

# Dry Needling in Postoperative Breast Cancer: Influence on Pain and Shoulder Range of Motion – Pilot Study

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*Agulhamento a Seco no Pós-Operatório de Câncer de Mama: Influência na Dor e na Amplitude de Movimento do Ombro – Estudo Piloto*

*Punción seca en el Posoperatorio de Câncer de Mama: Influencia en el Dolor y en la Amplitud de Movimiento del Hombro – Estudio Piloto*

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## ABSTRACT

**Introduction:** The estimated number of new cases of breast cancer in Brazil is 73,610 annually in 2023, according to the National Cancer Institute. Treatments for breast cancer can lead to adverse events such as muscle pain and limitation of shoulder range of motion. Myofascial pain is reported in 38% to 85% of patients. Among the treatments, the technique of dry needling is minimally invasive and consists of inserting a thin needle into the muscle fascia directly at the myofascial point. **Objective:** To evaluate whether dry needling influences musculoskeletal pain and shoulder range of motion in postoperative breast cancer patients. **Method:** The study included ten women with limited range of motion in flexion and abduction of the limb ipsilateral to surgery, whether presenting pain or not when in movement. Range of motion of flexion and abduction was assessed using a goniometer and pain using the visual analogue scale. Two weekly sessions of dry needling were performed for three weeks. The needle used was an acupuncture needle, characterized as solid filament without medication. **Results:** There was a significant reduction in pain scores ( $p = 0.0006$ ) and a significant improvement in range of motion, with an increase of approximately 50 degrees of flexion and abduction ( $p = 0.0002$ ). **Conclusion:** Dry needling appears to be a promising technique in reducing pain and improving shoulder range of motion in the postoperative period of breast cancer.

**Key words:** Dry Needling/methods; Breast Neoplasms/surgery; Range of Motion, Articular; Musculoskeletal Pain.

## RESUMO

**Introdução:** A estimativa de casos novos de câncer de mama no Brasil é de 73.610 anuais em 2023, de acordo com o Instituto Nacional do Câncer. Os tratamentos para o câncer de mama podem levar a eventos adversos como dor muscular e limitação da amplitude de movimento do ombro. A dor miofascial é referida de 38% a 85% das pacientes. Entre os tratamentos, a técnica de agulhamento a seco ou *dry needling* é pouco invasiva e consiste na inserção de uma agulha fina na fáscia do músculo diretamente no ponto miofascial. **Objetivo:** Avaliar se o agulhamento a seco influencia a dor musculoesquelética e a amplitude de movimento de ombro em pacientes no pós-operatório de câncer de mama. **Método:** Participaram deste estudo dez mulheres com limitação da amplitude de movimento na flexão e abdução do membro homolateral à cirurgia apresentando dor ou não ao movimento. A amplitude de movimento de flexão e abdução foi avaliada por meio do goniômetro e a dor, pela escala visual analógica. Foram realizadas duas sessões semanais de agulhamento a seco por três semanas. A agulha utilizada foi a de acupuntura, caracterizada como filamento sólida sem medicação. **Resultados:** Houve redução significativa nos escores de dor ( $p = 0,0006$ ) e melhora significativa da amplitude de movimento, com aumento de aproximadamente 50 graus de flexão e abdução ( $p = 0,0002$ ). **Conclusão:** O agulhamento a seco parece ser uma técnica promissora na diminuição da dor e melhora da amplitude de movimento de ombro no pós-operatório de câncer de mama.

**Palavras-chave:** Agulhamento Seco/métodos; Neoplasias da Mama/cirurgia; Amplitude de Movimento Articular; Dor Musculoesquelética.

