Axillary Web Syndrome: characterization of the different forms of clinical presentation of the cord.

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Abstract

Objective

Describe and characterize the forms of presentation and manifestation of the cord present in the Axillary Web Syndrome.

Materials and Methods

After a favorable opinion from the Research Ethics Committee of the Federal University of Goiás, the construction of items for the Axillary Web Syndrome Classification Scale began, based on the search for concepts involved in its diagnosis. The various steps of construction, application and validation of the instrument occurred from April 2020 to August 2021. The research took place at the outpatient clinic of Mastology at Hospital das Clínicas (Goiás). In the evaluation position: supine, upper limb ipsilateral to the breast operated in abduction, extension and external rotation of the shoulder, extension and supination of the elbow, extension of the wrist and fingers, information on the specific characteristics of the cord was recorded.

Results

The means presented by the evaluators were almost identical for the variables related to the characterization of the cord, indicating a strong correlation, Cronbach's alpha was 0.894 for evaluator 1 and 0.879 for evaluator 2, indicating strong internal consistency. Inter-rater agreement was 100% ($p>0.001$) for almost all variables evaluated, with the lowest Kappa coefficient (0.77 $p>0.001$) for "Length".

Conclusion

A consensus on classification criteria can be useful among researchers and practitioners. The fibrous cord classification items compiled in this study address its forms of presentation and manifestation and contribute to standardizing the assessment and classification of Axillary Web Syndrome.

Introduction

Axillary Web Syndrome (AWS) is a very common clinical presentation related to surgical interventions with axillary approaches [1, 8]. It is characterized by the development of scar tissue, formed by tense, non-erythematous subcutaneous cord-like structures [2, 13], which can manifest in different forms of presentation.

Assessment is very important for its early detection, as the diagnosis is essentially clinical, based on the presence of cords, reports of pain and mobility limitation, especially of shoulder abduction and flexion [3, 4, 5].

Therefore, the diagnosis and therapeutic intervention as soon as the AWS manifestations are detected, become essential to improve the functional and work activities of these women, positively influencing their recovery.

Despite this, there are no descriptions or consensus in the literature regarding the criteria used for its assessment and often the cord is not identified [6, 7], which may justify the divergence presented in relation to its incidence, which varies between 6% and 90.9% [3, 5, 7, 8, 9, 14].

To improve its diagnosis and classification, an Axillary Web Syndrome Assessment Scale (CS-AWS) was constructed with the aim of describing and characterizing the forms of presentation and manifestation of the cord in an initial validation study.

Materials And Methods

This study is part of exploratory methodological development research, with the aim of constructing and validating the CS-AWS performed at the Physiotherapy outpatient clinic of the Mastology Service of Hospital das Clínicas – Goiânia/GO.

The various steps of construction, application and validation of the instrument occurred from April 2020 to August 2021.

The Scale was applied at the Physiotherapy outpatient clinic of the Mastology Service of Hospital das Clínicas. After signing the free and informed consent form, 14 women in the postoperative period of breast cancer surgery diagnosed with SARS participated. Patients with any medical complications, involvement in the shoulder and/or axillary region ipsilateral to the operated breast and patients undergoing physical therapy were excluded.

Data were collected in person and individually on the same date, but at different times and in different rooms by two evaluators, between the 8th and 36th postoperative day, one patient being evaluated after 5 months of surgery.

Item construction:

The CS-AWS items sought to cover the criteria described in the literature and others observed in clinical practice.

Once the relevant characteristics were defined, from the compilation of concepts and criteria related to the presentation and forms of manifestations of the cord, the dimensions and items to be considered were delineated.

The instrument comprises 3 parts I- general information on personal, surgical and treatment-related data, age, BMI; II- Characterization of the cord and III: associated signs and symptoms (pain, limited range of motion and muscle strength, paresthesia, paresis, lymphedema).

For the description and characterization of the cord, the following criteria were considered:

- - *Presentation*: "*Visible in evaluation position*" – strings visible only with positioning; "*Visible in stretch*"- cords that need some traction of the tissue to be visualized, "*Palpable*"- cords only palpable.
- - *Type*: "*Axillary web*": More than 1 narrow cord in the same region, "*Single cord*": 1 cord up to 5 mm, - "*Fibrous band*": Wide cord with more than 5 mm in width (Figure 1).
- - *Depth*: "*shallow (+++) - high relief*"; "*medium (++) - low relief*" and "*deep (+)*" - adhered cord, furrow shape (Figure 2).
- - *Length*: - "*Up to 10 cm*", "*From 10 to 20 cm*", "*Larger than 20 cm*" (Figure 3).
- - *Thickness*: "*Narrow*": Less than 5 mm; "*Medium*"- Equal to 5mm; "*Thick*"- Greater than 5mm, considering the most limiting cord (Figure 4).

