Improving Scapular Kinematics on a Patient with Idiopathic Adhesive Capsulitis: A Case Report

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ABSTRACT

Adhesive Capsulitis (AC) is a common shoulder disorder caused by excess scar tissue formation in the joint that presents with pain and marked loss of motion leading to functional deficits. Over time, it promotes adhesion formations in the scapulothoracic structures that contribute to scapular dyskinesis, adding to shoulder pain and sub-optimal performance of the shoulder complex. Improving the scapular kinematics while also providing the conventional PT treatment can be implemented, offering a more comprehensive approach towards AC rehabilitation and may further address the persistent pain. This case report aimed to investigate the effect of improving scapular kinematics, by implementing scapular stabilization exercises, on shoulder pain and function in a patient with AC.

The patient was a 44-year-old female, diagnosed with right AC who is currently under the thawing stage with no pre-existing condition. She initially complained of sharp pain on the right shoulder upon end-range motions. The patient's goal is to do activities of daily living with less noted shoulder pain.

By the end of the 6-week program, improved scapular kinematics was achieved. The patient got 21 points on the Shoulder Pain and Disability Index (SPADI) as supported by the increased shoulder range of motion, improved scapular positioning with and without weights, and elimination of rapid downward rotation and early elevation of the scapula during resting and weighted shoulder movements.

This case report suggests that improving scapular kinematics may play a vital role in the management of AC as an adjunct as the shoulder mobility does not depend on the glenohumeral joint alone, but the whole shoulder complex which includes the scapula.

Key words: scapular kinematics, idiopathic adhesive capsulitis

Adhesive Capsulitis (AC) is a common self-limiting shoulder disorder caused by excess scar tissue formation in the joint that presents with pain and marked loss of motion leading to functional deficits.[1] It usually progresses in three stages, namely: freezing (2-9 months), frozen (4-12 months), and thawing stage (5-26 months).[2] As it transitions from these stages, AC will start with a slow onset of dispersed, intense shoulder pain that worsens at night followed by progressive loss of glenohumeral joint (GH) motion in all planes, especially external rotation, and finally, a gradual decrease of pain and return of motion will be noted as it reaches the thawing stage.[2] Despite the self-limiting nature of the disease, studies have cited that close to half of patients with AC suffer from persistent symptoms, resulting in up to ten years' functional limitation.[3]

For this case report, AC will refer to a patient suffering from pain and restricted shoulder motion with evidently altered scapular kinematics. As the joint heals from the inflammation, the persistent symptoms such as pain and shoulder stiffness can be attributed to the prolonged immobilization of the GH joint promoting adhesion formations in this joint and the other areas of the shoulder complex as well. Specifically, the scapulothoracic structures may suffer the same immobility complication that contributes to scapular dyskinesis, thereby impairing the scapular kinematics that adds to shoulder pain and sub-optimal performance of the shoulder complex.[4-7] Scapular kinematics describe the positioning of the scapula

on the thorax and its movement during motion.[7] An alteration of the normal scapular kinematics is termed as the scapular dyskinesis (SD) and is a poorly recognized dysfunction that is mostly overlooked by clinicians due to a lack of recognition and skills in examination and evaluation.[6] Nevertheless, it has a relevant role in projecting the shoulder's degree of freedom.[6] For instance, Ludewig, et al., have noted that an increased upward rotation of the scapula was seen in patients with AC as a compensatory mechanism to maximize the shoulder's limited motion from its previous stages where restrictive motion is mostly observed.[8]

Clinicians may have difficulty with scapular assessment as to its kinematics since determining the presence of SD can be quite complicated because of the lack of examinations that could quantify it in an individual.[7] For this case report, a combination of quality (direct obs ervation)[6] and quantifying (lateral scapular slide test)[9] tests were adapted. These tests are clinically able to track the scapular kinematics changes on a patient at rest and during motion with and without weights. Changes such as asymmetrical scapular positioning, winging, the early elevation of scapula, rapid downward rotation of the scapula, and shoulder shrug were observed on this patient upon initial evaluation. As for the functional outcome measure, Shoulder Pain and Disability Index (SPADI) was conducted as proven to be the most valid and most reliable in detecting the activity limitation and participation restriction in patients with AC.[10]

