Pre-Operative Outpatient Physical Therapy of a Torn Rotator Cuff and Peripheral Nerve Injury Caused by Anterior Shoulder Dislocation: A Case Report

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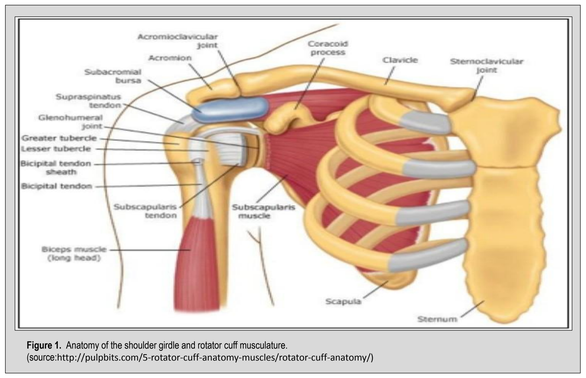

Figure 1. Anatomy of the shoulder girdle and rotator cuff musculature. (source:http://pulpbits.com/5-rotator-cuff-anatomy-muscles/rotator-cuff-anatomy/)

Background

- Due to the high degree of available range of motion of the Glenohumeral joint, it is highly susceptible to instability and injury. 98% of all traumatic shoulder dislocations are anterior.[1]
- Rotator cuff injuries and peripheral nerve injuries are commonly associated with traumatic anterior shoulder dislocations.
- Very little literature on pre-operative PT.

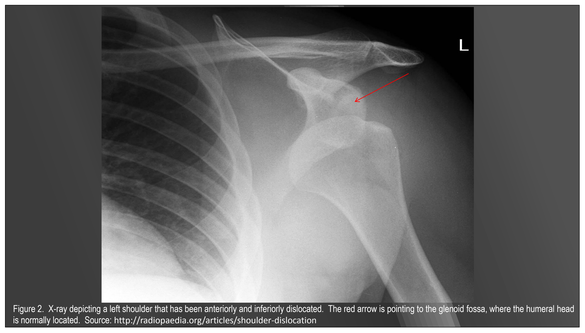

Figure 2. X-ray depicting a left shoulder that has been anteriorly and inferiorly dislocated. The red arrow is pointing to the glenoid fossa, where the humeral head is normally located. Source: http://radiopaedia.org/articles/shoulder-dislocation

Patient History

- 47-year old male
- Pre-morbid status : heavy machinery mechanic/electrician
  - Active lifestyle - mountain biking, snowboarding, camping.
- Chief complaint: Pain and the inability to functionally use his left hand.

Purpose

To investigate the effectiveness of pre-operative physical therapy (PT) management including passive range of motion, joint mobilization and exercises for a patient with both a torn rotator cuff and suspected neuropraxic peripheral nerve injury.

Systems Review

Cardiopulmonary system
- Not impaired

Integumentary system
- Not Impaired

Musculoskeletal system
- Gross strength deficits and limited gross range of motion of left UE, and slight subluxation of left glenohumeral joint

Neuromuscular system
- Impaired motor control of left hand and sensation of left distal UE

Examination

Table 1. Test and measures at initial evaluation and re-evaluation

Quick Dash (% - disability)				
	Initial Evaluation		Re-evaluation	
	95.45%		90.91%	
Grip Strength (measured in pounds (lbs.))				
	Left – 25	Right – 85	Left – 7	Right – 105
Manual Muscles testing (muscle grades 1-5/5)				
	Left	Right	Left	Right
Scapular retraction	4/5	5/5	+3/5	5/5
Shoulder abduction	-2/5	5/5	-2/5	5/5
Shoulder Flexion	+2/5	5/5	2/5	5/5
Shoulder Ext. Rotation	+2/5	5/5	+2/5	5/5
Shoulder Int. Rotation	+3/5	5/5	3/5	5/5
Elbow extension	+3/5	5/5	+3/5	5/5
Elbow flexion	-4/5	5/5	-4/5	5/5
Wrist extension	4/5	5/5	-4/5	5/5
Wrist flexion	+3/5	NT	4/5	NT
Finger flexion	+2/5	NT	-3/5	NT
Finger extension	4/5	NT	4/5	NT
Thumb abduction	-4/5	NT	-4/5	NT
Thumb adduction	3/5	NT	+3/5	NT
Thumb extension	4/5	NT	4/5	NT
Thumb flexion	+3/5	NT	+3/5	NT
Radial deviation	+3/5	NT	+3/5	NT
Ulnar deviation	+3/5	NT	+3/5	NT
Deep Tendon reflexes (0-3+)				
	Left	Right	Left	Right
C5-6 Biceps brachii	2+ - normal	NT	NT	NT
C6 brachioradialis	2+ - normal	NT	NT	NT
C7-8 Triceps brachii	3+ - brisk	NT	NT	NT
Special Tests				
	Left	Right	Left	Right
Popeyes' bicep	Observable deformity	Normal	NT	NT
Speeds' bicep	positive	negative	NT	NT
Yergasons' bicep	positive	negative	NT	NT
Range of Motion (measured in degrees)				
	Left-active	Left-passive	Right-active	Left-active	Left-passive	Right-active
Shoulder flexion	32	108*	WNL	40	115*	WNL
Shoulder abduction	20	112*	WNL	30	130*	WNL
Shoulder Ext. rotation**	32	NT*	WNL	32	NT*	WNL
Shoulder Int. rotation **	20	NT*	WNL	20	NT*	WNL
Elbow flexion/Ext.	WNL	WNL	WNL	WNL	WNL	WNL
Pain (0 -10/10 numerical rating scale)						
	Left-active	Left-passive	Right-active	Left-active	Left-passive	Right-active
Reported pain levels	6-7/10	4-5/10	0/10	4-6/10	3-4/10	0/10

