Original Article

Incidence and Risk Factors of Winged Scapula After Axillary Lymph Node Dissection in Breast Cancer Surgery

Juliana Flávia de Oliveira, MSc;[1] Thiago Bezerra, MSc;[3] Ana Carolina Padula Ribeiro;[2] Ricardo Almeida Dias ;[1] Fabiana Abrahão, PhD;[1] Júlio Guilherme Silva, MSc;[1] Anke Bergmann, PhD.[1]

1 Physiotherapy Research Group, Centro Universitário Augusto Motta

2-Physiotherapy Service, Cancer III Hospital, Instituto Nacional do Câncer

3 Neurology Post-graduation Program, Universidade do Rio de Janeiro (UNIRIO)

Abstract

Breast cancer has a high incidence in women as well as repercussions in an important worldwide public health problem. Among the surgical techniques, conservative surgery or mastectomies followed by axillary lymphadenectomy or sentinel lymph node biopsy may be performed. The objective of this study was to evaluate the incidence and risk factors of winged scapula in different moments. Ninety women, submitted to axillary lymph node dissection for breast cancer treatment, were included in this research in the National Cancer Institute between June and August of 2006. The average age was 60 years of age. Only 8.9% of the women were diagnosed in the initial stage of the disease, being stage II (A and B) predominant (54.4%). Neoadjuvant chemotherapy was necessary in 43.5% of the women. Considering the surgical treatment, most of the women underwent mastectomy (87.8%) with partial axillary lymph node dissection in 27.3% of cases (level I 3.4% and level II 23.9%). In average, 19 lymph nodes were removed (SD 8.8) and four lymph nodes were positive (SD 6.1). The incidence of winged scapula in the immediate postoperative axillary lymphadenectomy was 73.3%, 65.6% after 90 days and 27.7% at the end of follow-up (416 days). None of the variables was statistically related to winged scapula at the first and at the last physical examination. The studied population was characterized by women with a low level of schooling, most of them overweight/obese and diagnosis of cancer in the most advanced stages of the disease. We observed a high incidence of winged scapula in all follow-up.

Keywords: Breast neoplasms;Lymph node excision;Scapula; Incidence;Risk Factors;Surgery.

Introduction

Breast cancer has a high incidence in women as well as repercussions of an important worldwide public health problem. The number of new cases of breast cancer expected for Brazil in 2008 is 49,400 with a risk estimate of 51 cases in every 100 thousand women.[1] In our current reality, either for social or economic reasons, breast cancer diagnosis is usually established in a late stage of the disease. Between 2000 and 2001, half of thewomen were diagnosed in stages III and IV, causing a more aggressive treatment and, consequently, increasing the adverse effects derived from it.[2]

Breast cancer treatment is quite complex and depends on the characteristics of both the patient and the tumor. Nowadays, surgery and radiotherapy are available for locoregional control, as well as hormonal therapy and chemotherapy for systemic control. Among the surgical techniques, conservative surgery or

Correspondence:
Anke Bergman
Rua Visconde de Santa Isabel, 274 - Vila Isabel
20560120 - Brazil
Phone: 55 21 38796366
E-mail: ankebergmann@unisuam.edu

mastectomies followed by axillary lymphadenectomy or sentinel lymph node biopsy may be performed.[3]

Several complications, which occur in conservative surgeries as well as in mastectomies, due to axillary lymphadenectomy in surgical treatment of breast cancer, are reported.[3-8] Among them is the long thoracic nerve lesion, which may be either partial (neuropraxis) or complete (neurotmesis). In neuropraxis, there is an interruption of the nerve conduction in the myelin sheath, mainly involving the motor fibers, making demyelination possible one month to two years after the lesion. However, in neurotmesis, the situation is normally irreversible since the lesion injures the whole nerve trunk, involving the adjacent conjunctive tissue, endoneurium, perineurium and epineurium.[8]

Long thoracic nerve lesion generates either strength reduction or paralysis of the serratus anterior muscle, leading to scapular destabilization with prominence of the medial margin of the scapula and rotation of the inferior angle toward the midline, characterizing the winged scapula. This case may be associated with arm flexion limitation, with or without the presence of pain .[9] Reports in literature show the prevalence of winged scapula after breast cancer surgery varying from 1.5% to 12.6%.[4,10-12]

Among the etiological factors of winged scapula after the surgical treatment of breast cancer, there are reports of iatrogeny, direct contact of the suction drain with the nerve wall, thermal lesion caused by the use of electrocautery, arm position in hyperabduction during the surgery; abrupt decubitus changes of the patient under anesthesia and due to the anatomic variations in the nerve location and pathway.[9,13-14] We have not found studies which assessed the demographic and tumor characteristics such as the variables associated with the long thoracic nerve lesion. The knowledge of these risk factors would be useful for surgical and physiotherapeutic planning, preventing the lesion based on preoperative risk, as well as minimizing postoperative complications by previously providing for specialized treatment.