As mentioned, scapular dyskinesis is an anticipated secondary complication due to immobilization brought by the AC combined with the compensatory mechanisms to minimize the pain felt, but often neglected in treatment. A faulty positioning or movement when accumulates, can jeopardize the mechanisms involved in certain structures possibly resulting in pain. Agarwal, et al. have demonstrated that improving the scapular kinematics has shown positive outcomes in improving the pain and functionality of the shoulder in patients with AC.[4-6,11] For this case report, a normal scapular position at rest will refer towards scapular retraction, posterior tilt, and external rotation.[7] A large deviation from this at rest may possibly produce abnormal movement patterns as the shoulder starts to move. Therefore, the intervention towards improving the scapular kinematics on this patient will focus on strengthening her weakened scapular stabilizers that would promote the near normal to normal scapular positioning at rest and stretching of her periscapular muscles that cause the deviation. Strengthening exercise will be based on open and closed kinetic chain exercises such as muscle activation using isometric exercise, wall push-ups, lawnmower exercise, and resisted scapular retraction.[6-7] Stretching exercise will include unilateral corner stretch, forward elevation, external rotation, horizontal adduction, & internal rotation combined with an application of a hot moist pack.[6,12-13] Scapular mobilization will also be included to improve the flexibility of her stiffened scapula.[4]

Providing a stable base function on the patient's scapula through mobilization and stabilization exercises balances it from the push and pulls of its muscle group stabilizers, thereby maximizing the potential functional performance of her shoulder complex as it gains its ability to handle perturbations coming from the shoulder movements with or without weights.[14] Thus, the purpose of this report is to investigate and describe the implementation of scapular mobilization and scapular stabilization exercises on shoulder pain and function in a patient with AC under the thawing stage.

THE CASE

The University of Montana – Rehab Essentials has permitted to conduct this case report as part of the completion requirement for the doctorate physical therapy program. Institutional Ethical Board Review approval was not necessary with the type of research utilized for this study. The patient also successfully signed the consent form to participate in this study. Risks of discomfort and potential benefits upon doing the intervention were also explained to the patient carefully.

The patient was a 44-year-old female who has been suffering from her condition for nearly two years. She denied any traumatic event that could have precipitated such condition, which continued for several months and has impacted her activities of daily living (ADL) due to restricted motion of her right shoulder accompanied with sharp pain. Ten months before the initial evaluation (IE), she was prompted to see a primary care physician (PCP). After the patient interview and seeing the result of her shoulder's radiograph, she was medically diagnosed with right idiopathic adhesive capsulitis. She was then referred to physical therapy (PT) for rehabilitation management. She started attending her PT sessions since then, in an outpatient PT clinic setting.

Improvements in her shoulder range of motion (ROM) and the onset of pain from early ROM to late ROM were noted. Unfortunately, due to the COVID-19 pandemic crisis, she had to stop attending her PT sessions. For the past five months, the patient could do her ADLs and work from home but at a limited shoulder ROM since end-range motions exacerbate the pain.

At the initial evaluation (IE), the patient's chief complaint was a sharp pain and decreased ROM on her right shoulder. Her vital signs on the initial evaluation were as follows: 112/65 mmHg on her left brachial artery for blood pressure; 73 bpm taken via pulse oximeter; the respiratory rate of 15 cycles per minute; 36.4ºC taken on right axillary and 99% O_2Sat on room air which was assessed using a pulse oximeter. The patient has a healthy body mass index (BMI) of 21.6 but claims that she does not observe an active lifestyle but observes more of a proper balanced diet. The right shoulder pain, as reported by the patient, is aggravated during the end-range of shoulder motions, both actively and passively, with a pain scale (P/S) of 5/10. Furthermore, she also noted pain traveling up to her proximal lateral forearm with a dull, aching pain characteristic when shoulder pain is aggravated repeatedly. She reports that it is relieved by massaging her shoulder and putting it in an adducted and internally rotated position.

Other than pneumonia (~25 years ago), patient has no other pertinent medical history to report. A comprehensive systems review revealed unremarkable medical findings. Patient denies smoking and drinking alcoholic beverages. Patient only takes vitamin C tablet once a day. All in all, the patient self-reported good health except for her current AC condition, which has been bothersome on execution of office work and house chores. Her main goal for the physical therapy is to perform ADLs and office work routine with no difficulty and less pain on her right shoulder.

Clinical Impression

The collected data from the patient interview is in line with the typical characteristics of patients under the thawing stage of AC: the disease progression, restricted active and passive range of motion (ROM) suggestive of a capsular restrictions and absence of symptoms from other systems that may warrant further differential diagnosis. For this case report, the patient has proven to be a good physical therapy candidate for the following reasons: being consistent with the given medical diagnosis; currently on thawing stage, which denotes that this is the stage where physical therapy treatment is most effective[2]; absence of comorbidities that may delay the outcome of the study; and is willing to participate in this study. The examination section will determine if the patient fits appropriately in the intervention proposed in this case report. It will include scapular assessment and a set of tests and measures to quantify possible impairments, activity limitations, and patient participation restrictions. It will also serve as the baseline data to track improvements or regression of scapular kinematics and the patient's functioning.

Examination: Test and Measures

The examination started with the patient answering an outcome measure and can be found in Table 1. The patient completed the Shoulder Pain and Disability Index (SPADI), which assesses her participation restriction and activity limitation regarding her current condition.

