Axillary Web Syndrome
Myths, misunderstandings and what you need to know

Definition

“Visible web of axillary skin overlying palpable cords of tissue that are made taut and painful by shoulder abduction. The web is always present in the axilla and extends into the medial ipsilateral arm, frequently down to the antecubital space and occasionally to the base of thumb.” (Kepics, J.M. 2004)

What is Axillary Web Syndrome?

- Conflicting online information
- Typically initially appears 1-8 weeks after surgery (node dissection, ALN or SLN, with mastectomy or lumpectomy) (Treating axillary web syndrome, 2019)
- May reappear months or years later (Koehler, L.A., Haddad, T.C., Hunter, D.W., Tuttle, T.M., 2018) Can also resolve and then relapse
What is Axillary Web Syndrome?

- Reported incidence varies between 6-86% (may depend on study's definition and to whether AWS was specifically sought in post operative examinations, type of surgery and length of follow up)
- Higher incidence with ALND (36-72%) than with SLNB (11-58%) (Koehler, L.A., Haddad, T.C., Hunter, D.W., Tuttle, T.M., 2018)
- Highest incidence in patients who have prior or contemporaneous contralateral prophylactic mastectomy (86%)
- Also higher in women with lower BMI, younger in age, have more education, exercise more frequently, have greater number of lymph nodes removed, undergo more extensive surgery or receive adjuvant chemotherapy or radiation therapy (Koehler, L.A., Haddad, T.C., Hunter, D.W., Tuttle, T.M., 2018)
- Also known commonly as “cording”
- Can also be seen late in radiation treatment and after
- Typically in the axilla but can also extend distally down the arm as far as the wrist, inferior to the axilla down the anterolateral trunk and less commonly inferior to tissue expanders on anterior trunk
What is Axillary Web Syndrome?

- Typically diagonal orientation
- “Presents as tight, ~1 mm wide linear singular or multiple cords of tissue in the subcutaneous tissue of the axilla” (Koehler, L.A., Haddad, T.C., Hunter, D.W., Tuttle, T.M., 2018)

- “One study suggests that in over 50% of patients the cords will not be visible requiring careful palpation to detect” (Koehler, L.A., Haddad, T.C., Hunter, D.W., Tuttle, T.M., 2018)

- In arm, it may appear as “tenting”, “furrowing” or “pulling” of skin
- If the arm is not fully extended (straight) the tension is less and the cord may not be as evident visually or palpably

- Cord extension beyond the elbow is more common in patients who have had ALND compared to SLND
- Patient’s impairment of movement may depend on the location of the cord. Those with cording in the antecubital fossa may limit elbow extension d/t pain as opposed to those with axillary cording restricting overhead reaching or abduction
What is Axillary Web Syndrome?

- Unresolved cording can lead to chronic shoulder immobility and strength issues
- May lead to chronic alterations of movement patterns, shoulder dysfunction and pain (Koehler, L.A., Haddad, T.C., Hunter, D.W., Tuttle, T.M., 2018)

- Occasionally nodules may appear to be connected to cords and often cause alarm to patient regarding possible metastatic disease. Typically nodules are enlarged lymph vessels and/or lymph vessels surrounded by fatty tissue. None were found to be metastatic on biopsy. (Koehler, L.A., Haddad, T.C., Hunter, D.W., Tuttle, T.M., 2018)
- Most recent studies suggest no correlation between AWS and lymphedema

- Occasionally will occur prior to diagnosis of breast cancer, theoretically may be due to lymphatic involvement in metastatic disease, but currently no research to support this. If patient presents with AWS in absence of cancer diagnosis, further testing is recommended to determine cause and rule out cancer.
What is Axillary Web Syndrome?

- AWS may also be seen with other shoulder and axillary pathologies such as trauma and infection, melanoma with ALND, etc.

