CASE STUDIES DESCRIBING AXILLARY WEB SYNDROME

Treatments, Procedures And Outcomes.

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Case 1, 10,11

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Case 7

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Case 2, 3, 4, 5, 6

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Case 8, 9

Study Limitations

***Sflex* and *Sabd* measures** were provided by the treating therapists. Measures of cording width are based on therapist description. Both could only be confirmed by photograph review by the author.
This study reports on cases voluntarily provided by therapists and women to the Share Cording Protocols Project. This may not represent the variety of AWS cases seen in clinics across the world. Cases with Level 2, 1-3 mm cords were not submitted and have not been reported on in this study.
Treatment length: Data comes from therapist's notes- treatment length is time from first appointment to discharge and may not indicate first date of achieving maximum reported shoulder range eg case 6 achieved reported end range at 6th session 5 wks.

Introduction

Axillary Web Syndrome (AWS /cording) has been recognized as a common movement limiting complication experienced by women after breast cancer surgery.

Interventions to reduce movement restrictions must be considered as a means of reducing the high rate of post breast cancer upper body morbidity such as pain, ADL dysfunction and impaired lymphatic transport capacity.

Research has not yet established the cause of AWS, accepted assessment methods or effective treatment approaches.

The Share Cording Protocols Project brought together case studies from experienced therapists working in breast cancer rehabilitation from several countries. These case studies offer a description of interventions and outcomes based on real time considerations for individual patients and therapists.

Evaluating current clinical assessments, treatments and outcomes can establish commonalities, variances and innovations. These may be used to guide better research and clinical practice.

Objectives

1. Identify assessment dilemmas and make recommendations for assessment of AWS.
2. Identify common and unique treatment procedures for AWS.
3. Identify outcomes, timeframes and dilemmas for clinical benchmarking and research consideration.
4. Identify skills and resources to provide AWS services.

Method

Case study data submitted to the online Share Cording Protocols Project was reviewed. The content submitted in a power point format included the therapist's assessment of the case, treatments used and outcomes including before and after photographs of the cording. Additional data was requested of the contributor by email if there was confusion in translation to English or missing data.

Therapists were invited to contribute to the Share Cording Protocols Project via *Linkedin* connections and targeted website requests. As a case was submitted to the project it was added to the collection of cases available through *Youtube**. Eleven cases reported on treatments from 2014-5. Case 1 experienced 3 episodes of cording over the period of a year and was recorded as 3 separate cases.

Summaries of each case submitted were checked by the submitting therapist and peer review of content analysis was undertaken.

*www.youtube.com/playlist?list=PL2FWxNouGN9a-NnDNj0_FEMACpRp5raPx
(Share Cording Protocol Project playlist)

Photos showing shoulder range at start and discharge.

Results, (black) Discussion (purple) and Conclusions (purple bold)

AWS Assessment

1. Shoulder range measures vary when cording extends across the elbow- affecting reliability of shoulder flexion (S*flex*) and abduction (S*abd*) measures.
Eg Case 10 *S*abd* is 90°, S*flex* is 90° with in elbow in full extension (approx. 140°)
S*abd* is 130°, S*flex* is 140° with elbow in full flexion.

To improve reliability of reporting impairment, elbow should be in maximum extension during each S*flex* and S*abd* measurement and ROM of elbow recorded.

2. Shoulder abduction can measure less range than shoulder flexion in acute AWS- case 1b: 160° S*flex*, 110° S*Abd*, and case 11: 80°S*flex*, 50° S*Abd*.
In case 8, cording is a repeat episode, less painful and not observed at full range S*flex* or S*abd*. The cord is observed at greater pectoral stretch position (Reach-Out-The-Back position, ROTB position). At final treatment AWS was still observed in most cases (9/10) at near to full range (*flex and abd*). ROTB position was not commonly used in acute AWS but was used when full S*abd* range was achieved (case 8,9).
Previous research had implied that failure to observe cording at full range S*flex* or S*abd* indicates resolution of cording.
S*Abd* changes over time could better indicate AWS impairment reduction compared to S*flex* changes. After full or near full S*abd* is achieved, a greater pectoral stretch test (eg ROTB test) can be used to observe if AWS has resolved or is still present and contributing to more complex movement restrictions.