Shoulder Pain and Disability Index

SPADI is a self-reported questionnaire consisting of 13 items distributed in two subscales, the pain assessment subscale, and the disability assessment of the shoulder subscale. It has two versions, the visual analog scale, and numeric rating scale. For this report, the numeric rating scale was utilized. The outcome measure lets the patient rate each described activity or phenomena on an 11-point scale corresponding to each item's intensity level. The scores can be interpreted either by percentage or by points. The subscale score was computed by getting the sum of points from the subscale items, divided by the total subscale point

Table 1. Shoulder pain and disability index results.

	Initial Evaluation	4th Session	8th Session	12th Session
Pain Subscale Score	72% or 36 points	38% or 19 points	22% or 11 points	16% or 8 points
Disability Subscale Score	65% or 52 points	27.5% or 22 points	18.75% or 15 points	16.25% or 13 points
Total Score	67.69% or 88 points	31.54% or 41 points	20% or 26 points	16.15% or 21 points

and multiplied by 100. The total score was computed by adding the total subscale scores from the pain and disability subscale.[15] The total score of the test ranges from 0-100, with a higher score indicating severe disability.[15] For this patient, she got a total score of 67.69% or 88 points. Table 1 shows the changes in subscale and total scores throughout the report. The Minimal Detectable Change (MDC) is 19.7 points, and the Minimally Clinically Important Difference (MCID) is 20 points or 43% change from the baseline value.[15] SPADI has good validity and reliability (ICC = 0.84-0.95, Cronbach's α = 0.86-0.96)[15] in terms of assessing for patients with AC as endorsed by the American Physical Therapy Association (APTA) from the published clinical practice guideline.[12]

Gross shoulder ROM was then assessed using a goniometer. It was found that right shoulder motion is significantly limited in all planes, especially in the abduction and internal rotation. Data for ROM values can be found in table 2. Gross muscle strength (MMT) was also assessed, the right shoulder and scapular muscle groups were one grade weaker than those on the left side ranging from Grades 4-5 out of 5. During the examination, it was also observed that she has a low pain threshold that may necessitate for a lesser aggressive approach, especially in static stretching exercise.

The examination then proceeded with the scapular assessment consisting of direct observation and modified lateral scapular slide test. Due to limited validated scapular testing, the adapted tests were either supported by recent studies or recognized orthopedic organizations. The overall data for the scapular kinematic assessment are shown in Table 3.

Table 2. Range of motion data.

Range of Motion Action	Right AROM				Left AROM			
	IE	4th Session	8th Session	12th Session	IE	4th Session	8th Session	12th Session
SH Flex.	120º	128º	158º	158º	180º	180º	180º	180º
SH Abd.	52º	80º	100º	152º	180º	180º	180º	180º
SH IR	15º	50º	70º	70º	60º	70º	70º	70º
SH ER	30º	34º	50º	90º	90º	90º	90º	90º

Note: AROM – Active Range of Motion. IE – Initial Evaluation. SH – Shoulder. Flex – Flexion. Abd – Abduction. IR – Internal rotation. ER – External Rotation.

Table 3. Scapular kinematic changes.

I. Direct Observation of Scapula						
Initial Evaluation						
	Resting Scapula		Holding 1kg-bag during shoulder flexion		Holding 1kg-bag during shoulder abduction	
	R	L	R	L	R	L
Winging	✓	✗	✓	✗	✓	✗
Early elevation of scapula	✓	✗	✓	✗	✓	✗
Rapid downward rotation	✗	✗	✓	✗	✓	✗
Shoulder shrug	✓	✗	✓	✗	✓	✗

4th Session						
	Resting Scapula		Holding 1kg-bag during shoulder flexion		Holding 1kg-bag during shoulder abduction	
	R	L	R	L	R	L
Winging	✓	✗	✓	✗	✓	✗
Early elevation of scapula	✓	✗	✓	✗	✓	✗
Rapid downward rotation	✗	✗	✓	✗	✓	✗
Shoulder shrug	✗	✗	✓	✗	✓	✗
8th Session						
	Resting Scapula		Holding 1kg-bag during shoulder flexion		Holding 1kg-bag during shoulder abduction	
	R	L	R	L	R	L
Winging	✗	✗	✓	✗	✓	✗
Early elevation of scapula	✗	✗	✗	✗	✓	✗
Rapid downward rotation	✗	✗	✗	✗	✓	✗
Shoulder shrug	✗	✗	✓	✗	✓	✗
12th Session						
	Resting Scapula		Holding 1kg-bag during shoulder flexion		Holding 1kg-bag during shoulder abduction	
	R	L	R	L	R	L
Winging	✗	✗	✓	✗	✓	✗
Early elevation of scapula	✗	✗	✗	✗	✗	✗
Rapid downward rotation	✗	✗	✗	✗	✗	✗
Shoulder shrug	✗	✗	✓	✗	✓	✗