The objective of this study was to evaluate the incidence and risk factors of winged scapula in different moments after axillary lymph node dissection.

Material and Methods

A cohort study was carried out in women with surgical indication of axillary lymphadenectomy for breast cancer treatment in Cancer Hospital III / National Cancer Institute, between June and August of 2006. Women with comprehension difficulties, tumor stage IV, that had received previous treatment of breast cancer and those with alteration in the scapula prior to surgical procedure were excluded. The present study was approved by the Ethics and Research Committee of the National Cancer Institute (reference number 027/06).

The population elected for the study underwent physiotherapeutic evaluation at 1 day before and at 1, 90 and 400 days after the surgical procedure. Data collection was carried out by trained physiotherapists through anamnesis and physical test and was complemented by medical records.

In order to evaluate the serratus anterior muscle function, the patient was positioned orthostatically, pushing the wall with the arms abducted to 90º, flexed elbows and hands against the wall at the sternum level. The presence of winged scapula was determined when the prominence of the inferior angle of the scapula homolateral to breast cancer was observed.

For the analysis of the factors involved in long thoracic nerve lesion development, the following variables were collected: age; educational level; main occupation; body mass index; surgery undergone; responsible for the surgery (staff or resident); surgery duration; level of axillary lymphadenectomy; neoadjuvant treatment; tumor location; number of removed and damaged lymph nodes; tumor staging; laterality of surgery and presence of previous homolateral shoulder pathology diagnosed through physical test.

The calculation for the sample size was made based on a confidence interval of 95%, power of 80% and winged scapula expected frequency of 10%. Fifty women would complete the necessary sample. However, at the period chosen for the study, ninety women filled the inclusion criteria and this was the analyzed sample. At the last physical examination, seven women were considered loss to follow-up and did not return for evaluation. For data analysis, a descriptive study of the population was carried out through the measures of central tendency and dispersion of continuous variables, as well as frequency distribution for the other independent variables. Subsequently, the relative risk was performed in order to explore the magnitude of associations between independent variables and the winged scapula, considering a confidence interval of 95%. The SPSS 11.0 program was used to analyze the data.

Results

Ninety women, submitted to axillary lymphadenectomy for breast cancer treatment, were included in this research and 83 were followed for a mean of 90 days (SD 45) and 416 days (SD 50.6).

The average age was 60 years, 75.3% were considered overweight (BMI > 25). Breast cancer was located in the

upper quadrants in 27.5% of the cases and the left breast was the most injured (54.4%). Only 8.9% of the women were diagnosed in the initial stage of the disease, being stage II (A and B) predominant (54.4%). Neoadjuvant chemotherapy was necessary in 43.5% of the women. Considering the surgical treatment, most of the women underwent mastectomy (87.8%). From these, 74.4% were submitted to modified radical mastectomy (Madden) – preserving the pectoral muscles. The average duration of the surgery was 85 minutes (SD 26.4). Axillary lymphadenectomy was partial in 27.3% of cases (level I 3.4% and level II 23.9%). In average, nineteen lymph nodes was removed (SD 8.8) and 4 lymph nodes was positive (SD 6.1) (Table 1).

The incidence of winged scapula was 73.3% at the first day after the surgery, 65.6% at 90 days, and 27,7% at the end of the follow-up (416 days). In the bivariate analysis, none of the variables was statistically related to winged scapula at the first and at the last physical examination (Table 1).

Table 1 – Bivariate analysis between winged scapula and independent variables

		First follow-up (day 1 after surgery)		First follow-up (mean 416 days)	
Independent variables	**N (%)**	**RR (CI 95%)**	**p value**	**RR (CI 95%)**	**p value**
Age					
>65 years old	55	0.92 (0.72-1.18)	0.34	0.53 (0.26-1.07)	0.06
< 65 years old	35				
Occupation					
Housewife	53	1.24 (0.94-1.64)	0.09	1.06 (0.50-2.24)	0.54
Other	36				
BMI					
>30	37	0.94 (0.72-1.23)	0.42	1.31 (0.65-2.68)	0.31
< 30	51				
Tumor location					
Right	41	1.27 (0.99-1.62)	0.05	1.62 (0.80-3.26)	0.13
Left	49				
Surgery					
Mastectomy	79	1.17 (0.74-1.87)	0.33	3.36 (0.50-22.49)	0.13
Conservative	11				
Schooling					
Incomplete 1st segment	43	1.01 (0.79-1.30)	0.55	0.88 (0.43-1.84)	0.81
1st segment and +	45				
ALND level					
Partial (LI e LII)	24	0.82 (0.58-1.14)	0.15	0.84 (0.38-1.86)	0.44
Completed (LIII)	64				
Removed Lymph Nodes					
Up to 15	25	0.83 (0.60-1.15)	0.16	0.82 (0.37-0.18)	0.41
> 16	65				
Lymph Node Status					
Positive	56	0.99 (0.77-1.28	0.58	1.36 (0.63-2.94)	0.29
Negative	34				
Positive Lymph Nodes					
> 4	28	0.95 (0.69-1.30)	0.50	0.45 (0.18-1.12)	0.07
Up to 3	28				
Tumor Staging					
Up to II A	38	0.95 (0.73-1.23)	0.45	0.93 (0.46-1.88)	0.52
II B and +	51				
Neo chemotherapy					
No	51	0.86 (0.67-1.10)	0.18	0.72 (0.36-1.43)	0.25
Yes	39				
Surgery duration					
< 90 minutes	61	0.83 (0.67-1.05)	1.12	1.52 (0.67-3.43)	0.22
> 90 minutes	29				

