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Effectiveness Of Upper Limb Physiotherapy In Patient's Of Carcinoma Breast After Modified Radical Mastectomy

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Abstract
Physiotherapy of patients after modified radical mastectomy is a complex process. It includes not only physical exercises, but also other physiotherapy treatments, such as physical therapy, massage, kinesiotaping and psychological therapy. The best results brings the early introduction of rehabilitation to the patients, before the procedure, when they learn how to properly perform exercises, and improve the performance of the muscle pump and prevent blockages by circulatory and respiratory exercises, which are the basis of kinesiotherapy.

Keywords: Breast cancer, Modified Radical Mastectomy, Physiotherapy, Rehabilatation

Introduction

Breast cancer is the most common malignancy in women.[1] About 89% of women with breast cancer survive at least five years after treatment, but complication may persist for months or years following surgery.[2]

The etiology is not fully understood, however, the most often considered cause are older age, genetic conditions, early age of menarche and late menopause, or the late age of the first delivery ended with the birth of a live child.[3]

Both screening and treatment of breast cancer has improved significantly over the last few years, resulting in higher survival rates.[4]

In the 80s / 90s of twentieth century women underwent total amputations, but over time, modified radical mastectomy and simple mastectomy began to be used. Regardless of the treatment method, patients should also receive adjuvant therapy in the form of chemotherapy, hormonotherapy or radiotherapy. Now a days our main focus is to improve quality of life in patients of carcinoma breast by the management of complications related to breast cancer treatment and rehabilitation.[5] Among other aspects, quality of life is reduced by impairments of the upper limb, such as pain, impaired shoulder mobility, decreased strength and arm lymphedema.[6-8] In the acute treatment phase of the cancer, breast and axillary surgery and radiotherapy cause scar tissue formation, wound formation, fibrosis and shortening of soft tissues, such as the pectoral muscles.[9-12] Initially, this may lead to upper limb impairments such as local postoperative pain and a subsequent decrease in range of motion (ROM).[8,9] In a further postoperative stage, adhesive capsulitis, myofascial dysfunctions and/or nerve dysfunctions can also cause pain and impaired shoulder mobility.[10,12-14] Besides pain and impaired shoulder mobility, decreased strength of the upper limb may be present in the short and the long term.[8] Another possible provoking factor of pain and impaired shoulder mobility may be lymphovascular disorders, such as axillary web syndrome and the development of lymphedema.[10,11,15,16] Approximately 20% of patients

develop arm lymphedema after axillary dissection for breast cancer.[8] Prevalence rates of the most common impairments like pain and impaired range of motion ranges between 12-51% and 1.5-50%, respectively, 3 months to 6 years after surgery.[7-9] Presence of limitations in activities of daily life is reported in 9-57% of patients, leading to a reduced quality of life.[7] Because of the high prevalence rates, an effective evidence-based postoperative physical therapy program is necessary to treat postoperative pain and impaired ROM and to prevent other impairments of the upper limb and limitations in activities of daily life in the long term. In practice and in clinical trials four physical therapy modalities are used. First of all, passive mobilization techniques are recommended to restore joint mobility or to prevent muscular shortening.[9,17] Secondly, manual stretching and transverse strain is needed to prevent tightness of the pectoral muscles.[12,18] Thirdly, myofascial dysfunctions, often palpable as painful muscular trigger points, are seen in 45% of patients with breast cancer in the long term.[13] Therefore, myofascial techniques such as myofascial release techniques and sustained trigger point compression could be useful.[11] Fourthly, different types of exercises should be added.[19] Active and/or active-assisted mobilization exercises are needed.[17] Stretching exercises should be accompanied by scapulothoracic exercises since an increased posterior tilt, protraction and decreased lateral rotation of the scapula is often observed after breast cancer treatment.[18, 20-22] Shortened pectoral muscles emphasize this posture.[18, 20] Strengthening exercises should also be included to restore arm strength and prevent difficulties in performing activities of daily life.[17] When physical therapy is implemented, timing and intensity should be considered.[17]

McNeely's study, in particular, suggests that a supervised rehabilitation intervention is preferable to the standard one, which instead uses an informative booklet, a written educational package, or unstructured or non-individualized exercises.[23]

In Ebaugh's study, it is stated that postural pain, scar formation, and protection posture cause a shortening of the small pectoral and large pectoral muscles.[9]

Finally, chronic pain occurs in a proportion of up to 50% of patients six months after surgery.[24] Breast cancer survivors with persistent breast pain have significantly high levels of depressive symptoms, increased apprehension of pain, and increased anxiety as compared to patients who do not have persistent breast pain or women who have no history of cancer.[25]

Material And Methods

Study design We conducted a Cross sectional observational clinical study that consisted of evaluation of rehabilitation of upper limb limitations in women after modified radical mastectomy.