II. Modified Lateral Scapular Slide Test Changes

	Initial Evaluation		4th Session		8th Session		12th Session	
	R (in cm)	L (in cm)	R (in cm)	L (in cm)	R (in cm)	L (in cm)	R (in cm)	L (in cm)
Arms at side	10	8.5	9	8	8.5	7.5	7	7.5
Hands on hips	9.5	8	8.5	7.8	9	7.2	8	7.2
Scaption at 90 ° with 1 kg load	12	10.7	10	9.5	9.2	9	8.5	8

Direct Observation

The scapula is observed in three scenarios, during resting and while holding a 1-kg bag while doing shoulder flexion followed by shoulder abduction. The scapula is observed for winging, the early elevation of the scapula, rapid downward rotation, and shoulder shrugging during these scenarios. The less you observe these scapular movements the better scapular kinematics there is. For this test, the patient was noted with winging and elevated scapula while at rest, but shoulder shrug and rapid downward rotation appear to be present upon movement with weights.[6]

Modified Lateral Scapular Slide Test (MLSST)

The distance between the inferior angle of scapula and T7 of the patient was recorded at arms at side, hands-on waist, and scaption at 90º with a 1-kg load. The MDC applicable for this patient ranges from 0.67-1.40 cm.[16] Table 3 shows the MLSST measurement changes throughout the PT sessions. Although MLSST has no diagnostic criterion for shoulder pathology, it showed good to high intra- and inter-rater reliability from which the collected data can precisely project a mispositioned and asymmetrical appearance of the patient's scapula on various positionings reflecting the scapular kinematics bilaterally.[16]

Intervention

The success of physical therapy treatment in patients with AC does not solely depend on achieving the full ROM but focuses more on the dynamics of a large decline of shoulder pain, improved functional performance, and patient satisfaction.[12] This was the intervention program's basis in attaining the mentioned outcome.

The patient was seen for six weeks. She was treated twice weekly and received the following interventions: scapular mobilization, scapular stabilization exercises, stretching exercises combined with the application of hot moist pack (HMP), and glenohumeral peripheral joint mobilization (PJM).

Scapular Mobilization

Increasing the scapular mobility via scapular mobilization has garnered immediate positive outcomes as it directly affects the increased shoulder ROM as it promotes relaxation to stiffened adjacent soft tissues.[17] It is important to start the intervention with this mobilization to prepare the scapula for motions that need to be executed in the next exercises. The mobilization was done with the patient side-lying on the uninvolved side facing the therapist while the involved arm was supported over the therapist's shoulder. The scapular borders are then cupped by the therapist on opposite sides to move it side to side, up & down, and upward & downward rotation. This was performed for 25 repetitions per direction orientation, e.g., 25 reps for side to side, 25 reps for up & down maneuver.

Scapular Stabilization Exercises

This is widely studied among patients with subacromial impingement syndrome (SIS) but rarely is being studied among patients with AC. Both populations have been extensively studied and concluded that improving the scapular kinematics can improve the shoulder motion and reports of pain, ergo the adaptation of this exercise into the AC patient for this case report.[4-6,11,17] The exercises are composed of isometric exercises and open and closed kinetic chain exercises. The isometric exercises were initially done to engage and activate the scapular stabilizer muscles, keeping the patient from substituting other muscles during execution. In the first two weeks, it was performed with the parameter of six seconds hold for ten repetitions and was then progressed according to the patient's tolerance (Table 4). It has been said that SD is the result of imbalanced muscle strength of scapular stabilizers, specifically the upper trapezius and a weakened lower trapezius and serratus anterior, thus strengthening of these was the main focus for the given scapular stabilization exercises.[18] The strengthening of scapular adductors was also implemented to aim for the symmetry with the left scapular positioning from which a painless and full functioning shoulder can be seen.[7,14] On the strengthening exercise proper, the open kinetic chain exercise was composed of prone overhead raise, dynamic hug and diagonal exercise, side-lying forward flexion, and lawnmower exercise (Table 5).[19] The closed kinetic chain exercise would be wall push-ups progressed to 45˚ incline push-up and then progressed to platform walks according to patient's tolerance; also, gym ball scapular exercise. Both open and closed kinetic chain exercises were executed ten repetitions each and were progressed accordingly (Table 4).

Table 4. Scapular stabilization exercises progression.

