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SCIENTIFIC ARTICLE

Functional rehabilitation of the upper limb in women with mastectomies: systematic review of the literature

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KEYWORDS
Functional rehabilitation;
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Abstract
Introduction: Breast cancer is a highly harmful pathology in women's lives. It has emotional and psychological consequences that can affect their quality of life. Early and structured interventions performed by elements of rehabilitation nursing can be essential to the functional recovery of the upper-limb and to the patients' well-being.
Objectives: To assess the efficiency of functional rehabilitation programs in the recovery of the patients' upper-limb and that began in early post-surgery of women who have undergone a radical mastectomy.
Methods: This is an integrative review of literature. After we had established the inclusion and exclusion criteria, after we had analyzed the researchers, six primary studies were selected. Those studies were searched through some browsers like PubMed; The Cochrane Library; some Institutional Repositories and PEDro. We used different set of keywords like "rehabilitation", "breast cancer", "upper-limb", "modified radical mastectomy" and "post-surgery complications" in Portuguese and in English. The search took place between June and April 2014, following the principles suggested by the Cochrane Handbook.[1]
Results: The studies suggest the existence of clinical benefits that are statistically significant when there is an early rehabilitation intervention. This early action will help ease the patients' pain, prevent the lymphedema, recover joint amplitude and will allow patients to perform daily tasks in an independent way.
Conclusion: Structured and systemic Rehabilitation Nursing Programmes generate benefits in women's functionality and quality of life and will greatly improve their health.
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Introduction

Breast cancer is a disease which has a huge impact on the Portuguese society, not only because of its incidence and severity, but also because it is associated with an organ full of symbolism, a symbol of maternity and femininity. It is the most common type of cancer among women and the second cause of death by cancer in female patients.[2]

According to a report published by the Portuguese League against Cancer[3] there is in Portugal an incidence of 4500 new cases of breast cancer every year; one in every ten women will suffer from breast cancer at a certain moment of her life; every day 11 to 13 women are diagnosed with the disease; every year cancer kills approximately 1500 women (4 every day) and approximately 90% of breast cancers can be cured, if they are detected prematurely and treated correctly.

Currently, the surgical procedures adopted (modified radical mastectomy) are less aggressive than they were in the past, there are more ways to cure cancer, survival periods are longer and the patients' quality of life is much better. This situation is due to the use of new surgical techniques, to the emergence of the first biological therapeutics and to the patients' early rehabilitation programmes.[4] Despite the evolution we have just described, breast cancer is still highly feared by society in general. The complications which are associated with surgery can be local or systemic and, as several authors[5] refer, the bigger the surgical extension is, the higher is the probability of post-surgery complications. The limited range of motion (RM) of the shoulder is seen as one of the main post-surgery complications in cases of breast cancer, a type of complication that causes the upper-limb (UL) loss of function.[6]

At the same time, the changes that occur in the structural physiology of the axillary cavities may lead to the emergence of adhesions and to a loss of the shoulder joint motion that can cause a quick increase of rigidity and muscle atrophy. Both long immobilization, caused by fear or by pain, and the kind of surgery- the size of the incision, the existence of axillary lymphadenectomy, injuries in the long thoracic nerve or muscle spams in all the cervical area- are factors that contribute to a woman's gradual loss of motion of the upper-limb homolateral to surgery.[5]

In order to lower the incidence of complications, people are in favor of early physical exercise practice (right after the surgery) which will undergo a gradual progression. However there is no consensus in this matter. Some authors recommend that the exercise programme should only begin after the removal of the chest tubes.[6-8]

These controversies continue when we try to find out which exercises are right for the patients, how many exercises should be prescribed and what the ideal moment to perform those exercises is.[5]

In these situations, Healthcare professionals have to show that they have vast, deep and up-to-date knowledge, both scientific and technological, to be able to take the right decisions and perform the right procedures. To rehabilitation nurses, people's quality of life represents the core concern of their action and they develop in association with their peers and with their patients a set of strategies which main goal is to reinforce self-care capacities and to make daily tasks something their patients will perform easily and independently.[9]

Thus, and based on the assumptions we have described, we came up with the following investigative question: What is the long-term (after a one year period) efficiency of the functional rehabilitation programmes of upper-limbs which have started in early post-surgery (from PS0 of the post-surgery period to the sixth month after the patient's hospital discharge) for women who had undergone unilateral radical mastectomy to help prevent co-morbidities (pain, paresthesia, strength loss, loss of joint amplitude and lymphedema)? Following the question, the main objective of this investigation was evident: to assess- in their ability to prevent co-morbidities- the efficiency of the functional rehabilitation programmes of upper-limbs which had started in early postoperative stages for women who had undergone a unilateral radical mastectomy.