What patients report

- "AWS may lead to higher level of psychological distress and anxiety due to the additional burdens of loss of function, reduced movement and pain." (Koehler, L.A., Haddad, T.C., hunter, D.W., Tuttle, T.M., 2018)
- Some patients fear AWS is a sign of cancer recurrence or progression; this has not been shown in any research
- Typically described by patient as “pulling”, “tight” and “painful”

What patients report

- Described as being felt mainly in the axilla but also can extend down medial and anterior arm and anterior and lateral chest
- Those with shorter or less rigid cords may describe movement as feeling abnormal but not necessarily painful
- Cords may not be palpable but patients will complain of pain or pulling with arm movement, particularly flexion and abduction of the shoulder and/or extension of the elbow
What patients report

- "Clinical signs are frequently described as pain and tension during movement in the axillary region, elbow, forearm and wrist, following the arm lymphatic pathway. Moreover, patients report difficulties in moving the arm into activities that require a moderate range of motion and could feel and see the affected arm cords similar to a tendon" (Sandrin, F, 2018)

Mondor's vs AWS

- AWS was initially considered to be scar tissue or a variant of Mondor’s disease, but this has been shown to be incorrect (Koehler, L.A., Haddad, T.C., Hunter, D.W., Tuttle, T.M., 2018)
- Mondor’s is a superficial sclerosing thrombophlebitis which can be seen in other parts of the body (Koehler, L.A., Hunter, D.W., Haddad, T.C., Blaes, A.T., Hirsch, A.T., Ludewig, P.M., 2014)

Mondor’s vs AWS

- Mondor’s disease typically presents as a linear or curvilinear vessel like appearance with occasional redness and/or swelling, may appear as a protuberance or furrow and is often thicker than AWS cords which are diagonal in orientation. Swelling and redness are less likely to be present with AWS.
Mondor’s vs AWS

Mondor’s may present after breast augmentation particularly along the inframammary fold. High frequency ultrasound can be used to detect thrombosis of a superficial vein (Mondor’s) and rule out AWS.

Mondor’s vs AWS

Study used ultrasound to determine if AWS was a variant of Mondor’s and clarify pathophysiologic basis of AWS as vascular or lymphatic abnormality.

18 MHz transducer was used to obtain images and compare AWS side to uninvolved side. Blinded radiologist was asked to assess and determine which side was AWS in 17 subjects. (Koehler, L.A., Hunter, D.W., Haddad, T.C., Blaes, A.H., Hirsch, A.T., Ludewig, P.M., 2014)

Mondor’s vs AWS

“A distinct ultrasonographic structure or abnormality could not be identified in subjects with AWS... which excludes the possibility of AWS being associated with vein thrombosis or a fascial abnormality and supports the theory that AWS may be a pathology that is not visible with 18 MHz ultrasound, such as microlymphatic stasis or binding of fibrin or other proteins in the interstitial space.” (Koehler, L.A., Hunter, D.W., Haddad, T.C., Blaes, A.H., Hirsch, A.T., Ludewig, P.M., 2014)
Theoretical cause

- Theory - surgery “traumatizes connective tissue that encases nearby bundles of blood vessels, lymph vessels and nerves leading to inflammation, scarring and eventually a hardening of the tissues” (Axillary web syndrome, 2019)
- Very few studies done and most with few patients

Theoretical cause

- Some theorize it may increase risk for lymphedema, others feel it is not related. Tends to be diagnosed in thin women whereas lymphedema occurs more frequently in women with a higher BMI
- If the cords resolve or are no longer palpable, we don’t know what happens to them
- “Several studies of dissected cords have shown thrombosed or dilated lymphatics and superficial veins” (Mayo, R.C., 2018)

Theoretical cause

“Local inflammation from lumpectomy or mastectomy may also cause AWS” “May be present in early post operative period after SLNB or ALND” (Mayo, R.C., 2018)
- Cords can sometimes be traced with palpation to ALND scar or drain site scar on anterolateral trunk
Regarding radiation treatment