## RESUMEN

**Introducción:** Según el Instituto Nacional del Cáncer, se estima que el número de nuevos casos de cáncer de mama en Brasil sea de 73 610 al año en 2023. Los tratamientos para el cáncer de mama pueden provocar eventos adversos como dolor muscular y limitación de la amplitud de movimiento del hombro. El dolor miofascial se reporta entre el 38% y el 85% de los pacientes. Entre los tratamientos, la técnica de punción seca, o *dry needling*, es mínimamente invasiva y consiste en insertar una aguja delgada en la fascia muscular directamente en el punto miofascial. **Objetivo:** Evaluar si la punción seca influye en el dolor musculoesquelético y la amplitud de movimiento del hombro en pacientes posoperatorios de cáncer de mama. **Método:** Diez mujeres con limitación de la amplitud de movimiento en flexión y abducción del miembro ipsilateral a la cirugía, presentando dolor o no, fueron incluidas en este estudio. La amplitud de movimiento de flexión y abducción fue evaluada utilizando un goniómetro y el dolor mediante la escala visual analógica. Se realizaron dos sesiones semanales de punción seca durante tres semanas. La aguja utilizada fue una de acupuntura, caracterizada como filamento sólido sin medicación. **Resultados:** Se observó una reducción significativa en los puntajes de dolor ( $p = 0,0006$ ) y una mejora significativa en la amplitud de movimiento, con un aumento de aproximadamente 50 grados en flexión y abducción ( $p = 0,0002$ ). **Conclusión:** La punción seca parece ser una técnica prometedora para reducir el dolor y mejorar la amplitud de movimiento del hombro en el periodo posoperatorio del cáncer de mama.

**Palabras clave:** Punción Seca/métodos; Neoplasias de la Mama/cirurgia; Rango del Movimiento Articular; Dolor Musculoesquelético.

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## INTRODUCTION

Breast cancer is the most incident worldwide with 2.3 million annual new cases. The estimate for Brazil is 73,610 new cases annually according to the National Cancer Institute<sup>1</sup>. Surgical intervention is the most common treatment followed by complementary interventions as radiotherapy, chemotherapy or hormone therapy<sup>2</sup>.

Notwithstanding increasing survival, these treatments can cause several adverse events as pain, and limitation of shoulder range of motion (ROM). Studies have indicated an incidence between 38% and 85% of the patients with myofascial pain syndrome (MPS)<sup>3</sup> defined as a set of autonomic, motor and sensory signs and symptoms caused by myofascial trigger points. Typically, it contributes to the appearance of regional mechanical pain followed by increased muscle tension and decreased flexibility. A myofascial point is a hyperirritable palpable point in a taut band of muscle fibers. This point is painful when submitted to mechanic deformation on compression and can give rise to referred pain and sensitivity, motor dysfunction and autonomic phenomena<sup>4</sup>.

Dry needling is safe and effective, reducing local, referred and generalized skeletal muscle pain immediately and rehabilitation of the range of motion and muscle activation patterns<sup>5</sup>.

It is a qualified intervention with a fine filiform needle to puncture the skin and stimulate myofascial points to deactivate, provoking controlled micro muscle spasms at the punctured area, leading to muscle relaxation without additional substances. The intervention has been proved positive to treat pain in some myofascial structures difficult to access by manual palpation, producing analgesia due to somatosensorial involvement for local and referred pain<sup>6,7</sup>.

The objective of the present study is to evaluate whether DN technique influences postoperative musculoskeletal pain and shoulder range of motion in women treated for breast cancer.

## METHOD

Ten women in postoperative unilateral breast cancer at initial or late surgery time have been selected. They presented active or latent myofascial points to digital pressure on the shoulder girdle (trapezius, supraspinatus, levator scapulae, deltoid, latissimus dorsi, serratus anterior, pectoralis major and minor, rhomboid major and minor, teres major and minor and infraspinatus) at physiotherapy physical exam with limited flexion or abduction range-of-motion of the limb ipsilateral to the surgery with or without pain when moving.

Women submitted to surgery for less than 15 days with surgical drain, with history of osteoarticular pathologies at the limb ipsilateral to previous surgery, with cicatricial dehiscence and/or bleeding and/or infection at the wound, women with aversion to needles, convulsions and difficulty for self-determination of pain were excluded.