3. A single case (10) with thick band, level 2 AWS received treatment for 18 weeks to achieve near full S*abd* , with concurrent chemo. Case 1 with mixed cording, level 2 AWS had two episodes of treatment for 12 and 15 weeks, to achieve near and then full S*abd,* while having chemo and then began radiotherapy. Two cases with 5-15mm, level 2 AWS received treatment for 2 and 3 weeks (6,4). Full S*abd* was not achieved as these cases had their AWS treatment program ceased to commence other cancer treatments.
Cord width and length measures can be considered as descriptors of impairment:

1-3mm (string like)	Level 1: trunk only
5- 15mm (cord or rope like)	Level 2: chest wall to upper arm
>15 mm (band like)	Level 3: chest wall to lower arm (elbow and wrist),
1-3mm and 5 -15mm (mixed)	

4. Abdominal cording is less common and detected with soft tissues on stretch using body positioning, arm stretch (case 5), or skin stretch (case 1c). Treatment ranged from 4-6 weeks.

AWS Treatment:

1. Cases with acute AWS gained 20°- 100° shoulder movement and less elbow movement gains (5°-40°). These outcomes varied in treatment length (2 -18 wks) and number of sessions (4-20).

2. Pectoral muscle contraction was commonly seen and reported in the acute stage of AWS. Stretch of pectoral muscles and breast scar massage were commonly used treatment procedures. Case 8 received treatment only to modify upper chest wall fascia and scar tissue.
Links between AWS and it's fascia and the fascia of pectoral muscle at the breast scar tissue should be considered.

3. Either chemotherapy, radiotherapy, work commitments or an inpatient cancer program occurred regularly (7/13), affecting AWS treatment frequency. See AWS Assessment point 3 case examples.
Other breast cancer treatments (chemo & radiotherapy) have timeframes that will take precedence over AWS treatment and will affect AWS treatment number, frequency, duration and outcomes.

Case	Cord location	Onset time after surgery	SFlex change in degrees	SAbd change in degrees	Cord width mm	Cord length (see levels)	Pectoral m. tightness at initial assess	Treatment number per episode	Session length	Treatment length	Other influences to treatment length^	Cord present at treatment end	Use of ROTB
11	axilla	2 wks	**100°**	**130°**	5-15mm	level 3	yes	14	40-45min	6 wks	no	yes/less	no
7	axilla	3 mths	**100°**	**105°**	5-15	level 3	yes	4	45-30min	2 wks	no	yes/less	no
10	axilla	9 wks	**90°**	**90°**	5-15	level 3	yes	8	45min	4 wks	no	no	yes
9	axilla	10 days	**90**	**85**	**>16mm**	level 2	yes	10	45-30min	18 wks	yes	yes/less	yes
6	axilla	1 wk	**80**	**80**	5-15mm	level 2	yes	4	30min	2 wks	yes	yes/less	no
2	axilla	2 wks	**50°**	**60°**	1-3 and 5-15	level 3	yes	6	30min	2.5 wks	yes	yes/less	no
1b	axilla	6-7 mths	**20**	**70**	5-15mm	level 2	yes	14	45min	15 wks	yes	yes/less	yes
1a	axilla	2 wks	NR	NR	1-3 and 5-15	level 2	NR	20	45min	12 wks	yes	yes/less	no
4	axilla	3 wks	NR	NR	5-15mm	level 2	yes	6	30min	3 wks	yes	yes/less	no
8	axilla	5 yrs	NAD	NAD	5-15mm	level 2	yes	1	45 min	1day	no	yes/less	yes
1c	trunk	8-9 mths	NAD	NAD	1-3mm	level 1	NR	6	with 1b	6-7 wks	yes	yes/less	no
3	trunk	9 mths	NR	NR	>15mm	level 1	yes	6	30min	4 wks	no	yes/less	no
5	trunk	3 days	NR	NR	5-15mm	level 1	yes	6	30min	4.5 wks	no	yes/less	yes

