesic consumed is increased in individuals with higher level of catastrophizing during postoperative period (Khan et al., 2011).

Short Form 36 (SF-36) is one of the most commonly used scales in the world today to evaluate the QoL. The test assesses the physical and mental status of the patients. The results obtained with this scale in patients after breast surgery could be compared with the normal population, and the QoL of the patients after treatment could be objectively evaluated (Ware et al., 1995).

The purpose of this study was to investigate the effect of surgical treatment modality (MRM or BCS) and the patient's catastrophizing on QoL of the patients who had surgery for breast cancer in a single center.

Patients and Methods

The study was approved by the Ethical Board of Gaziosmanpasa University Faculty of Medicine (Approval No: 2019-KAEK-265). Patients were identified by searching the database of University Hospital using the ICD-10 diagnosis code among the patients who had been operated between January 1st 2014 and August 1st 2018 in General Surgery Department. A total of 197 patients were reached over the phone and were informed about the study. Exclusion criteria from the study were bilateral mastectomy, distant metastases, ailments of cervical-cranial origin, pre-operative conditions involving shoulder or upper extremity, chronic pain, cognitive impairment and surgical treatment in the last six months. 72 patients who complied with the study criteria and agreed to participate in the study were invited to our clinic. Their written consent were obtained.

Evaluation of patients

The patients were questioned in terms of age, educational status, time after the operation (months) and the operated side. Surgical treatment applied (MRM or BCS) was recorded by examining the patients' files. The patients were informed about the SF-36 form and PCS before physical examination. Then, the physical examination was performed, and the patients were examined for the presence and severity of shoulder pain during movement. Physical examinations were performed by two general surgeons. Patients were asked to fill out SF-36 and PCS-TR forms after the examinations were completed (Suren et al., 2014a; Pinar 2005).

The Pain Catastrophizing Scale

Pain catastrophizing scale (PCS) is a test of 13 questions used to measure an individual's emotions and feelings about pain. The test whose validity and authenticity for Turkish society was approved by Suren et al. (2014a) (Cronbach's $\alpha = 0.90$) consists of three sub-items. Each question is scored by numbers between 0 and 5 and higher scores are associated with negative outcomes. The scale is evaluated with a sum of score changing from 0 to 52 calculated as the total of points from the 13 questions in the scale. The PCS cut-off value was determined as 17 by Suren et al. (2014b). The values equal to or greater than 17 were considered high while those smaller than 17 were regarded as normal.

Pain Level

The presence and severity of shoulder pain during movement was numerated using a 10 cm numeric rating scale (NRS) (0 = no pain, 10 = most severe pain). Numeric Rating Scale is a reliable method that evaluates the severity of subjective pain. It does not require verbal or reading ability, is easy to use, and is accepted all over the world (Huskisson, Jones & Scott, 1976). NRS ≥ 1 was diagnosed as the existence of pain. The patients were grouped into four according to the existence and severity of shoulder pain during movement ($10 \geq NRS \geq 0$). The first group included the patients with no shoulder pain during movement and with a pain severity of zero, while the second group included the patients with a mild pain ($4 > NRS \geq 1$), the third group had the patients with a moderate pain ($7 > NRS \geq 4$), and the last group consisted of the patients with a severe pain ($10 \geq NRS \geq 7$) (Hladiuk, Huchcroft, Temple & Schnurr, 1992) (Figure 1).

The SF-36 Health Survey

Short form-36 presented by Ware & Sherbourne (1992) was employed to determine the QoL of patients. This test consists of eight separate sub-items that evaluate the mental and physical functions of the patient. The sub-items were mental health (MH), physical functioning (PF), general health perception by the patient (GH), role limitations as a result of physical problems (RP), vitality (VT), social functioning (SF), bodily pain (BP) and role limitations as a result of emotional restraints (RE) SF-36 has points varying from 0 to 100. Health status is estimated to be better with higher points. SF-36 was translated into Turkish, and validity and reliability studies have been conducted for cancer patients (Pinar, 2005) (Cronbach's α =0.81- 0.94).

Statistical Analyses

Data were analyzed using Statistical Package for Social Sciences (ver. 20.0, SPSS Inc., Chicago, IL). Quantitative data with normal distribution were expressed as arithmetic mean ± standard deviation. Normalcy of the distribution of the information was evaluated by Shapiro-Wilk test. SF-36 test results of patient groups who underwent different surgical treatments (MRM or BCS) and patient groups who had different PCS values were compared using significance test of two means. Data from the variables with discrete distributions were presented as number of individuals and percentage (%). Chi-square test was used to compare qualitative information. $P < 0.05$ was accepted as significant.

Results

72 female patients with an average age of 52 years were included in the study. 34 patients underwent BCS while 38 patients had MRM. Results from the evaluation of SF-36 form by the surgical treatment or PCS value were given in Table 1.