Figure 3 Aspect/ Depth of the cord a) Superficial (+++): high relief b) Medium (++) : medium relief c) Deep (+): adhered, furrow shape

Evaluation

After validation by judges and refinement of the instrument, we proceeded with the assessment of the reliability of the items.

The assessment of the cord took place in person and individually on the same date, but at different times and rooms for assessor 1 and assessor 2.

The patient was placed in the supine position with the upper limb ipsilateral to the breast operated in abduction, extension and external rotation of the shoulder, extension and supination of the elbow, extension of the wrist and fingers, respecting the limits of range of motion and pain [3].

In this position, the strings were evaluated as to their form of presentation; Type; Aspect / depth; Length; Thickness, in all possible regions of involvement (armpit, arm, forearm, antecubital fossa, hand, thumb, breast, chest).

Regarding length and thickness measurements, these data, although quite subjective, were evaluated with the aid of a flexible ruler, measuring tape and calliper.

Statistical analysis

The reliability of the CS-AWS was verified through the Internal Consistency (Cronbach's coefficient and mean correlation between the items) and Equivalence (index of agreement between two evaluators through the Kappa coefficient).

The mean correlation was analyzed using Spearman's test, for which values above 0.70 show a strong correlation. The higher the correlation, the higher the Cronbach's Alpha value. Studies suggest values above 0.70 as ideal [10] and indicate that the items measure the same construct, satisfying the reliability assessment.

Kappa coefficient is a measure of agreement and was used for interobserver assessment. The closer to 1, the greater the agreement and, therefore, the greater the instrument's internal consistency.

Results

The means presented by examiner 1 and examiner 2 were almost identical to the variables related to the characterization of the cord, presenting $r = 0.98$ $p < 0.001$ for "Presentation"; $r = 0.969$ $p < 0.001$ for "Type"; $r = 0.938$ $p < 0.001$; $r = 0.901$ $p < 0.001$ in Length and $r = 0.913$ $p < 0.001$ for the Thickness variable. Cronbach's alpha was 0.894 for rater 1 and 0.879 for rater 2, indicating strong internal consistency (Table 1).

Table 1
Mean, Standard Deviation, Median, Cronbach's Alpha and Correlation of the score of the items referring to the characterization of the cord in relation to the raters

	Mean ± SD	Median	Cronbach's Alpha			
Evaluator 1						
1-Presentation of the Cord	18.7 ± 8.6	16.7	0.894			
2-Type of Cord	15.1 ± 8.8	13.9				
3-Aspect of the cord	14.3 ± 9.7	13.9		Correlation		
				r p		
4 - Length of the cord	40.5 ± 19.3	33.3				
5 - Thickness of the cord	45.2 ± 21.1	33.3		1-Presentation	0.98 <0.001	
				2-Type	0.969<0.001	
				3-Aspect	S0.938<0.001	
Evaluator 2						
1-Presentation of the Cord	19.0 ± 8.4	16.7		0.879	4 - Length	0.901<0.001
2-Type of Cord	15.1 ± 8.6	11.1			5 - Thickness	0.913<0.001
3-Aspect of the cord	13.9 ± 9.7	11.1				
4- Length of the cord	42.9 ± 20.4	33.3				
5 - Thickness of the cord	47.6 ± 21.5	33.3				
SD= standard deviation, r= correlation, p= level of significance. Source: authors themselves, research data						

Inter-rater agreement was 100% ($p > 0.001$) for almost all variables evaluated, with the lowest Kappa coefficient (0.77 $p > 0.001$) for "Length" (Table2).