1st – 3rd Session	4th – 8th Session	9th – 12th Session
Isometric Scapular Retraction and Depression (6 sec hold, 10 reps for 1 set)	Isometric Scapular Retraction and Depression (10 sec hold, 10 reps for 2 sets)	Isometric Scapular Retraction and Depression (10 sec hold, 10 reps for 2 sets)
Prone Overhead Raise (10 reps for 1 set)	Prone Overhead Raise with 2 lbs of dumbbell (10 reps for 1 set)	Prone Overhead Raise with 2 lbs of dumbbell (10 reps for 3 sets)
Dynamic Hug and Diagonal Exercise	Dynamic Hug and Diagonal Exercise (using 2 lbs dumbbell,10 reps for 1 set)	Dynamic Hug and Diagonal Exercise (using 2 lbs dumbbell,10 reps for 3 sets)
Lawnmower (using 2 lbs dumbbell for 10 reps)	Lawnmower (using 2 lbs dumbbell for 10 reps for 1 set)	Lawnmower (using 2 lbs dumbbell for 10 reps for 3 sets)
Side-lying forward flexion (10 reps for 2 sets)	Side-lying forward flexion (using 2 lbs dumbbell, 10 reps for 1 set)	Side-lying forward flexion (using 2 lbs dumbbell, 10 reps for 3 sets)
Wall Push-ups (10 reps, 1 set)	45 degree Push-ups (10 reps for 2 sets)	Platform Walk (10 reps for 2 sets)
Gym Ball Scapular exercise (10 reps each direction for 1 set)	Gym Ball exercise (10 reps each direction for 2 sets)	Gym Ball exercise (10 reps each direction for 3 sets)

Table 5. Scapular stabilization exercise description.

Exercise	Description
Isometric Scapular Retraction and Depression	Patient is in side-lying position and asks the patient to retract or depress her scapula and applies a resistance to medial border or inferior angle of scapula, respectively.[26]
Prone Overhead Raise	Patient is in prone position with the arm raised above the head while it is in accordance with the lower trapezius' muscle fibers.[19]
Dynamic Hug	Patient is standing with her back on the wall, knees bent, and feet are shoulder width-apart. The starting position of the upper limb is in such a way that the elbow is flexed by 45°, shoulder is abducted by 60°, and slightly internally rotated. The limb is then moved in a hugging motion as far as possible.[19]
Diagonal Exercise	The starting position is the arm positioned at contralateral hip and then raised in a diagonal pattern such that there is a combination of shoulder flexion, horizontal abduction, and external rotation while in sitting position.[19]
Side-lying Forward Flexion	Patient does forward flexion of the upper limb up to 135° while on side-lying position.[19]
Lawnmower exercise	The patient stands with the knees slightly bent and the hip extended (butt out). Starting position would be the arm at the contralateral leg and then raised diagonally with trunk extension, trunk rotation and the scapula retracted. [19]
Push-ups	Two hands are placed on a surface that is slightly wider than patient's shoulders. Both arms and legs are straightened. Then patient slowly lowers her body and then pushes herself back-up.
Platform Walk	Two hands are placed on a surface that is slightly wider than patient's shoulders. Both arms and legs are straightened. Then patient moves one hand at time going in and then out which counts as one repetition.
Gym Ball Scapular Exercise	Patient stands with hand placed on the gym ball against a wall, bringing the arm upwards, downwards and side to side.

Stretching Exercise

This is combined with an application of HMP for a maximum of 20 minutes to help tolerate a painful stretch, followed by the stretching exercises. The stretching exercise includes unilateral corner stretch, forward elevation, external rotation, horizontal adduction, & internal rotation.[7] Each parameter observed was 15 seconds hold for three repetitions each.[20]

Glenohumeral Joint Mobilization

The glenohumeral joint was placed in its resting position while the therapist distracts the joint with one hand, and the other hand applies the directional force on the humeral head. For this case report, both posterior and caudal glide was performed on the patient.

Aside from the physical therapy sessions, the patient was also instructed with a daily home exercise program, consisting of strengthening and stretching exercises that mimic the given intervention program above (Table 6). The only difference would be that the patient will be doing it by herself. As observed, there was minimal load given for the strengthening exercises to promote stimulation of the under-activated scapular stabilizers which will aid bring back the normal scapular kinematics.

Outcomes

The patient was seen twice weekly for a total of 12 sessions. The patient was able to tolerate all the given interventions and was able to complete the treatment sessions without adverse effects noted such as, but not limited to, worsening of pain, and decline of available ROM. The following outcomes were observed:

4th Session/Week 2

As early as two weeks from starting the program, some outcome measures have already shown meaningful improvements to the patient. Her initial SPADI score of 88 points went down to 41 points (MCID = 20 points)[15] and the shoulder shrug on resting position was eliminated. The scapular positioning on various positions has narrowed its difference from the unaffected shoulder as seen in table 3, subsection II.

Table 6. Home exercise program.