Based on the data, the patient group with PCS ≥ 17 had significantly lower QoL ($p < 0.05$), physical functioning ($p = 0.001$), role limitations as a result of physical problems ($p = 0.001$), role limitations as a result of emotional restraints ($p = 0.001$), vitality ($p = 0.002$), mental health ($p = 0.001$), social functioning ($p = 0.001$), bodily pain ($p = 0.001$) and general health perception by the patient ($p = 0.001$) compared to the patient group with PCS < 17. In addition, QoL of the patients was not associated with surgical treatment modality, age, education level and side of the extremity subjected to surgery (Table 1, $p > 0.05$). Shoulder pain severity of the patients with PCS ≥ 17 was significantly higher than that of patients with PCS < 17 ($p = 0.001$). It was observed that breast surgery method was not associated with the pain felt by the patients ($p = 0.69$).

Discussion

Functional health status, experienced pain grade, self-perception, self-attribution and quality of interaction with the surrounding environment contributes to the QoL. Since the breast cancer is the cancer type with the highest prevalence among women and breast loss might have serious effect on patient, QoL of breast cancer patients has become interestingly important as a result of higher survival rate thanks to advanced diagnostic and treatment modalities. The present study demonstrates that the QoL of breast cancer patients was associated with pain catastrophizing while the surgical treatment method did not affect the QoL (Table 1).

Due to many advances in the diagnosis and treatment of breast cancer, five-year life expectancy has increased to over 80%. Studies geared to improve the QoL of the patients gained importance (Acil & Cavdar, 2014; Bhat, Roshini & Ramesh 2019; Lovelace et al., 2019; Richmond at al., 2018). There are many studies in the literature evaluating the QoL in patients who have surgical treatment for breast cancer. A shared outcome from these studies was that the deterioration of the QoL was related to the surgical treatment method applied. Based on the results from these studies, patients who had MRM experienced physical, psychological and social problems in their lives. BCS is the preferred treatment option since it does not remove the whole breast, an important sexual organ and also a part of female identity, and it does not involve lower shoulder movement restriction and muscle strength loss. Also, lower rate of functional problems such as lymphedema and similar life spans with the MRM are reported (Acil & Cavdar, 2014; Rupp et al., 2019). Hidding et al. (2014) informed that 62% of patients who had surgery for breast cancer had functional problems that caused a deterioration in the quality of their lives. The number of publications reporting that these problems were more pronounced in patients who had MRM is quite high (Mejdahl, Andersen, Gärtner, Kroman & Kehlet, 2013; Rietman et al., 2004; Temur & Kapucu, 2018). However, there are also reports stating that surgical treatment did not affect the development of functional problems such as decrease in shoulder joint motion range and loss of muscle strength which cause deteriorations in QoL of the patients (Ernst et al., 2002; Morimoto et al. 2003). There has been an increase in the number of studies reporting that functional problems such

as decrease in shoulder joint motion range observed in the long term after surgical treatment are related to the severity of the patient's pain (Box et al., 2002; Ernst et al., 2002; Morimoto et al. 2003). Therefore, deterioration in the QoL of patients undergoing surgical treatment due to breast cancer could be a result of anatomical and physical changes due to the surgical treatment method applied as well as due to psychosocial reasons (Buyukakincak et al., 2013; Kement et al, 2011; Lovelace et al., 2019). In this study, there was not a significant difference between the QoL of the patients who had MRM and the patients who had BCS, which was revealed by non-significant differences between the two patient groups for parameters such as physical functioning, role limitations as a result of physical problems or emotional restraints, vitality, social functionality and pain perception. Furthermore, it was observed that the surgical treatment method had no effect on the severity of shoulder pain felt during the movement of the patient ($p = 0.69$) (Table 1).

Catastrophizing is generally defined as considering an event worse than it actually is and reflecting it with exaggeration. Pain catastrophizing refers to the unsuccess of individuals to cope with pain when faced with difficult conditions, and this term has been in use for about 50 years. Pain catastrophizing changes remarkably among individuals, and psychological, cultural, environmental, genetic and social factors all have influence upon this (Parr et al., 2012). PCS is a test presented by Sullivan et al. (1995) to evaluate the pain experience of individuals, and it consists of a total of 13 items. Numerous clinical studies have been introduced to evaluate the pain catastrophizing. According to the results of these studies, pain catastrophizing is regarded as an independent risk factor for the deterioration of QoL (Laroche et al., 2017; Leung, 2012). To our best knowledge, there are no studies in the literature comparing the QoL with PCS in patients who had surgery for breast cancer. In their studies on catastrophizing, Van Eijsden-Besseling et al. (2010) reported the prognosis to be worse in patients who had high pain catastrophizing scores. Bergboom et al. (2011), stated that pain catastrophizing could predict the insufficient healing and physical disability in patients receiving physical treatment due to musculo-skeletal system pains. Likewise, Sullivan et al. (2002) reported the association between actual physical intolerance and pain catastrophizing in delayed onset muscle soreness caused by exercise, and found that physical intolerance developed in patients with high pain catastrophizing levels. Studying patients with chronic musculoskeletal disease, Thilbault et al. (2008) observed that the physical performance measured by lifting sandbags was lower in patients with high pain catastrophizing levels compared to the other group in the study. There are studies mentioning that functional problems that cause a deterioration in QoL of patients undergoing surgical treatment for breast cancer were related to the person's pain sensation, regardless of the surgical treatment modality (Box et al., 2002; Ernst et al., 2002; Morimoto et al. 2003). However, there are no studies that directly compared pain catastrophizing with SF-36 in these patients. In their study, Suren et al. (2014b) reported the cut-off value for PCS as 17, and PCS ≥ 17 was considered high. In the present study, it was observed that the QoL measured by SF-36 form of the patients with PCS < 17 was higher than the group with PCS ≥ 17 ($p < 0.05$). Significant difference was analyzed between the patients with high and normal PCS for all parameters (Table 1). In addition, it was observed that the patient group with PCS ≥ 17 had a shoulder pain intensity level of 4.65 ± 1.85 during movement, which was only 1.62 ± 1.41 in patients with PCS < 17 ($p = 0.001$). These results showed that the deterioration in the QoL experienced in postoperative period by the patients who had breast surgery was associated with pain catastrophizing, and this finding was consistent with the previous literature.