Table 2
Inter-rater agreement for variables related to cord characterization

Factor	Evaluator 1				Appraiser 2				Kappa	p
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)		
	No	Visible on stretch.	Visible in evaluation position	Palpable	No	Visible on stretch.	Visible in evaluation position	Palpable		
1 - Presentation										
Armpit	0 (0.0)	1 (7.1)	11 (78.6)	2 (14.3)	0 (0.0)	1 (7.1)	11 (78.6)	2 (14.3)	1.00	0.000
Arm	8 (57.1)	3 (21.4)	2 (14.3)	1 (7.1)	7 (50.0)	4 (28.6)	2 (14.3)	1 (7.1)	0.89	0.000
Forearm	8 (57.1)	5 (35.7)	1 (7.1)	0 (0.0)	8 (57.1)	5 (35.7)	1 (7.1)	0 (0.0)	1.00	0.000
Wrist	14-100	0 (0.0)	0 (0.0)	0 (0.0)	14-100	0 (0.0)	0 (0.0)	0 (0.0)	1.00	
Thumb	14-100	0 (0.0)	0 (0.0)	0 (0.0)	14-100	0 (0.0)	0 (0.0)	0 (0.0)	1.00	
Thorax	13(92.9)	1 (7.1)	0 (0.0)	0 (0.0)	13(92.9)	1 (7.1)	0 (0.0)	0 (0.0)	1.00	0.000
	No	Axillary web	Single cord.	Fibrous band	No	Axillary web	Single cord.	Fibrous band		
2. Type										
Armpit	0 (0.0)	9 (64.3)	5 (35.7)	0 (0.0)	0 (0.0)	9 (64.3)	5 (35.7)	0 (0.0)	1.00	0.000
Arm	7 (50.0)	4 (28.6)	3 (21.4)	0 (0.0)	6 (42.9)	5 (35.7)	3 (21.4)	0 (0.0)	0.89	0.000
Forearm	9 (64.3)	2 (14.3)	3 (21.4)	0 (0.0)	10(71.4)	1 (7.1)	3 (21.4)	0 (0.0)	0.85	0.000
Wrist	14-100	0 (0.0)	0 (0.0)	0 (0.0)	14-100	0 (0.0)	0 (0.0)	0 (0.0)	1.00	
Thumb	14-100	0 (0.0)	0 (0.0)	0 (0.0)	14-100	0 (0.0)	0 (0.0)	0 (0.0)	1.00	
Thorax	13(92.9)	1 (7.1)	0 (0.0)	0 (0.0)	13(92.9)	1 (7.1)	0 (0.0)	0 (0.0)	1.00	0.000
	No	Surface	Average	Deep	No	Surface	Average	Deep		
3- Depth										
Armpit	0 (0.0)	12 (85.7)	2 (14.3)	0 (0.0)	0 (0.0)	12 (85.7)	2 (14.3)	0 (0.0)	1.00	0.000
Arm	7 (50.0)	6 (42.9)	0 (0.0)	1 (7.1)	6 (42.9)	7 (50.0)	0 (0.0)	1 (7.1)	0.87	0.000
Forearm	9 (64.3)	2 (14.3)	1 (7.1)	2 (14.3)	10 (71.4)	2 (14.3)	0 (0.0)	2 (14.3)	0.87	0.000
Wrist	14-100	0 (0.0)	0 (0.0)	0 (0.0)	14-100	0 (0.0)	0 (0.0)	0 (0.0)	1.00	
Thumb	14-100	0 (0.0)	0 (0.0)	0 (0.0)	14-100	0 (0.0)	0 (0.0)	0 (0.0)	1.00	
Thorax	13(92.9)	1 (7.1)	0 (0.0)	0 (0.0)	13(92.9)	1 (7.1)	0 (0.0)	0 (0.0)	1.00	0.000
	No	Up to 10 cm	11 to 20 cm	> 20 cm	No	Up to 10 cm	11 to 20 cm	> 20 cm		
4. Length										
	0 (0.0)	12 (85.7)	1 (7.1)	1 (7.1)	0 (0.0)	11 (78.6)	2 (14.3)	1 (7.1)	0.77	0.000
	No	Up to 1 cm	1.1 to 2	> 2 cm	No	Up to 1 cm	1.1 to 2	> 2 cm		
n= absolute frequency; %= relative frequency, p = level of significance Source: Research data.										

Factor	Evaluator 1				Appraiser 2				Kappa	p
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)		
5. Thickness										
	0 (0.0)	10 (71.4)	3 (21.4)	1 (7.1)	0 (0.0)	9 (64.3)	4 (28.6)	1 (7.1)	0.85	0.000
n= absolute frequency; %= relative frequency, p = level of significance Source: Research data.										

Discussion

There is no standardized assessment, classification or grading system, and so studies are used in different ways in an attempt to better characterize the cord [9].

Some identification criteria are used by studies and include number, thickness, location, length, width, type, depth [3, 4, 5, 11].

The cords are identified as present or absent, and may be visible or palpable [3,4,12].