Exercise	Instruction
a. **Strengthening**	Patient does the same scapular stabilization exercise instructions from Table 5.
b. **Stretching**	
Unilateral Corner Stretch	Patient stands in a corner of the wall. Patient places her hand (affected side) on the wall at shoulder level and slowly rotates the trunk towards the contralateral side as far as possible. Hold it for 15 seconds and repeat it three times.
Forward Flexion	Patient lies supine and grasps the wrist of the affected side. While maintaining the elbow straight of the affected side, the other hand raises the arm overhead as far as the patient can tolerate. Hold it for 15 seconds and repeat it three times.
External Rotation	Patient lies supine or in sitting position while holding a wand/stick. A towel is placed between the elbow of the affected side and her trunk. During the stretch, patient will hold the towel in place by tucking it at her side while her hand holds the wand. Meanwhile, the hand of the unaffected side pushes the wand away from the body as much as the patient can tolerate. Hold for 15 seconds and repeat it three times.
Horizontal Adduction	Patient lies supine with the affected shoulder taken across the body with the elbow straight. The other hand will try to push the affected side further towards the body and is held for 15 seconds, repeated three times.
Internal Rotation	Patient lies on the affected side with its upper arm and elbow bent at 90˚. The patient slowly pushes the back of her wrist downwards up to the range that the patient can tolerate. Hold it for 15 seconds and repeated three times.

The ROM changes were also noted but with minimal improvement as to her shoulder external rotation.

8th Session/Week 4

Continuous recovery was noted as to ROM, SPADI, and MLSST measurements. By direct observation of the scapula, the early elevation of the scapula and rapid downward rotation during shoulder flexion was now eliminated. The patient showed the greatest difficulty in executing shoulder abduction accompanied by pain and stiffness at its end-range. Shoulder internal rotation with shoulder abduction by 90º was now noted as the first shoulder ROM achieved fully with minimal pain noted (P/S: 3/10).

12th Session/Week 6

Upon the conclusion of the treatment program, the SPADI score improved to 21 points (MCID = 20 points).[15] Total SPADI score also contains two subscales which were tracked throughout the sessions as seen in table 1. The pain subscale score improvements support the patient's subjective reports of improved quality of life by being able to carry weighted objects without pain and do overhead reach with minimal difficulty which was reflected on the patient's disability subscale. An improvement in her scapular kinematics was also noted as manifested by timely elevation of the scapula and downward rotation on various positions (Table 3). The patient's MLSST findings were also noted with great improvement from initial evaluation to 12th session with 3 cm difference on arms at side, 1.5 cm difference with hands on hips, and 3.5 cm difference on scaption at 90 degrees with 1-kg load (MDC = 0.67-1.40 cm).[16] All shoulder ROM showed great progress as seen in table 2, and her gross shoulder muscle strength as well was observed for its improvement. The shoulder flexion improved by 38º and shoulder abduction by 100º. As for the shoulder rotation while the shoulder is abducted in 90º, shoulder internal rotation improved by 55º and shoulder external rotation improved by 60º. In the overall 6-week treatment program, the patient's goal of improving her performance in office works with less noted pain was achieved.

DISCUSSION

Scapular dyskinesis (SD) is often overlooked by clinicians despite its relevance in the shoulder's degree of freedom and associated shoulder pain.[6] SD is one of the anticipated complications caused by the AC condition brought by several compensatory mechanisms on its previous stages to maximize the available shoulder ROM. In this case report, the added scapular kinematics-focused exercises are beneficial for the patient which highlighted the strengthening of the scapular adductors, serratus anterior, lower trapezius, and minimizing the participation of the upper trapezius.[6,18,21-22]

As compared to the initial evaluation, pain at rest and available ROM has greatly recovered leading to improved activities of daily living performances. According to the findings, clinically meaningful differences were observed on scapular initial positioning which eventually led to improvements of the scapular kinematic. McQuade and colleagues argued that in improving shoulder mobility and scapular kinematics, the scapula has to develop the ability to handle perturbation coming from the constant push and pulls of muscles surrounding it which warrants a balanced activation of its stabilizers.[14] Thus, no normative value concentrated on the affected shoulder was aimed as to the positioning of the scapula, but its symmetry was more emphasized since the shoulder resilience observed from the normal side describes the painless and functional shoulder for this patient. Therefore, the narrowed differences in MLSST measurements were more considered. Residual deficits such as winging and shoulder shrugging upon carrying a 1-kg load during shoulder flexion and abduction denote that further strengthening of the scapular adductors and minimizing the activity of the upper trapezius is needed.