Table 1. Cases in descending order of shoulder movement gains.
^chemotherapy, radiotherapy, inpatient cancer care, work. ***NAD****: No abnormality detected* **NR**: not reported
*Sflex and S Abd: N is change between start and end reported range (degrees). * elbow in max. extension.*

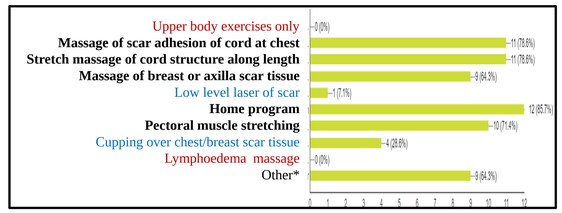


Table 2. Treatment Techniques Used During Episode of Care (N=13)
** muscle relaxation, breath and core stability retraining, abdominal fascia release, self cupping, self scar release*

4. These therapists did not use lymphoedema massage or exercise advice only. Therapists mostly used a combination of myofascial and scar tissue release techniques. Less common interventions were the use of low level laser and negative pressure (cupping) for chest wall scar - both possible innovations for AWS treatment.

5. Treatment sessions ranged from 30-45 mins. Sessions commonly involved soft tissue massage of cord adhesions, cord length and breast scars, pectoral stretches and training for at-home treatment. Treatment varied from 1day–20 weeks and 1-4 times per week.

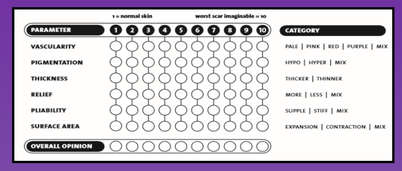
Therapists treating AWS used specialist soft tissue skills to gain full or near full S*flex* and S*abd*. This approach to acute AWS may not be a service that can be added into a typical lymphoedema treatment, due to treatment time and skills required.

Case study data can guide AWS research and breast cancer clinics in real life timeframes, outcomes, therapist's skills and time resources. Breast cancer and lymphoedema clinics can then evaluate if or how the AWS treatment program is delivered.

Referral responsibility, service delivery and staff training need to be decided - as AWS onset may extend across breast cancer care agencies. Doctors should be informed that breast cancer patients with ipsilateral arm movement and pain impairments need to be referred to a service provider with breast cancer rehabilitation skills.

Reference: ***A systematic review of axillary web syndrome .*** *W. M. Yeung & S. M. McPhail & S. S. Kuys. J Cancer Surviv 2015*

MASTECTOMY SCAR ASSESSMENT:
A REVIEW OF POSAS OBSERVER SCALE



POSAS Observer Scale

AUTHORS

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Introduction

Mastectomy is associated with increased incidence of upper-body morbidity, lymphoedema and reduced QOL after breast cancer. Scar severity may be the underlying impairment to these dysfunctions, however an objective assessment tool is not available for clinicians or researchers to measure mastectomy scar responses.

Patient and **O**bserver **S**car **A**ssessment **S**cale (POSAS) has been a popular research tool for the evaluation of burns scars and scar treatments. The POSAS **O**bserver **S**cale (OS) has been evaluated against the POSAS patient self-rating scale and the Vancouver Scar Scale for linear scars after breast cancer.

POSAS has not been validated to assess scar tissue at the mastectomy chest wall. Clinicians and researchers must be able to reliably assess below-skin scar features to guide treatment and measure treatment effectiveness.

A review of POSAS OS is required to determine the usefulness of this tool for assessment of post-mastectomy scar severity.

Aims

1. Identify scar types that expert clinicians feel should be addressed after mastectomy.

1. Identify instructions, training and other recommendations that may improve reliability and validity for POSAS Observer Scale for mastectomy scar assessment.

2. Identify post mastectomy scars and features that are not adequately assessed by the POSAS and therefore require alternative assessment tools.

Method

A survey was distributed to cancer care practitioners from national and international Linkedin connections and websites indicating provision of services in oncology rehab, breast cancer rehabilitation, lymphoedema or oncology massage.