In patients with high PCS levels during pre-operative or post-operative period, implementation of rehabilitation programs could lead to improvements in long-term QoL of patients who underwent breast surgery.

Conclusion

Our study revealed that high levels of catastrophizing caused worsening in the QoL of patients who had surgery for breast cancer. The surgical treatment method, on the other hand, did not have any significant effect on QoL. It seems reasonable that high pre-operative PCS levels could predict more serious deterioration in QoL during the postoperative period. Identifying these patients, monitoring them and implementing psychotherapies for them in early postoperative period could alleviate the long-term adverse effects on their QoL.

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Table legend

Table 1. **SF-36 test results of the study groups established by PCS and surgical treatment modality for the breast cancer surgery (MRM or BCS)**

		PCS			Surgical treatment modality		
		< 17 n = 45	≥ 17 n = 27	P	MRM n = 38	BCS n = 34	p
Age		51.91 ± 10.41	52.67 ± 10.37	0.766	51.61 ± 12.48	52.85 ± 7.36	0.61
Education	Primary	28	18	0.8	26	20	0.4
	High school College	17	9		12	14	
Extremity	Left	21	9	0.3	13	17	0.2
	Right	24	18		25	17	
	PF	81.22 ± 17.25	54.85 ± 22.07	0.001	69.47 ± 24.40	73.41 ± 21.46	0.47
	RP	66.94 ± 43.39	29.53 ± 14.73	0.001	50.00 ± 43.39	45.22 ± 37.07	0.66
	RE	91.85 ± 23.75	50.61 ± 40.10	0.001	82.45 ± 36.13	69.60 ± 45.22	0.19
	VT	65.22 ± 14.30	48.70 ± 23.27	0.002	56.18 ± 20.34	62.20 ± 18.83	0.19
	MH	64.88 ± 15.95	51.25 ± 16.78	0.001	58.94 ± 13.83	60.70 ± 16.66	0.67
	SF	91.38 ± 10.60	62.50 ± 31.77	0.001	79.60 ± 26.06	81.61 ± 24.66	0.73
	BP	78.61 ± 16.81	39.16 ± 20.17	0.001	63.22 ± 28.00	64.48 ± 24.77	0.84
	GH	76.67 ± 14.61	56.67 ± 22.57	0.001	73.42 ± 20.17	64.41 ± 19.76	0.06
	PCS	8.80 ± 3.87	27.19 ± 5.95	0.001	15.32 ± 10.39	16.12 ± 9.96	0.74
	Shoulder Pain	1.62 ± 1.41	4.65 ± 1.85	0.001	2.63 ± 1.19	2.83 ± 2.14	0.69

(PCS; Pain catastrophizing scale, MRM; modified radical mastectomy, BCS; breast conservation surgery, PF; physical functioning, RP; role limitations as a result of physical problems, BP; bodily pain, GH; general health perception by the patient, VT; vitality, SF; social functioning, RE; role limitations as a result of emotional restraints, MH; mental health)

Figure legend

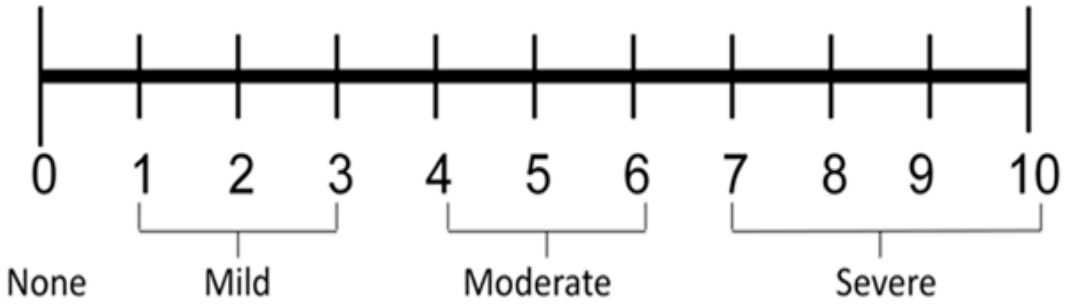

Fig. 1. **Numeric rating scale for pain assessment**