Successfully addressing the rapid downward rotation and early elevation of the scapula on various positions of the patient, on the other hand, may have caused the improvements in pain and disability as supported by the study of Mohamed, et al., stating that normalizing the scapular kinematics among patients with AC, a meaningful difference in shoulder flexion and abduction of 7.8º and 4.98º, respectively, were noted as early as two weeks from initiating their program.[11] Their study utilized a proprioceptive scapular re-training approach in restoring the normal scapular kinematics which could have helped address the shoulder shrugging of the patient during shoulder flexion and abduction with weights since prolonged SD may have damaged the correct proprioception-related muscle mechanisms.[11]

Numerous studies with different approaches to address AC condition was successfully conducted and recorded improvements having statistically significant differences in range of motion as the common measurement for comparison of the studies. Johnson, et al. proved that just in the third treatment, patients who had posterior glide mobilization can attain as much improvement in shoulder external rotation versus the anterior glide.[23] Ibrahim, et al., on the other hand, showed that as early as four weeks, the static progressive stretch was indicated to be an effective adjunct in increasing the shoulder motion.[24] In addition to that, Donatelli's case report addressing adhesive capsulitis in a specific multi-approach has also demonstrated that by sixteen weeks, a full, pain-free shoulder movement is achievable in his patient.[25] Arguably, enhancing the scapular kinematics by strengthening the scapular stabilizers alongside the stretching and joint mobilization of the shoulder may have effectively aided the patient's recovery as reflected by the noted improvements in her ROM and SPADI.

Nevertheless, the lack of reliable and valid assessments for scapular kinematics and lack of reference values specific for patients with AC under the thawing stage in utilizing scapular kinematic assessments were the external limitations for this study. As for the internal limitations, the duration of stretching should have been 30 seconds for a more effective deformation of the muscle fiber[20] and could have resulted in a larger improvement than documented in this report. The HEP given could have been more tailored into a program that complements the intervention given during her PT sessions rather than mirroring the exercises given on her PT sessions. Lastly, one of the most important aspects that should have not been missed especially to patients with AC would be the pain education. Giving this prior to the initiation of the program might positively influence the patient's pain perception and increase her pain tolerance making it possible to progress the program better.

On the other hand, information regarding Filipino patients with AC in response to physical therapy intervention programs is almost non-existent and further research is needed to establish an evidence-based approach towards it. Moreover, the lack of stage-specific AC research interventions needs to be in detail in the inclusion criteria of studies for accurate reference of the efficacy of each treatment utilized.

CONCLUSION

The implementation of scapular mobilization and stabilization, as seen on the utilized outcome measures, reflected positive responses. This suggests that it may play a vital role in the management of AC. Thus, adding it to the treatment program may contribute to faster improvement of the shoulder pain and mobility.[6,8,11]

REFERENCES

1. Le HV, Lee SJ, Nazarian A, Rodriguez EK. Adhesive capsulitis of the shoulder: review of pathophysiology and current clinical treatments. Shoulder Elbow 2017;9(2):75-84. doi:10.1177/1758573216676786
2. Chan HBY, Pua PY, How CH. Physical therapy in the management of frozen shoulder. Singapore Med J. 2017;58(12):685-9. doi:10.11622/smedj.2017107
3. Ramirez J. Adhesive capsulitis: Diagnosis and management. Am Fam Phys 2019;99(5):297-300. Accessed October 2, 2020. https://www.aafp.org/afp/2019/0301/p297.html
4. Agarwal S, Raza S, Moiz JA, Anwer S, Alghadir AH. Effects of two different mobilization techniques on pain, range of motion and functional disability in patients with adhesive capsulitis: a comparative study. J Phys Ther Sci 2016;28(12):3342-9. doi:10.1589/jpts.28.3342
5. Ravichandran H, Janakiraman B, Gelaw AY, Fisseha B, Sundaram S, Sharma HR. Effect of scapular stabilization exercise program in patients with subacromial impingement syndrome: a systematic review. J Exerc Rehabil 2020;16(3):216-26. Published 2020 Jun 30. doi:10.12965/jer.2040256.128
6. Panagiotopoulos AC, Crowther IM. Scapular dyskinesia, the forgotten culprit of shoulder pain and how to rehabilitate. SICOT J 2019;5:29. doi:10.1051/sicotj/2019029
7. Longo UG, Risi Ambrogioni L, Berton A, et al. Scapular dyskinesis: From basic science to ultimate treatment [published correction appears in Int J Environ Res Public Health 2020 May 27;17(11):Published 2020 Apr 24. doi:10.3390/ijerph17082974
8. Ludewig PM, Reynolds JF. The association of scapular kinematics and glenohumeral joint pathologies. J Orthop Sports Phys Ther 2009;39(2):90-104. doi:10.2519/jospt.2009.2808
9. Curtis T, Roush JR. The lateral scapular slide test: A reliability study of males with and without shoulder pathology. N Am J Sports Phys Ther 2006;1(3):140-6. Accessed October 26, 2020. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2953361/
10. Rabin A, Irrgang JJ, Fitzgerald GK, Eubanks A. The intertester reliability of the Scapular Assistance Test. J Orthop Sports Phys Ther 2006;36(9):653-60. doi:10.2519/jospt.2006.2234