Only data received by therapists with 2+ years experience in mastectomy scar assessment or treatment was used for analysis. Two scenarios were considered:

1. To provide a reliable and consistent assessment of mastectomy linear scar **(MLS)** using the POSAS observer scale (OS);
2. To provide a reliable and consistent assessment of mastectomy chest wall adhesions* **(CWA)** using the POSAS observer scale (OS)

The following five items were evaluated for their importance:

- Removal of clothing to see the scar tissue and surrounding skin
- Stretch of arm or body to assess OS scar features
- Palpation skills of scar types
- Knowledge of scar types that can occur following mastectomy
- Photographs of responses to guide rating.

Median scores were established from the responses.

**Adhesion was chosen to improve clarity of responses compared to scar tissue. Scar tissue may have referred to the other scar types for example seroma scar tissue ,AWS or radiotherapy fibrosis.*

Results and Discussion

Fig 1: Where participants work (29)

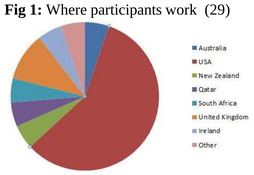


Fig 2: Participant's occupation (29)

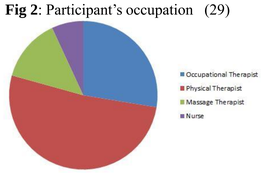


Table 1: Importance of treating scar types.

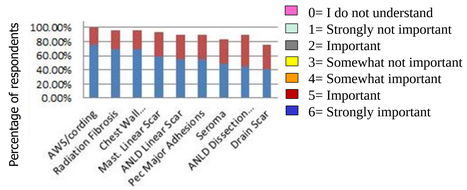


Table 2: Responses to new instructions for OS features

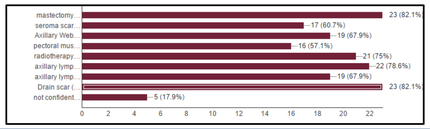
	Clothing		Stretch		Palpation		Knowledge		Photograph	
POSAS SCAR FEATURE	MLS	CWA	MLS	CWA	MLS	CWA	MLS	CWA	MLS	CWA
Vasularity	6	6	5	5	5	5	5	5	4	4
Pigmentation	6	6	4	4	4	5	5	5	4	4
Thickness	6	6	4	5	5	5	5	5	4	4
Relief	6	6	4	5	5	5	5	5	4	4
Pliability	6	6	4	5	5	5	5	5	4	4
Surface Area	6	6	4	5	5	5	5	5	4	4
Overall Opinion	6	6	5	5	5	5	5	5	5	4

Median scores: 4= somewhat important 5= important 6= strongly important

Table 4: Suitability for clinical practice

Suitability of using one OS test only	MLS	CWA
1. For screening	4	4
2. For measuring changes over time	4	4
3. To be beneficial for clinicians	4	4
Suitability of using two tests: MLS& CWA	median score = 3	
Median Scores: 3= no opinion, 4= agreement, 5= strong agreement		

Table 3: What scar types would participants include in POSAS assessment of CWA.



Data was analyzed from 34 health professionals, with a range of professional backgrounds and from several countries. Twenty nine (29) participants had two and more years of experience in breast scar assessment (Figure 1 and Figure 2).

Twenty six (26) participants reported they assess six of the nine types of scar (Table 1) after mastectomy. AWS/ cording was the most important scar type assessed, followed by Radiation Fibrosis and CWA. Only two scar types are surgical linear scars (MLS, ANLD LS^) and seven scar types are located under the skin at the dissection sites.

^ ANLD LS: Axillary Lymph Node Dissection linear scar

Applicability of Observer Scale to therapists' practice

Very experienced participants failed to achieve strong agreement for the potential use of the Observer scale in their practice for tasks such as measuring change, benefits to clinician and patient screening: median=4 for both MLS and CWA (Table 4).

Participant's failed to achieve strong agreement in which scar types would be included in a POSAS assessment of CWA (Table 3). Additionally there was a lack of strong agreement (median=3) as to whether POSAS should be performed for MLS and CWA together or separately (Table 4).

These findings could be attributed to lack of training and clinical experience with POSAS or possibly reflect a lack of confidence in the features of the tool for mastectomy scar tissue severity.

This also raises questions about which scar features the patient would be rating if asked to use the Patient Scale to rate the severity of their mastectomy linear scar.