Personal and surgery information were collected, inspection and palpation on the surgery area and digital pressure on shoulder girdle were performed. Goniometer was utilized to measure the active flexion and abduction range of motion of limb ipsilateral to surgery and pain was evaluated with the visual analogue scale (VAS). Sessions were held twice a week for three weeks and evaluations occurred in the first and sixth sessions without other concomitant interventions.

After positive diagnosis of active or latent myofascial trigger points, deep dry needling was applied to the muscle until the target was reached and kept for 180 seconds. Next, the investigator performed a cross stimulation on the myofascial point for nearly ten seconds and the needle was removed (solid acupuncture 0.25 x 0.40 mm filament needle). The patient was in supine (figure 1) for pectoralis major needling. For women who underwent breast reconstruction with silicone implants or expander, DN was limited to the clavicle of pectoralis major, in contralateral supine to the breast operated (Figure 2) on medium trapezius, major and minor rhomboid and infraspinatus.

The Institutional Review Board (IRB) approved the study, report number 6070138 (CAAE (submission for ethical review): 68716323.1.0000.5382) in compliance with Directive 466/12<sup>8</sup> of the National Health Council.

## RESULTS

Ten middle aged women, mean age 56.2 ( $\pm$  11.10) years, in late unilateral postoperative breast cancer. Mean postoperative time was approximately 30.5 ( $\pm$  45.6) days, four patients were submitted to conserving surgery and three to breast reconstruction. Eight women underwent axillary lymphadenectomy. Of the ten participants, three had complications due to ROM limitation as bursitis, and long head biceps tendonitis.

DN was effective to reduce pain after six sessions (figure 3). Pain diminished significantly from 5.4 ( $\pm$  2.05) to 1.7 ( $\pm$  1.67) in the sixth session ( $p$  = 0.0006). Descriptive statistics as mean and standard deviation were calculated for the intervention evaluated. Independent Student's  $t$  test was calculated to compare measurements at the initial and final evaluation, with level of significance of 0.05 for all the analyzes. ROM improved substantially (figures 4 and 5). There was significant increase of 50 grades of





Figure 1. Patient in supine: needling pectoralis clavicle major muscle



Figure 2. Surgery contralateral supine: needling middle trapezius, major and minor rhomboid and infraspinatus

shoulder ROM flexion and abduction post breast cancer operation ( $p = 0.0002$ ).