In our clinical practice, cords that behaved differently from the two described in the literature were observed. Some cords were not visible in the evaluation position but became apparent when the tissue was being pulled. Therefore, we describe the "Presentation" section as: "Visible in anatomical position", "Visible in stretch" and "Palpable", as these cords could only be palpated, but not visualized.

This classification proposal is part of the construction of an instrument to assess AWS and has not been found in the literature since this study is the first to propose a characterization of the forms of manifestation of the fibrous cord.

In this study, there was 100% agreement between rater 1 and rater 2 ($p < 0.01$) regarding the description of the variable "Cord presentation" in the axillary region, with 7.1% of the sample ($n=1$) being evaluated as "Visible in stretch", 78.6% ($n=11$) "Visible in the evaluation position" and 14.3% ($n=2$) "Palpable".

To characterize the "Type of cord based on what the literature presents as a reference, the following were considered: "Axillary web": More than 1 cord in the same region, "Single cord": 1 cord up to 5 mm, "Fibrous strip": Cord over 5 mm wide [7].

Regarding the "Type of cord", there was agreement between the findings of the two evaluators in the armpit region", with 64.3% ($n=9$) of the cords being considered "Visible in stretch" and 35.7% ($n=5$) "Visible in assessment position" according to assessor 1 and assessor 2. A) Shallow (+++): high relief.

Regarding these variables, there are no data comparable to our results, as we did not find any study with this objective.

Like this one, in other research, the length was verified with the aid of a measuring tape and to assess the width, the references used were: - <, > or = at 1 mm. Depth was recorded as shallow, medium and deep [2].

The most limiting cord for the evaluation of length was considered as a reference, which was classified as follows: "Up to 10 cm", "From 10 to 20 cm", "Larger than 20 cm".

The evaluation of agreement ($k=0.77$, $p < 0.01$) in relation to "Cord length" in the axillary region was 85.7% ($n=12$) for evaluator 1 and 78.6% ($n=11$) for evaluator 2 in relation to the dimension: "Up to 10 cm".

In relation to thickness, the cords were defined as: "Narrow": Less than 5 mm; "Medium" - Equal to 5mm; "Thick" - Greater than 5mm, considering the most limiting cord.

Showing an agreement of 0.85 and $p < 0.01$ between the two evaluators, the "Thickness of the cord" was evaluated as "Thin - Up to 1 cm" in 71.4% of the sample by evaluator 1 and 64.3% by evaluator 2 in evaluation of the axillary region.

In order to guide patients in the postoperative period of breast cancer surgeries, as well as improve the self-diagnosis of AWS, the "Screening Test AWS (ST-AWS)" was created. This is a self-questionnaire containing five questions that include: - the patient's perception of arm movement; - the feeling of tension; - visual and tactile perception of the axillary cord; - the feeling of swelling in the breast or armpit [6].

This information served to guide us during the assessment, and although it is an excellent instrument for early self-assessment and self-diagnosis, it does not provide specific criteria that involve the cord and guide the professional in its characterization.

Conclusion

The construction of items to characterize the fibrous cord was based on a gap in the literature.

The items for characterization of the axillary cord compiled in this study address its forms of presentation and manifestation. There is currently no diagnostic tool for AWS, so a consensus on classification criteria is useful among researchers and professionals.

According to the objectives proposed for the study, through the compilation of the items mentioned in the literature and those suggested by this study, it was possible to define the forms of presentation and manifestation of the cord. Our results showed that the criteria defined for the organization of items to characterize the cord are coherent, clear and pertinent.

The instrument's reliability, verified through the internal consistency and agreement test, was satisfactory, and the sample of items from the instrument was able to yield reliable measures in the evaluation of the axillary cord.

Declarations

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'Availability of data and material': Not applicable.

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'Ethics approval': Approval was obtained from Research Ethics Committee of the Federal University of Goias. The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

'Consent to participate': Informed consent was obtained from all individual participants included in the study.

'Consent to publish': The authors affirm that human research participants provided informed consent for publication of the images in all Figure(s).

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Figures

Figure 1

Presentation of the cord a) visible in the evaluation position b) visible in stretch c) palpable

Figure 2

Type of cord a) Axillary Web b) Single cord c) Fibrous band

Figure 3

Aspect/ Depth of the cord a) Superficial (+++): high relief b) Medium (++) : medium relief c) Deep (+): adhered, furrow shape

Figure 4

Thickness of the cord a) Narrow b) Medium c) Thick