Source of data Post operative patients of breast cancer which were admitted in R.D Gardi Medical College hospital, Ujjain (M.P).

Duration of study July 2020 to March 2021.

Sample size- 45

Measurements- At the first evaluation, the patient's age, height, weight, and BMI were measured.

A clinical examination was performed to exclude participants with scoliosis or other postural disorders. If necessary, an X-ray of the spine was obtained.

The Constant Murley score is divided into four subscales: pain (15 points), activities of daily living (20 points), strength (25 points) and range of motion: forward elevation, external rotation, abduction and internal rotation of the shoulder (40 points). The higher the score, the higher the quality of the function.

A clinical evaluation of the shoulder joint range of motion (flexion, extension, adduction, abduction, and internal and external rotation) on the operated side was performed with a goniometer.

Assessment of the muscular strength of the shoulder (Power) as per the Medical Research Council Manual Muscle Testing (MRC) scale was performed.

A grade of 5/5 on the MRC scale indicates that movement is possible against maximum resistance; 4/5indicates movement that is possible only against minimum resistance; 3/5 indicates movement that is possible only against gravity; 2/5 indicates movement that is possible only in the absence of gravity; 1/5 indicates evidence of movement; and 0/5 on the MRC scale indicates no movement.

Activity of Daily Living (ADL) was assessed by Disabilities of Arm, Shoulder, and Hand

Volume 5, Issue 1; January-February 2022; Page No 896-901

Questionnaire (DASH) is a 30-item, self-reported questionnaire that measures physical function and symptoms in people with any of several musculoskeletal disorders of the upper limb. It quantifies general disabilities that are related to the upper extremity. The questions are related to the degree of difficulty in performing various functional activities due arm, shoulder, or hand impairments (21 items); the severity of pain, activity-related pain, tingling, weakness, and stiffness (5 items); and the effects on social activities, work, and sleep and their psychological impact (4 items). Each item has 5 options, ranging from 1 to 5. The responses to the 30 questions are summed to form a raw score that is then converted on a scale from 0 to 100. A higher score reflects greater disability.

Severity of pain was assessed by Visual Analogue Score (VAS)

The Visual Analog Scale (VAS) is a simple, robust, sensitive, and reproducible instrument that enables patients to express their pain intensity as numerical values from 0 to 10 cm. Patients associated the severity of their upper limb pain on the side of the surgery with a 10-cm continuous line, marked "no pain" on one end and "worst pain" on the other.

Data analysis-The mean and standard deviations were computed for all data. We verified the normal distribution of all variables and we applied parametric or nonparametric tests, as appropriate, to compare means. Anova -F test was used to compare data, applying Bonferroni correction to reduce type I errors. The critical alpha level was set to 0.05 for all analyses. All statistical analyses were performed using Microsoft excel.

Results

Table 1 shows that the mean of patients who underwent Modified Radical Mastectomy and were followed up with upper limb physiotherapy was 49.31 ± 12.71 years. Maximum number of patients were in the age group of 41 – 50 years (33.33 %) followed by 51 – 60 years (28.89%). The minimum number of patients were in the age group of > 60 years (13.34 %).

Table 1: Age distribution of studied population (N = 45)

Age distribution(years)	Number of patients (n)	%
≤ 40	11	24.44
41 – 50	15	33.33
51 – 60	13	28.89
> 60	6	13.34
Mean ± SD (range)	49.31 ± 12.71 (32 – 78)	

Table 2 shows that, the mean Constant Murley Score at the time of presentation was 17.36 ± 4.43 (poor as per score) while at the final follow up was 97.7 ± 14.63 (excellent as per score). The Constant Murley scores at different time intervals are tabulated. When compared statistically, the difference in means came highly significant (p = 0.000).