*- limited or not tested due to pain; NT= not tested; WNL= within normal limits; Ext. = external; Int. = internal; **- tested at 45 deg.

PT Diagnosis

- Pattern 4D: Impaired Joint Mobility, Motor Function, Muscle Performance, and Range of Motion Associated with Connective Tissue Dysfunction
- Pattern 5F: Impaired Peripheral Nerve Integrity and Muscle Performance Associated with Peripheral Nerve Injury

Interventions

Patient Education:

- The Patient was educated on strengthening and stretching exercises to do at home, number of repetitions/sets per day, and proper form/technique for these exercises.
- He was also educated on what to expect with rotator cuff surgery and the prognoses of that surgery

Procedural Interventions:

Therapy Session schedule	Additions made on session 3
10 minute warm up – bicycle ergometer/(patient preference) To increase overall blood flow and warm up tissues	
GH mobilization (grade 1-2) - posterior/inferior/short arm traction Scapular mobilization - depression/elevation/retraction/protraction	
PROM of GH joint (within limits of pain)	
AROM Exercises Finger - abduction/adduction/extension/flexion Wrist- - flexion/extension/ pronation/ supination Scapular clock - depression/elevation/protraction/ retraction bicep curls (hammer curls –wrist neutral) tricep extensions	- Added finger-tip to thumb dexterity exercises - Added light resistance to wrist motions (with forearm supported on table)
Stretching exercises Wrist and finger extensor/flexor stretches	- Added AAROM pulley exercises – flexion/abduction (left arm just along for the ride and within limits of pain)
STM of the left distal UE to control/reduce swelling and relax tight tissues STM of pectoral muscles, trapezius, levator scapulae and tissues surrounding the GH joint - to decrease muscle guarding and reduce pain and improve tissue pliability.	

Outcomes

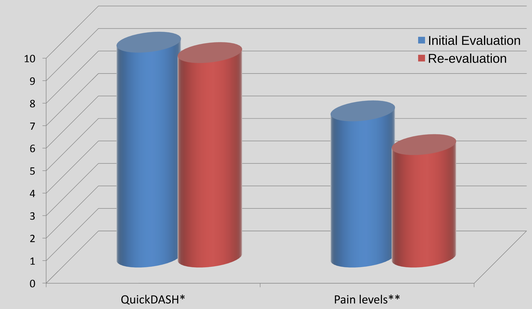

Figure 3. Visual representation of the difference between QuickDASH scores and pain levels recorded at the initial evaluation and the reevaluation. The Scoring for the quick dash is the percent disability out of 100%. The pain levels were based off of a 0-10 numerical rating scale.

- Patient also reported improved sensation and motor control of left distal UE.

Discussion

- The patient was only seen for a short period of time.
  - Five sessions including initial examination and re-examination
- The patient was unable to return for post-op rehab so we were unable to determine the effectiveness of the manual therapy on post-op results.
- Despite the short time frame the patient did report less pain and improved sensation and motor control of his distal upper extremity.
  - Decreased pain and improved patient satisfaction has also been found in research on pre-operative PT for total hip and knee replacements.[2]
- More research needs to be done on pre-operative PT management.

References

1. Hayes K, Callanan M, Walton J, Paxinos A, Murrell GA. Shoulder instability: management and rehabilitation. *J Orthop Sports Phys Ther.* 2002;32(10):497-509.
2. Gawel J, Brown S, Collins J, McCallum C. Does pre-operative physical therapy improve post-surgical outcomes of patients undergoing a total knee and/or total hip arthroplasty? A systematic review. *Physiotherapy Practice & research.* March 2013;34(1):9-20