- May be problematic if present during radiation as it may affect patient’s ability to correctly position arm for treatment
- May reappear near end of radiation as inflammation increases

Not often described in radiation literature but may still be present at the time radiation treatment occurs. “Many radiologists may not be familiar with the condition because there are no studies which have shown that medical imaging can demonstrate the origin or presence of the AWS cords. In fact it has been shown that ultrasound reveals no structure or abnormality that can indicate the diagnosis of AWS but ultrasound may be useful in ruling out other pathology. (Mayo, R.C., 2018)

Therapy perspective

“I describe the cord to my patients as being like a fishing line that is stuck in several places along the fishing rod. You release a few of the stuck spots, but it then magnifies the tightness in the other areas that are still stuck.” Nicole Stout, MPT, CLT-LANA PT and lymphedema therapist at the Breast Care Center National Naval Medical Center
In clinic

- Diagnosed clinically with physical exam revealing weblike structure of palpable, cord like structures
- May not be visible or palpable without tension on skin and fascia in axilla and proximal upper extremity
- May present along with increased fascial tension and decreased tissue mobility in anterior arm

Research

- Appeared in study at a mean of 51 days after breast surgery but only a mean of 16 days after ALND suggesting etiology of AWS was most likely due to the interruption of axillary lymphatics (Kepics, J.M., 2004)
- On biopsy, one lymphatic was filled with a fibrin clot.

Research

- Simple ROM exercises and non steroidal anti inflammatory drugs typically used in standard treatment of orthopedic shoulder pathologies were not found to be helpful.
Sometimes will resolve spontaneously, but responds to manual therapy performed by trained therapist.

“Rehabilitation is usually advised to prevent further complications such as frozen shoulder, articular impeachment syndrome and long term chronic pain, complications that could worsen patient’s quality of life with significant increase in costs and time to recover” (Sandrin, F., 2018)

Currently awaiting publication of study completed in Europe looking at efficacy of therapy treatment of AWS compared to patient education on home program, however, therapy limited to “manual maneuver to snap the cord” and home exercise program.

Therapy is recommended based on more recent studies as effective treatment to decrease cording and associate pain and loss of ROM and function utilizing techniques developed specifically to address AWS as we have become more familiar and knowledgeable of the cause.
Research

- Researcher speculates “thromosed lymphatics go through an inflammatory phase with thickening of the vessels and temporary shortening which later remits” spontaneously in some patients. (Kepics, J.M., 2004)
- It is unclear from this study if lymphatics then become patent or drainage is diverted to other lymphatics, so “snapping” the cord may not be the ideal treatment.

Research

- Patients are often seen in the therapy clinic who continue to complain of pain, tenderness with stretching and limited ROM months and even years after surgery. This is often assumed to be related to soft tissue changes from scar tissue formation or radiation. Shortening of the chest musculature with anterior shoulder rotation and scapular protraction in “protective posturing” is often noted as well as faulty motor recruitment. Mildly increased kyphosis is also noted leading to faulty mechanics of the shoulder complex and related pain and dysfunction.

Research

Faulty postures may be at least partly due to unresolved AWS
- Decreased use of arm due to pain, and/or use of faulty motor recruitment patterns impacts return to previous level of function and normal activities, further frustrating patients as they attempt to return to their “pre-cancer” life. Chronic use of the arm and trunk in faulty patterns and postures can contribute to overuse syndromes and joint and muscle injuries. Patients are sometimes assured by medical personnel these tissues changes are a typical and expected result of cancer treatments.
Why Therapy?

- Education, home program, exercise and tissue manipulations including a variety of adjunctive rehabilitation interventions to improve ROM and mobilization, cord manipulation and stretching have been effective in addressing patient’s complaints of AWS related pain and improving functional use.

- Treatment by a therapist trained in lymphedema and/or cancer rehabilitation is most beneficial. Compression therapy is sometimes useful in decreasing c/o pain.