OR = Odds Ratio; CI = Confidence Interval; BMI = Body Mass Index, AL: Axillary Lymph Node Dissection. The differences in percentage correspond to missing values.

Discussion

The population included in this research characterized people with a low level of schooling, most of them overweight/obese and diagnosis of cancer in the most advanced stages of the disease. In these cases, they were submitted to more aggressive treatments, and consequently, exposed to a higher risk of intra and postoperative complications.

The incidence of winged scapula in the immediate postoperative axillary lymphadenectomy was 73.3%, 65.6% after 90 days and at the last follow-up (14 months) was 27.7%. The decrease in the incidence of winged scapula observed in our study, along the follow-up period, probably reflecting the process of regeneration after a partial lesion (neuropraxis) of the long thoracic nerve. Moreover, all patients are accompanied by physical therapy, which may have contributed to the reversal of this condition.

In a multicentric study carried out with 689 patients in the initial stage of breast cancer, the incidence of winged scapula was lower than 1% on average, after 32 months.[3] When Freitas-Junior et al.[4] studied patients with similar characteristics to our population, they reported a 0.5% prevalence of long thoracic nerve lesion after modified radical mastectomy. Although both studies reported low incidence, the definition, the type of lesion and the follow-up were divergent; therefore, they are not comparable to our study, which also occurred with Pain et al.[15] study. In this study, the incidence of winged scapula of 8.4%, but as this study was of prevalence only among women monitored by a university project, the incidence is not comparable to our study.

We have not found studies which evaluated risk factors associated with winged scapula after surgical treatment of breast cancer. In our results, none of the variables was statistically related to winged scapula at the first and at the last physical examination.

Some intraoperative variables have been pointed as the possible causes of the lesion in several types of surgeries. The anesthetic procedure has been reported as the most likely cause, presenting a 5% incidence of long thoracic nerve lesion.[16-17] During anesthesia, some procedures may lead to lesions, among them: the placing of the shoulder support for the Trendelenburg position stabilization; the tension suffered by an unconscious (under anesthesia) patient's neck and arm when transferred from the operating table to the stretcher; the finger pressure on the neck lateral or when the patient has his head turned in order to wear the anesthetic mask and; the lateral decubitus position, when distending the upper part of the nerve during neck and head lateral angulation toward the opposite side.[18] Another intraoperative factor is the use of electrocautery which, due to its thermal effect, may damage subjacent tissues causing temporary nerve lesion.[19-20] Moreover, as it is a school hospital, the surgical intervention performed either by the staff or the resident doctor and the experience of the surgeon may be an important variant on the evaluation of the observed outcome. However, in our study, it was not possible to analyze these factors due to the difficulty to access such data during the surgery.

Another variable that needs to be studied is the neoadjuvant chemotherapy and risk of nerve injury. Chemotherapeutic agents can cause toxic effects on peripheral nerves secondary to agents that inactivate the components required to maintain the metabolic needs of the axon, which results in a significant debilitating symptom that compromises quality of life and results in pain or discomfort.[21-22] However, we didn't find studies that have examined this association.

In this study, the number of patients may be considered insufficient to appraise the associations between independent variables and winged scapula; therefore, a larger sample would be necessary. Another problem is that the intraoperative characteristics, such as the use of electrocautery and limb positioning during the operation have not been evaluated, and these factors may be theoretically related to nerve lesion.

New studies that include in its protocols other treatment periods and the evaluation of intraoperatory variants such as the use of electrical scalpel, upper limb positioning and the surgical intervention performed either by the staff or the new resident doctor are required.

Conclusion

The incidence of winged scapula in the immediate postoperative axillary lymphadenectomy was 73.3%, 65.6% in 90 days and 27.7% at the end of the follow-up (416 days). None of the variables was statistically related to winged scapula at the first and at the last physical examination.

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