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What is Cording?

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Axillary web syndrome (AWS), or cording, is a common sequellae of breast cancer surgeries. In prospective studies it is found in up to 72% of women undergoing axillary node dissection and 20% of women undergoing sentinel node dissection in addition to lumpectomy or mastectomy.[1,2] Even with conservative calculations, tens of thousands of women in the United States develop AWS every year without warning from their medical providers. Although lymphedema awareness has radically improved over the past decade, especially for breast cancer patients, awareness and education regarding AWS formation after surgery remains elusive. As the care of our breast cancer patients evolves into a proactive approach focused on evaluation and measurements before surgical intervention, the inclusion of education regarding AWS signs and symptoms along with lymphedema precautions training becomes even more appropriate.[2,3] This article aims to provide information on the characteristics, types, treatments, and composition of AWS in order to promote ongoing AWS pre-operative and post-operative education.

Characteristics of Cording

In a 2001 American Journal of Surgery article, Moskowitz described cording as …a visible web of axillary skin overlying palpable cords of tissue that are made taut and painful by shoulder abduction.[4] Cording is typically located within the medial upper arm along an angled path from the axilla towards the cubital fossa. Because of its distribution, upper arm to cubital fossa cording can significantly limit shoulder flexion, abduction, scaption, elbow extension and shoulder protraction due to pain and tissue adherence. These limitations cause significant impairments with overhead and forward reaching during activities of daily living while in the acute and sub-acute stages. Gentle stretching of the cording during or after soft tissue mobilization that bends the axillary/upper arm cords into a "C" or "S" petrissage stroke is helpful to improve painful tissue adherence. Begin manual techniques proximally within the axilla, working towards the distal end of the palpable cord then retreat towards the axilla to complete the techniques. Manual lymphatic drainage (MLD) stationary circles performed directly on the cords in this same pattern also improve tissue movement and may facilitate proper lymphatic collector flow.

Cording of the forearm and wrist occurs less often but the origin of the cords is still within the axillary region. As with axilla to upper arm and cubital fossa cording, range of movement limitations include the shoulder, scapula, and elbow, but now also involve the forearm and wrist. With this cording pattern, ulnar deviation and wrist extension are generally restricted, though forearm supination or pronation may or may not be involved. Stretching and manual techniques now include movements affecting the soft tissues of the forearm and wrist, in addition to the axillary region and upper arm.

Cording is more common in thinner women. Studies have noted that women with a BMI below 23 and 25 will have a higher occurrence of cording post surgically than those

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with BMIs above 26 and 28.9.[1, 5] Pre-surgery education regarding AWS and the ability of rehabilitation to lessen discomfort, improve movement and shorten the duration of symptoms may be best targeted towards these thinner patients.[5]

The most frequent onset of cording causing pain and movement restriction is documented between the 1st and 8th weeks post axillary node removal though, it can occur after this initial surgical recovery period.[2,4,5,6]

Cording Physiology

Lymphatic fluid does have the capability of spontaneous coagulation, though it typically coagulates more slowly than blood unless it is exposed to thrombokinase, an enzyme released into the lymphatic fluid by tissue damage and cell death.[14] In cases of surgical trauma and inflammation involving tissue damage, thrombokinase may accelerate lymphatic fluid coagulation and influence cording formation, with or without axillary node removal. A spontaneous resolution of cording within two to three months is frequently reported, even without rehabilitation, as lymphatic flow is hypothesized to be restored by that time. In clinical practice, however, the cording may last months or even years without treatment with up to 15% of cording cases lasting > 6 months.[15] Initiating rehabilitation at cording onset may be an effective means of reducing pain,

restoring function, and limiting the course of this syndrome.[5,15]

Cord Composition

Tissue samples of axillary cording are limited, but do implicate lymphatic thromboses, venous thromboses and fibrosed lymphatic vessels as the most frequent tissues comprising axillary webbing.[4,10-13] Additionally, tissue sampling identifies tissue fibrosis extending into the adjacent adipose tissue of the arm, possibly explaining why a "cellulite" texture of the arm appears when the cords are stretched, even in thin women.[11] Positioning, surgical retraction of tissues during node removal and expected outflow obstruction with resultant fluid stasis are proposed causes of cording.[1,2,4-6, 10,11] Incidence of axillary and arm cording is also noted in conjunction with infection after breast cancer surgery and during or after chemotherapy or radiation therapy.[5,10] Some patients who recover completely from cording after their surgery may have it recur during or after radiation therapy or during or after chemotherapy.[5] Seroma formation, early and aggressive stretching or trying a new physical activity that is out of the ordinary (i.e. shoveling snow, raking leaves) following axillary node removal may also increase the risks of AWS, though this is anecdotal.

Types of Cording and Treatment

Phlebitic Cording

Phlebitic Cording: This variant of cording runs somewhat vertically along the medial forearm and may be a result of superficial venous thrombosis and/or inflammation. It frequently occurs in combination with a reversing localized pitting edema of the forearm and, less often, the hand and fingers. If any variant of cording presents with lymphedema, each issue must be treated or the lymphedema may become chronic. A recent study by Torres Lacomba et al noted findings suggestive of a relationship between AWS and increased risk of lymphedema.[2]

Contrary to traditional lymphedema precautions advice, moist heat along the painful phlebitic forearm cord(s) for limited time periods (5-10 minutes several times/day) quickly alleviates pain and improves venous blood flow, thereby reducing lymphatic load and edema. Moist heat is also indicated in cases of extremely painful acute AWS, when the pain limits the therapist's ability to provide adequate treatment.[7] Although unlikely, if active hyperemia increases the edema, immediately apply MLD and bandaging techniques.

Pseudo Cording: Pseudo cording presents as a thick band of scar tissue within the axilla after mastectomy with or without reconstruction. As with axillary cording, it limits overhead reach, shoulder scaption, flexion and hand behind head reaching. Although full range of movement can be restored with the techniques mentioned previously, the cord will not resolve cosmetically unless surgically released when tissue expanders are replaced with permanent breast implants. In the case of pseudo cording without reconstruction, an additional surgery to release the cord is not often recommended due to the risk of both infection and lymphedema onset.

Truncal Cording: Rarely, cording has been noted along the lateral trunk. In these cases, the cords originate below the axilla and traverse the ipsilateral lower abdominal quadrant. An additional variant occurs at the inframammary region following breast reconstruction after mastectomy or elective breast augmentation.6 In these atypical cases, the cord(s) run vertically through the inframammary fold, limiting trunk extension and/or trunk rotation. The inframmary variant, which may be either lymphatic or venous in origin, can occur unilaterally or bilaterally, as it is not dependent upon axillary node removal but is caused by the surgical trauma itself.

Mondor's Disease

This syndrome is caused by thrombophlebitis of the subcutaneous veins of the anterolateral chest wall, most often the lateral thoracic, thoracoepigastric, and superior epigastric veins.[2,6] This sclerosing thrombophlebitis has been noted following elective breast augmentation, breast reconstruction following mastectomy and in cases of superficial tissue injury and exposure to targeted agents (that have been shown to activate coagulation) for treatment of psoriasis.[2,8] In 2008, Mera reported a case of Mondor's disease of the neck region.[9] Tissue sampling and staining identified lymphatics, not veins, as the tissue of origin.[9] This data contradicts the idea that Mondor's disease is always caused by venous structures and supports the possibility of a lymphatic origin.

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