11. Mohamed AA, Jan YK, El Sayed WH, Wanis MEA, Yamany AA. Dynamic scapular recognition exercise improves scapular upward rotation and shoulder pain and disability in patients with adhesive capsulitis: a randomized controlled trial. J Man Manip Ther 2020;28(3):146-58. doi:10.1080/10669817.2019.1622896
12. Kelley MJ, Shaffer MA, Kuhn JE, et al. Shoulder pain and mobility deficits: adhesive capsulitis. J Orthop Sports Phys Ther 2013;43(5):A1-A31. doi:10.2519/jospt.2013.0302
13. Philippine Academy of Rehabilitation Medicine (PARM). Clinical Practice Guidelines on the Diagnosis and Management of Shoulder Pain.; 2014. Accessed September 29, 2020. https://parm.org.ph/pdf/sp.pdf.
14. McQuade KJ, Borstad J, de Oliveira AS. Critical and theoretical perspective on scapular stabilization: What does it really mean, and are we on the right track?. Phys Ther 2016; 96(8):1162-9.
15. Thoomes-de Graaf M, Scholten-Peeters W, Duijn E, et al. The responsiveness and interpretability of the shoulder pain and disability index. J Orthop Sports Phys Ther 2017;47(4):278-86. doi:10.2519/jospt.2017.7079
16. Shadmehr A, Sarafraz H, Heidari Blooki M, Jalaie SH, Morais N. Reliability, agreement, and diagnostic accuracy of the Modified Lateral Scapular Slide test. Man Ther 2016;24:18-24. doi:10.1016/j.math.2016.04.004
17. Duzgun I, Turgut E, Eraslan L, Elbasan B, Oskay D, Atay OA. Which method for frozen shoulder mobilization: manual posterior capsule stretching or scapular mobilization?. J Musculoskelet Neuronal Interact 2019;19(3):311-6. Accessed October 24, 2020. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6737560/
18. Nodehi Moghadam A, Abdi K, Shati M, Noorizadeh Dehkordi S, Keshtkar AA, Mosallanezhad Z. The effectiveness of exercise therapy on scapular position and motion in individuals with scapular dyskinesis: Systematic review protocol. JMIR Res Protoc 2017;6(12):e240. doi:10.2196/resprot.8011
19. Schory A, Bidinger E, Wolf J, Murray L. A systematic review of the exercises that produce optimal muscle ratios of the scapular stabilizers in normal shoulders. Int J Sports Phys Ther 2016;11(3):321-36. Accessed October 25, 2020. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4886800/
20. Page P. Current concepts in muscle stretching for exercise and rehabilitation. Int J Sports Phys Ther 2012;7(1):109-19. Accessed October 23, 2020. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3273886/
21. Ribeiro LP, Barreto RPG, Pereira ND, Camargo PR. Comparison of scapular kinematics and muscle strength between those with a positive and a negative Scapular Assistance Test. Clin Biomech (Bristol, Avon) 2020; 73: 166-71. doi:10.1016/j.clinbiomech.2019.12.030
22. Kopkow C, Lange T, Schmitt J, Kasten P. Interrater reliability of the modified scapular assistance test with and without handheld weights. Man Ther 2015;20(6): 868-74. doi:10.1016/j.math.2015.04.012
23. Johnson AJ, Godges JJ, Zimmerman GJ, Ounanian LL. The effect of anterior versus posterior glide joint mobilization on external rotation range of motion in patients with shoulder adhesive capsulitis. J Orthop Sports Phys Ther 2007; 37(3): 88-99. doi:10.2519/jospt.2007.2307
24. Ibrahim M, Donatelli R, Hellman M, Echternach J. Efficacy of a static progressive stretch device as an adjunct to physical therapy in treating adhesive capsulitis of the shoulder: a prospective, randomised study. Physiotherapy 2014; 100(3): 228-34. doi:10.1016/j.physio.2013.08.006
25. Ruivo R, Donatelli R, Parraca J. A specific multi-approach intervention for adhesive capsulitis: A case report. J Exerc Sports Orthop 2017;4(3):1-7. Accessed November 17 2020. http://dx.doi.org/10.15226/2374-6904/4/3/00162
26. Kisner C, Colby LA, Borstad JD. The shoulder and shoulder girdle. In: Biblis MM, Duffield MA, Lang GW, Pine JA, eds. Therapeutic Exercise 6e Foundations and Techniques. 6th ed. Philadelphia, PA: F.A. Davis Company; 2012.