- Therapy including manual lymph drainage has been shown to significantly reduce arm volume and pain compared to PT alone (Koehler, L.A., Haddad, T.C., Hunter, D.W., Tuttle, T.M., 2018).

Therapy evaluation

- Gently but maximally extend arm at elbow and wrist, then gently but maximally abduct shoulder. Should visualize and physically palpate for cords at axilla, antecubital fossa, wrist, chest wall and inferior to inferior edge of tissue expander if present.

- Goniometric measurements for ROM.
**Therapy evaluation**

- May measure length, depth (superficial, deep) and width of cords as well as document number if multiple are present.
- Can trace with marking pen to measure or use photos.
- Describe level of tension.

- Document pain intensity and site.
- Measure AROM and PROM in shoulder, elbow, wrist and hand if affected, assess ability to complete necessary ROM for radiation therapy if applicable.
- Scapular dysfunction and faulty motor recruitment patterns, particularly of the pectoralis.

- Can use Disabilities of the Arm, Shoulder and Hand Questionnaire (Roehl, L.A., Haddad, T.C., Hunter, D.W., Tuttle, T.M., 2018) for participation in functional activities and QOL.
- Circumferential measurements of UE and chest, and lymphedema assessment including tissue texture and mobility may be warranted.
Therapy approach

► Myofascial techniques
► Re-education in appropriate motor recruitment patterns if pectoralis has been overused and is tightened
► Postural education and awareness of complete shoulder complex including scapula and sternoclavicular joint

Therapy approach

► Whole body alignment education
► ROM and strengthening when appropriate
► Use of gentle warmth (precaution with lymphedema) and home program
► Assessment of typical motor patterns and habits in personal ADLs

Therapy approach

► Stretching, skin traction and tissue bending techniques
► Patients report tension from axilla extending down to drain site scars on chest wall. Palpable cords are sometimes felt extending from the axilla directly to the drain site scar.
► Scarring and myofascial tightness in axilla (not necessarily AWS) may decrease after second stage of reconstruction when scar tissue may be excised
Snap, crackle and pop

- Fascial restrictions and true AWS “feel” like Rice Krispies “sound”, venous cords do not have the “crunchy” crepita feel.
- Occasionally a “pop” can be heard and/or felt by a patient and therapist during manual therapy. We don’t know if the lymphatic vessel has truly broken or released, but patients generally report a decrease in pain and tension and typically demonstrate improved ROM after. It may be a release of supporting fibrous or inflammatory tissues. (Koehler, L.A., Haddad, T.C., Hunter, D.W., Tuttle, T.N., 2018)

“Breaking a cord” is never a goal and aggressive techniques are generally avoided as lymphatic tissues have been shown to crush with low levels of force/pressure.

AWS may be associated with lymphangiogenesis, in which case aggressive manual techniques would best be avoided.

Case report

- 55 year old right dominant female seen in clinic approximately 4 weeks post nipple sparing modified radical mastectomy on the left with ALND dissection with 5/18 nodes positive for metastatic disease. She had implants previous to mastectomy and underwent first stage reconstruction with tissue expander on the left at the time of the mastectomy.
She had been seen for 2 expansions in the plastic surgeon’s office prior to this appointment. She was under a lifting restriction of 10 lbs per plastic surgery protocol. She was scheduled for port placement for chemotherapy and anticipated radiation therapy following chemo.

Reports swelling on her left lateral trunk stable since surgery.
Worked out previous to surgery with weight lifting and running, but not since surgery.
PMHx – arthritis, hypothyroidism, depression
At time of eval, requiring assistance with household tasks d/t lifting restriction, c/o pain with overhead reaching, decreased functional ROM of left shoulder

Evaluation
Numbness in L axilla, proximal medial anterior LUE and lateral trunk
Significantly decreased tissue mobility in L chest and axilla and anterior LUE, several areas of “puckering”, adhesion noted at drain sites L lateral trunk
Webbing noted in axilla and extending along anterior proximal UE and into forearm with c/o tension, pulling
Evaluation