Table 2: Evaluation of effectiveness of upper limb physiotherapy in Modified Radical Mastectomy patients by constant and murley score

Follow up	Maximum	Minimum	Mean	Std. Deviation	95 % Confidence interval for Mean		ANOVA F value	*p* value
					Lower bound	Upper bound		

Volume 5, Issue 1; January-February 2022; Page No 896-901

At presentation	29	12	17.36	4.43	16.06	18.65	2763.845	0.000
3 weeks	62	33	42.02	8.22	39.62	44.42		
6 weeks	83	60	70.2	11.25	66.91	73.49		
12 weeks	94	79	85.78	13.07	81.96	89.60		
6 months	100	89	97.67	14.63	93.39	101.94		

Table 3 shows, pairwise comparison between the mean Constant Murley score of each follow up interval using the Bonferroni correction test to determine significant change of score. The maximum change (Mean difference 80.31 ± 10.2) in the score was noted between preoperative mean score and the mean score at final follow up which was highly significant (p = 0.000).

Table 3: Difference of Constant Murley and pair wise significance

Comparison	Mean difference	Critical value	*p* value	a*
At presentation – 3 weeks	-24.67	7.29	0.000	HS
At presentation – 6 weeks	-52.84	7.29	0.000	HS
At presentation – 12 weeks	-68.42	7.29	0.000	HS
At presentation – 6 months	-80.31	7.29	0.000	HS
3 weeks – 6 weeks	-28.18	7.29	0.000	HS
3 weeks – 12 weeks	-43.76	7.29	0.000	HS
3 weeks – 6 months	-55.64	7.29	0.000	HS
6 weeks – 12 weeks	-15.58	7.29	0.000	HS
6 weeks – 6 months	-27.47	7.29	0.000	HS
12 weeks – 6 months	-11.89	7.29	0.000	HS

a* Adjustment for multiple comparisons – Bonferroni correction

HS= Highly significant

Discussion

This study was aimed at assessing effectiveness of upper limb physiotherapy in patient's of carcinoma breast after modified radical mastectomy. As a result of breast cancer radical treatment, many patients complaints of limited activities of their arm and shoulder, leading to limitations in activities of daily living.

Physiotherapy can be helpful in improving shoulder ROM, post-operative pain, and chest expansion for the complication occurring post-MRM. In this study, 45 patients were taken with mean age of 49.31 ± 12.71 years (Table 1). The functional outcome was assessed by using Constant and Murley scoring system. Patients were assessed during a specified period using Constant and Murley score and found that score improved from 17.36 at presentation to 85.78 at 12 weeks and 97.67 by the end of 6months ($p < 0.001$) which showed highly significant.

Volume 5, Issue 1; January-February 2022; Page No 896-901

We compared our study results with a study conducted by B.C. Hanusch, L. Goodchild and A. Rangan.[26] In their study -24 patients were included which were assessed prospectively before and at a mean of 27 months after miniopen repair using constant and Murley score. The mean Constant and Murley score improved significantly from 36 before to 68 after surgery (p <0.0001).

Study limitations

First, several treatment modalities for breast cancer were used. Certain types of surgery (axillary lymph node dissection and mastectomy) and radiotherapy at the axilla may increase the risk of the development of impairments of the upper limb after breast cancer. Furthermore, the extent of surgery and the possible combination with other adjuvant treatment modalities such as chemotherapy may influence the duration of wound healing and seroma formation.

Second, different starting points and follow-up time frames were used in the included studies.

Third, several methods of measurement were used. A standardized way of measuring impairments of the upper limb is needed to enable more adequate comparisons.

Finally, heterogeneity in the physical therapy interventions applied in the different studies makes it difficult to compare studies.

Conclusion

In conclusion, passive mobilizations, exercises and the combination of manual stretching and general exercises are effective for improvement of shoulder ROM after breast cancer surgery. Exercises are also effective for treatment of postoperative pain of the upper limb. Three studies supported the early start of exercises for recovery of shoulder ROM, while four studies supported the delay of exercises to avoid prolonged wound healing.

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Volume 5, Issue 1; January-February 2022; Page No 896-901

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Volume 5, Issue 1; January-February 2022; Page No 896-901