Material and methods

Following our investigation question and the objectives that were defined, we performed a systemic review, without any meta-analysis, of the literature available, looking for information about, *"early rehabilitation of the upper-limb in women who went through a mastectomy"*. The goal of this review was to identify the scientific evidence about this issue, hoping that it would clarify the role of rehabilitation nursing and help make good medical and nursing practice a reality. In order to reach these objectives, we followed the *Cochrane Handbook*[1] international guiding lines. The review was defined based on the PI[C]O method. Participants are women who had undergone a unilateral radical mastectomy and the research took place between January and April 2014 and used the following database: *PubMed* (*Public Medline*), *The Cochrane Library, PEDRO data base* (Evidences in physiotherapy) and Institutional Repositories. 2004-2014 was defined as chronological filter and the keywords that were used were *"rehabilitation", "breast cancer", "upper-limb", "modified radical mastectomy" and "post-surgical complications"*. Research was conducted in Portuguese and in English using OR and Boolean Operators. The exclusion and inclusion criteria are expressed in Table 1.

The first step was to submit a list with the titles and a summary of the 491 articles we had found through our filtered search to two reviewers. This submission was an independent decision and was based on the relevance of the study, the participants and the intervention for the SRL that was being performed. Each reviewer selected the studies and then 475 were left out because they had little to do the investigative question. 16 articles were selected for full text analysis. The next step was the full reading of the 16 articles by the reviewers. Following the criteria that had been defined, 10 articles were excluded: articles that were not available in *full text* (1); systemic revisions of the literature (6); articles that were collected more than once (1); articles that were excluded after a full reading (2). In conclusion, 6 randomized clinical essays were kept as part of the *corpus* of this article. From all the studies we have identified through the different kinds of research we had used and from the methodology we have referred before, we were able to define the study selection process that follows in Figure 1.

Table 1 Primary studies selection criteria

Selection criteria	Inclusion criteria	Exclusion criteria
[P] Participants	Women who went through a modified radical mastectomy. Aged between 30 and 65	Women who suffer from breast cancer and did not undergo any surgery Participants from other age-groups
[I] Intervension	Upper-limb functional rehabilitation programmes which started in the early post-surgical period (from the first day of the postoperative period to the sixth month after the patient's hospital discharge Women who underwent rehabilitation programmes after having left the hospital	Other contexts that don't have to do with the rehabilitation of women who had undergone a mastectomy
[C] Comparisons/context study	Upper-limb functional rehabilitation programmes which started in the early post-surgical period vs Upper-limb Functional rehabilitation programmes which only started after the patients discharge from the hospital	Previous evidence of upper-limb dysfunction epsilateral to mastectomy
		Patient had already started the process of breast reconstruction. Record of neurological dysfunctions
[O] Results	Prevalence of morbidities in the upper-limb of the woman who went through mastectomy one year after the end of the rehabilitation programme	Other results linked to rehabilitation interventions in areas that are not associated with women who had undergone a mastectomy
Design	Randomized controled studies; "Evaluation Studies"; "Follow-Up Studies"; "Validation Studies"; "Prepost intervention study"	Narrative review of the literature and SRL

SRL: Systematic Revision of the Literature.

The chart we used for the critical assessment of the 6 articles was made available by Carneiro.[10] To this author, the only "quality studies" are those which get a 75% score or higher. According to the score they were given 84% of the articles show a high quality and S16 is the only article with a 65% score.