1. Instruction of clothing removal to see scars

In each POSAS scar feature, participants typically felt that the clothing removal instruction was strongly important (median=6) for both the linear scar and the chest wall adhesion.

2. Palpations skills of mastectomy scar types

Participants frequently rated palpation skills as important (median= 5) for all scar features except for pigmentation of the linear scar (median=4).

3. Knowledge of scar types

Participants typically felt knowledge of scar types to be important (median =5) when rating the severity of all POSAS scar features for both MLS and CWA.

4. Placing the scar on stretch instruction

Participants frequently rated the instruction of placing the person or arm into a stretch position as being important (median= 5) for rating each feature of CWA -except for pigmentation. In contrast there was less strength (median= 4-5) of importance for use of stretch for most POSAS features when considering rating the severity of the MLS.

5. Use of photographic examples

Participants frequently rated use of photographic examples as being only somewhat important (median=4) for each scar feature of both the MLS and CWA.
This could possible be due to the high level of experience these participants had in post breast cancer scar assessment.

Conclusions

1. Experienced therapists can assess up to nine different types of scar tissue after mastectomy. AWS, CWA and radiotherapy fibrosis are seen as the three most important scar types in this survey.
2. Mastectomy scar responses can be complex and may extend well beyond the most visible linear scars. The use of OS on the MLS alone may not reflect the patient's scar severity. This raises similar questions about the use of the Patient Scale after mastectomy.
3. An effective mastectomy scar severity assessment will require actions to improve agreement of scar types to be assessed and subsequent training should be considered.
4. Simple instruction changes to POSAS have been supported by this survey group of experienced clinicians. This will require consideration and approval by the POSAS organization.
5. A modified version of OS for mastectomy MLS or CWA could be evaluated against the Patient Scale (POSAS), shoulder impairment scales and breast cancer specific tests to identify potential impact on post breast cancer dysfunction as well as guide and measure treatment effectiveness.
6. New tools that will objectively measure subcutaneous scar features - vascularity, scar pliability and thickness and especially scar adhesions of the chest wall tissues, radiotherapy fibrosis and AWS/ cording would be welcomed by clinicians, researchers and breast cancer survivors.

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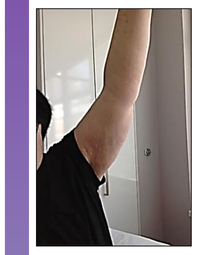
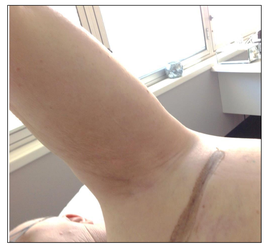
Acknowledgements: To the women who consented to use their photos and the experienced therapists who shared their care, time and knowledge.

Reference: Truong PT, Lee JC, Soer B, Gaul CA, Olivotto IA. Vancouver Island Centre **Reliability and validity testing of the Patient and Observer Scar Assessment Scale in evaluating linear scars after breast cancer surgery.** Plast Reconstr Surg. 2007 Feb;119(2)

POSAS scar features, mastectomy scar types and assessment issues





Clothing, local fat and swelling make it difficult for the Observer to see and evaluate below skin scar features ie **vascularity, thickness, relief.** It is unknown if MLS severity represents the severity of scar **thickness** and **pliability** of AWS/ cording and CWA.
Photograph: MLS, cording, CWA and seroma are present.

Stretch of the arm may influence the Observer's rating of severity for below skin scar features such as **pliability** and **thickness**.
The POSAS instruction for **surface area** is not suited for below skin scars.
Photograph: MLS, AWS , CWA and pectoral muscle adhesions are present.

Pigmentation and **vascularity** scar features could be tested using the P**OS**AS instructions at the skin of the chest wall. It is not known whether arm stretch will influence ratings of these features.
Photograph: Radiation skin changes, MLS, CWA, pectoral adhesion, AWS.

Palpation skills are currently used by experienced clinicians to identify the scar type. It is unknown if palpation skills influence severity ratings.
Photograph: MLS, radiation skin changes, pectoral m adhesion, AWS and drain scar are present.