### Pain - Visual Analogue Scale (VAS)

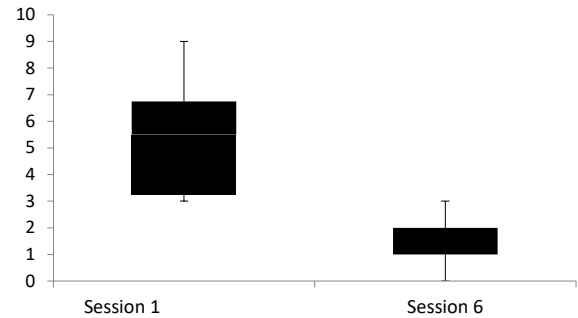


Figure 3. Pain before and after intervention

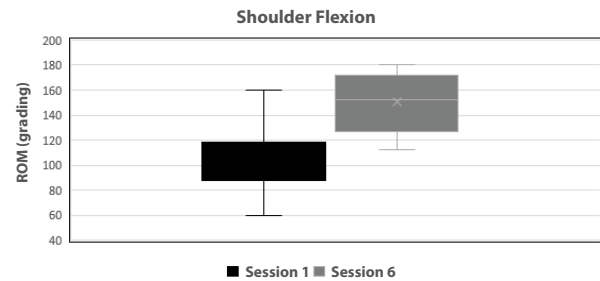


Figure 4. Shoulder flexion before and after intervention

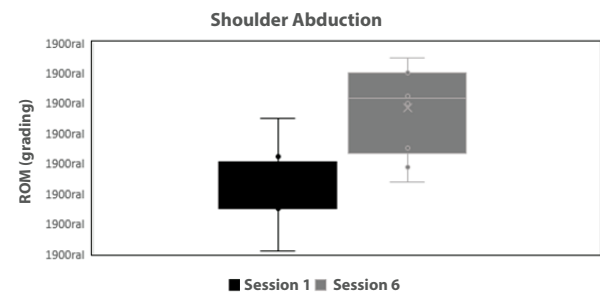


Figure 5. Shoulder abduction before and after intervention

## DISCUSSION

Shoulder pain and ROM in postoperative breast cancer improved after DN application.

A study with 116 women with breast cancer found trigger-point in 44.8% of them in the first six months post-surgery, mainly in latissimus dorsi (25.9%), serratus anterior (24.0%), major pectoralis (20.7%) and infraspinatus (19.0%), likely caused by the position of the shoulder during surgery, due to cicatricial wound, excision

of pectoral fascia during surgery or postural alteration. No differences of trigger-points because of the type of surgery or complementary treatment performed<sup>9,10</sup> have been found.

Therapeutic effects from DN can occur due to several mechanisms as mechanic, neurophysiological and chemical effects. It is believed that DN offers mechanical stretching to shortened sarcomeres and cytoskeletal structures contracted inside myofascial trigger-point. This would allow the sarcomere to resume its resting length, reducing the degree of overlap between actin and myosin filaments. The main therapeutic factor for the effectiveness of DN is the mechanic disruption of the myofascial point by the needle and trigger points change in status from active trigger point to latent trigger points or palpably normal tissue<sup>10</sup>.

DN therapeutic effects are likely caused by neurophysiologic and chemical-mechanic effects, it can stimulate the A-delta nerve fibers which, in turn, may activate the enkephalinergic inhibitory dorsal horn interneurons. Several studies showed alterations of the chemical properties of myofascial trigger-point. Local contraction responses can reduce the concentration of sensitizing substances on the myofascial point, resulting in opioid-mediated pain suppression<sup>10</sup>.

Some studies have also demonstrated that the increased levels of bradykinin on myofascial points are directly corrected. This gene is related to the calcitonin peptide, substance P and other chemical products as well as reduced pH. In addition, it is known that local oxygen saturation on a trigger point is lower than 5% compared to normal.

Local sensitiveness and referred pain improved after DN when muscle nociceptors are stimulated in response to the reduction of oxygen levels and increase of inflammatory mediators<sup>11,12</sup>. Injured muscle fibers are shortened (producing taut bands) in response to excessive quantity of calcium ions released from inner injured fibers or in response to the corresponding motor endplate releasing excessive amounts of acetylcholine. DN may influence the muscle microcirculation, enhancing blood flow in the stimulated region<sup>12,13</sup>.

This is the first study investigating DN on myofascial trigger-points in postoperative breast cancer based on several cases. It was possible to observe how a low cost and little invasive technique can bring fast and solid results to shoulder ROM flexion and abduction and intensity of pain without adverse effects.

## CONCLUSION

DN appears to be a promising technique in improving pain and ROM of women post-breast cancer operation. It

is a pilot study of the main study whose goal was to test and refine the methodology prior to conducting a large scale study as no articles on breast cancer postoperative DN have been found in the scientific literature so far.

The present study provided preliminary data to help identifying possible adverse effects or risks associated with intervention, ensuring the participants' safety in the main study, in addition to acceptability and adherence of the participants to the procedures for best efficacy of enrollment and retention strategies.

## CONTRIBUTIONS

All the authors contributed to the study design, acquisition, analysis and interpretation of the data, wording and critical review. They approved the final version to be published.

## DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interests to declare.

## FUNDING SOURCES

None.

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