Results

Early Rehabilitation, early post-surgery complications, functional capacity of the upper-limb, pain and lymphedema were the main outcomes analysed. The results obtained from this analysis were taken into account to assess the efficiency of the rehabilitation programmes.

Early rehabilitation

The evidences collected from those six studies suggest that there are statistically significant (P = .000) and clinically significant benefits from an early intervention, carried out in a hospital environment (from the first day of the post-surgery period) with a twelve months *follow-up* period. Evidence shows that upper-limbs early rehabilitation programmes are efficient, but those studies also showed how different those interventions may be. There is an evident diversity of exercises, too. This doesn't come as a surprise since there no total agreement on what do "ideal exercises" for this kind of patients really mean. In those women physical rehabilitation there is no trials carried out by comparing and standardizing the exercise programmes. However, we think that the protocols would be easier to reproduce if they followed certain common patterns. In the articles found, the majority of the exercises began from PS1/3. and the kind of exercises that were developed were: flexion and abduction of the shoulder up to 90º; internal and external rotation of the shoulder; simultaneous lifting and relaxation of the shoulders; lateral inclinations of the neck as well as internal and external rotations of the head and stretching of the neck muscles; raising the shoulders one at a time and internal rotation of the shoulder with abduction of the arm up to 90º with the elbow flexed.

Complications

The most frequent complications in early post-surgery are associated with the increase in the drainage volume which will have an influence on the period of time needed to remove the patients' tubes. Situations that include swelling and dehiscence of the stitches were also reported, although some authors admit that those clinical situations are related, not only to early mobilization, but also to obesity, age (patients over 55) and the increase in the period of efficient healing (S12, S14); McNeely et al[11] tells us that if we want to promote the upper-limb short-term functionality, to the detriment of the increase in the