- Initially unable to extend elbow with shoulder abduction and flexion
- Reaches to T3 on R and T1 on L hand behind head, T7 R and L2 on L hand behind back
- Tension and decreased tissue mobility can be palpated from drain site extending up into L axilla and increased tension reported in AWS cords with pressure/palpation to drain site

Evaluation

- Anterior shoulder rotation, increased muscular tension in pectoralis, protracted scapulae
- L shoulder flexion 112, abduction 72 with c/o tension, ER 66 guarded, IR 61 guarded
- No palpable edema in LUE
Due to patient anticipating radiation therapy, primary goal was to increase AROM for positioning of LUE for radiation treatment (approximately 140 degrees flexion necessary for optimal positioning, elbow can be flexed) Although radiation treatments are typically 15 minutes long, the simulation prior to treatment can require patient to be in position with shoulder flexed for 30 minutes.

Goal also for increased functional AROM for daily tasks in pain free range and to be able to return to exercise routine without faulty motor recruitment of pectoralis in resistance activities

Normally port for venous access would be placed on contralateral side, but in this patient’s case, it was placed ipsilateral on affected side.

Patient continued with expansion of tissue expander with further stretching of skin and underlying tissue in L chest wall including fascia and pectoralis musculature. She completed chemotherapy with side effects of fatigue and joint pain as well as alopecia. Radiation initiated approximately 3 weeks after chemo completed. Therapy treatments planned to continue on weekly basis during radiation unless not tolerated or discontinued by radiation oncologist. Radiation field included L chest wall and axilla.
Response to treatment

- Demonstrated reduction in tension, number and length of cords with each therapy treatment, but continued to demonstrate rebound of cording to near previous levels between sessions.
- Demonstrated increased active ROM with less pain and pulling in position necessary for radiation treatment. Just prior to radiation, left shoulder flexion was 158 degrees (increased from 112) and abduction was 116 degrees (increased from 72).

- Due to scar tissue component from previous augmentation surgery, moist heat was attempted but reported as “not helpful” by patient.
- During radiation, patient did present with increased cording extending to the elbow, but continued to respond to treatment within the clinic to decrease tension and length of cords.

- Manual therapy in radiation field was avoided after skin irritation developed at about 10th radiation treatment mark.
- Due to scar tissue in axilla and trunk from previous breast augmentation, treatment will continue as needed after completion of radiation and will continue to monitor for development of lymphedema.
Barriers to appropriate referrals

- Research limited and contradictory
- Medical practitioners may not be knowledgeable in assessing true AWS or not aware of availability of appropriate therapy
- Focus on cancer treatment planning in post op period in favor of attention to less threatening physical impairment (Koehler, L.A., Haddad, T.C., Hunter, D.W., Tuttle, T.M., 2018)

- Patients are seeing multiple practitioners in the post op period and may not be aware which one to report symptoms to. (Koehler, L.A., Haddad, T.C., Hunter, D.W., Tuttle, T.M., 2018)

- Similarly, practitioners may believe/expect another practitioner is addressing the AWS
- Recommendations to monitor for AWS for 3 years after surgery
Summary

Axillary Web Syndrome, aka cording, is a common side effect of lymph node dissection, either axillary or, to a lesser degree, sentinel with surgical treatment of breast cancer.

Limited research has been completed, but it has been shown by ultrasonographic evidence not to be venous in nature, and therefore not Mondor’s disease as initially thought.

Summary

Complaints of pain and pulling can lead to decreased functional use of the affected upper extremity and establishment of dysfunctional movement patterns with long term effects.

Summary

Treatment in therapy clinic by PTs or OTs trained in specific techniques can be beneficial in reducing tension and pain and regaining AROM. Patient education includes avoidance/correction of compensatory techniques and patterns to return to previous levels of function.

Decrease risk of future impairments due to faulty mechanics, particularly in the shoulder complex.
Thank you!

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References


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