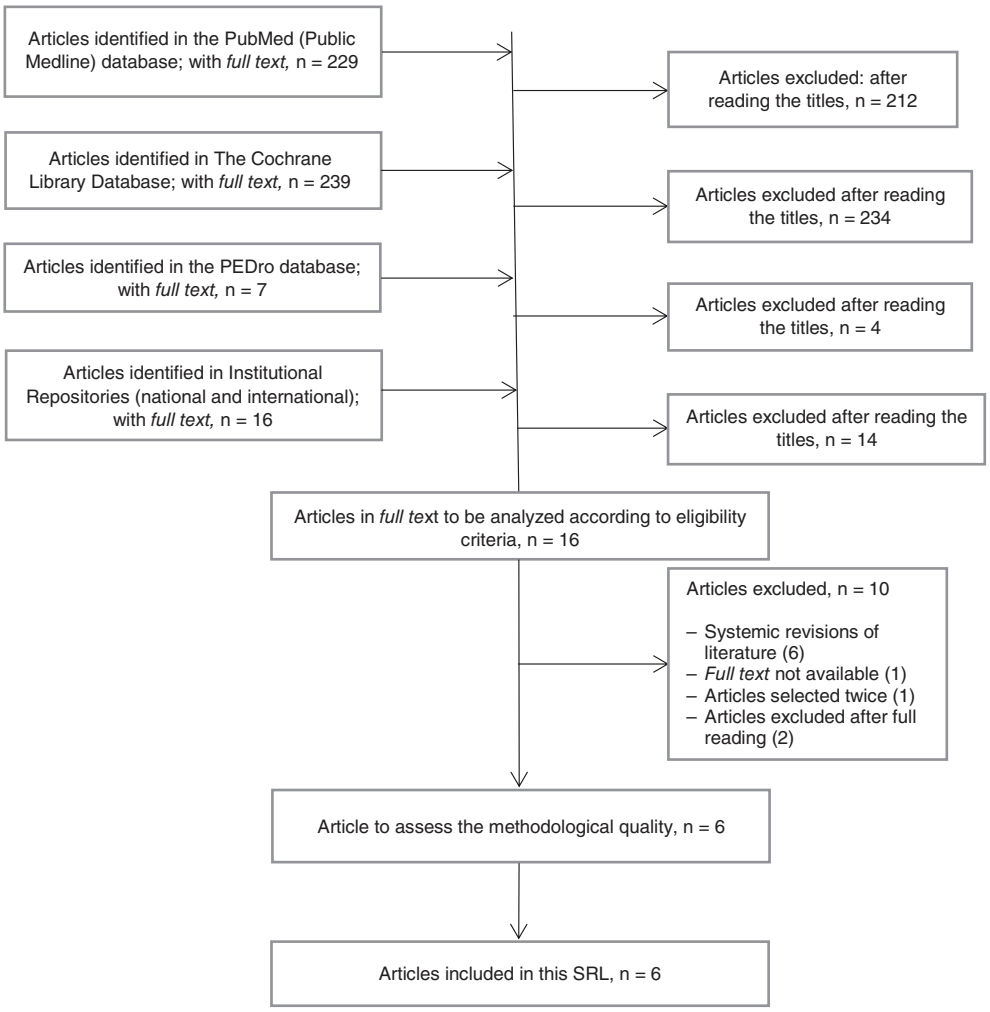

Figure 1 Research and studies selection process. Source: adapted from the Joanna Briggs Institute.[1]

drainage volume of the surgical wound (to avoid a delay in the healing and the risk of infection), we have to start early rehabilitation right after PS1. If we want to prevent this increase in the volume drained, we can postpone the implementation of the post-surgical exercises for a week approximately.

Functional capacity of the upper-limb

We have also found benefits associated with the functional capacity of the upper-limb which will gain amplitude in the flexion, abduction, extension and external upper-limb movement (S1, S3, S5, S12); data collected point out that the effective exercise programmes must go on after the surgery and for 6 to 12 months.[11,12]

The upper-limb rehabilitation in women who had undergone a neoplasia surgery must promote a total or partial recovery of the patient's amplitude of movement. Some authors describe a 10% a 15% deficit in the normal value defined for each movement of the upper-limb and in the recovery of the patient's amplitude of movement as acceptable, since this situation doesn't seem to interfere with the functionality of the upper-limb and will allow the patient to perform his daily tasks.[5]

Pain

Although there are many references to the reduction of pain in literature, in this article corpus Beurskens and his collaborators (S5) were the only ones to show that early rehabilitation reduces pain, a 3.4 reduction in the Visual Analogue Scale (VAS) that are in contrast to the 0.5 observed in the GC ($P < .001$).

Lymphedema

Regarding this variable we couldn't find an agreement among the authors. Study S16 refers that after a 12 months follow up period, the secondary lymphedema grew four time quicker in the GC (GI/GC, relative risk 0.26; $P = .010$), since the volume of the affected arm was 5.1% superior to the volume of the healthy arm, while in the GI there was a 1.6% average increase in the volume. However, there was no evidence that supports that early exercise after the surgery can lead to an increase in the lymphedema. On the contrary, it seems that it prevents the lymphedema from developing or, when it already exists, reduces its size (S3, S5, S14, S16). It seems that there's an agreement when it comes to how important early rehabilitation is, always supported

by an educational strategy in order to prevent and reduce the secondary lymphedema in patients that have just undergone cancer surgery which involved axillary ganglion drainage.

Conclusion

The most important conclusions we have reached after having analyzed those studies stress out the importance of the early interventions and the relationship it has with another of the outcome we have discovered: the quality of life of women who went through a mastectomy. In fact all the studies show positive results that come from the structured exercise programmes which benefits from medical support. They all state that a structured programme improves the functional capacity of the upper-limb and therefore play an important role in the improvement of short and long-term quality of life.

All the articles show (with different relevance) positive results of early rehabilitation in matters like the prevention of complications mainly in the early post-surgery, the improvement in the functional capacity of the upper-limb, in the pain relief and in the reduction of the lymphedema and in the prevention/reduction of comorbilities.

We could observe that although there are no ideal or singular programmes, the early rehabilitation of the upper-limb, performed by competent professionals really helps patients deal with the disease and helps restore their independence, giving them the possibility to perform everyday tasks.

The relationship that exists between the different health professionals who work in the hospital is essential so that this transition process can evolve in a systemic way. All this has to be done in association with primary healthcare so that the patient can get all the support she deserves and so that health professional can give women who have undergone a mastectomy what they really need.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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