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Physical Therapy Management Of A Manual Laborer With Chronic Rotator Cuff Tendinopathy: A Case Report

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The patient signed an informed consent allowing the use of medical information and video footage for this report and received information on the institution's policies regarding the Health Insurance Portability and Accountability Act.

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Abstract

Background and Purpose

Rotator cuff tendinopathy (RCT) is a chronic tendon injury that can have significant impact on an individual's occupation, recreation and personal life. Currently there is a paucity of information detailing physical therapy (PT) interventions for individuals with RCT, who must continue working. The purpose of this case report was to report a clinical experience detailing the PT management of a patient with RCT, who secondary to occupational obligations must continue to participate in activities harmful to her condition.

Case Description

The patient was a 44 year-old, female, who worked as a manual laborer. She was diagnosed with left rotator cuff syndrome by her primary care physician (PCP) after experiencing shoulder pain at work, 7 months prior to her initial physical therapy (PT) evaluation. Examination revealed functional limitations secondary to impairments of pain, strength, range of motion and posture. Interventions included stretching, strengthening, postural suggestions and a focus on rest and modification.

Outcomes

The patient's impairments fluctuated from treatment to treatment. Her presentation was related to activities she had participated in. Throughout the episode of care, her condition showed no significant improvements or deteriorations. As demonstrated by the Upper Extremity Functional Index, she did not progress 9 points that would have demonstrated the minimal clinically important difference.

Discussion

Physical therapists commonly treat patients who are unable to fully comply to their plan of care. Although improvements were anticipated, the patient made no significant improvements. Daily activities, rest, functional status and pain affect outcomes of PT management of patients with RCT. Future research is warranted for patients with RCT in order to investigate the variance in results of conservative PT with proper rest, versus conservative PT for those who participate in manual labor. Research may seek to determine specific frequency and duration of interventions and rest for optimal results.

Introduction

Rotator cuff tendinopathy (RCT) is a chronic tendon injury that can have significant impact on an individual's occupation, recreation and personal life. Tendon injuries, especially of the rotator cuff, often involve a slow and lengthy healing process. Lack of substantial blood flow may contribute to chronic slow healing.[1] If not treated properly this condition may last weeks to years and effect individuals in a variety of deleterious ways.[2] The prevalence of RCT in the general population has been demonstrated to account for approximately 22% of individuals.[3] 38% of manual laborers who often participate in daily, moderate to heavy lifting (25 pounds - >50 pounds) will experience some degree of RCT.[3] In chronic cases, 54% of those who have had RCT for 3 years or greater experience persistent and recurring symptoms.[4]

In 2012, 8.8% of Maine's warehouse workers were reported to have been injured on the job. Of that 8.8%, 7.2% were required to spend days away from work, receive work restrictions or a job transfer. [5.] In 2013 an exploratory study was performed by Moore et al to better understand why manual laborers did not report injuries that occurred while at their place of employment. Despite the available treatment supported by worker's compensation insurance, approximately 27% of the 135 workers confirmed they had failed to report a work-related injury. The most common reasons were, "my injury was small" and "pain is a natural part of my job". Other responses included fear of employer retaliation, loss of work opportunities or inability to afford taking time off. [6] The amount of worker's compensation varies depending on severity of the injury, the amount the employee made prior to the injury and the state they work in (Figure 1).[7]

Many successful physical therapy (PT) management strategies for RCT have been identified and used with great success for patients who do not perform manual labor for their livelihood. These strategies have typically focused on strengthening of rotator cuff muscles, regaining full range of shoulder motion, scapular stabilization and symptom minimization.[8-11] Manual laborers are often at increased risk for RCT due to the manual nature of their job. Their employers are often at odds of providing appropriate accommodations, knowing that productivity and ultimately profit may suffer. There are very few research studies that investigate the modifications necessary for this population. Therefore, the purpose of this case

report was to share a clinical experience detailing the PT management of a patient with chronic RCT, who secondary to social and occupational obligations, continued to participate in activities harmful to her condition.

Case Description

History

The patient was a 44 year-old endomorphic female, who worked as a manual laborer. She was diagnosed with left rotator cuff syndrome by her primary care physician (PCP) after experiencing shoulder pain at work, 7 months prior to her initial PT evaluation. The injury at work involved the patient attempting to catch a falling crate weighing approximately 50 pounds. 2 ½ weeks prior to her initial PT session, the patient's PCP prescribed her 400 mg ibuprofen twice a day for pain relief. The patient had not undergone any other treatment for her shoulder pain, other than self-massage and unsuccessful positioning, no medical images were taken. Despite her condition, she reported continued participation in her occupational activities including overhead lifting and pulling. After 7 months she still had not reported the incident to her employer, secondary to fear of repercussions.

The patient was seen at the outpatient physical therapy clinic with the chief complaints of inability to lift her arm without increased pain in the left shoulder, continuous ache in the left shoulder and the inability to sleep through the night secondary to her shoulder pain. The patient's pain level was initially rated at 6/10 on the visual analog scale (VAS), but ranged from 4/10 to 8/10 depending on her activity. Her significant past medical history included type II diabetes mellitus, obesity, anemia and hypertension. Precautionary measures were taken to monitor her blood sugar and pressure to ensure safety during participation in PT. Diabetes has the potential to contribute to a slow healing process secondary to impaired peripheral blood flow. Rotator cuff pathology and obesity are common comorbidities.[12] According to Janiszewski individuals who are obese are more likely to have weak supporting musculature, poor posture and heavier extremities, all contributing to rotator cuff conditions.[12] The patient had no

previous history of shoulder problems and an unremarkable surgical history. Her primary goal was to return to a pain-free status while sleeping and participating in activities of daily living and occupational duties.

Review of Systems

The patient's primary problems were believed to stem from a partial supraspinatus tear based on the location of pain, mechanism of injury and pattern of symptoms. The patient's vital signs were not noted during the systems review; however her chart indicated the presence of controlled hypertension. Upon initial observation of the patient, the musculoskeletal system presented with multiple impairments. It was noted that her posture was abnormal, warranting further inspection. Observation suggested obesity and her chart indicated she was 5'9" 303 pounds. There was tenderness of the supraspinatus muscle, most significantly at the posterior lateral border of the acromion and at the muscle's distal insertion point on the humeral head. Active range of motion and strength were limited by pain with all shoulder motions except extension. The presence of a painful arc through the mid-range of abduction was noted. Screening of the cervical spine was performed to rule out neurological dysfunction.

Clinical Impression I

The patient's primary problem was left shoulder pain with overhead activity, sleeping on her left side, and lifting objects. Following the subjective history and systems review, it was hypothesized that the patient presented with a partial tear of the left supraspinatus. The patient's description of the mechanism of injury, her location of pain and participation in repeated overhead activities were the major reasons for this hypothesis. The location of pain was directly over the supraspinatus musculotendinous junction and insertion; the most common places for supraspinatus tears.[13] The mechanism of injury was similar to that of an overhead throwing athlete. When muscles that compress and control the humeral head (Table 1) are weakened by

vigorous overhead activities, glenohumeral instability can occur.[14] In this patient's case, tensile overload during eccentric contraction may have occurred involving the posterior rotator cuff.[13,14]

Differential diagnoses of sub-acromial bursitis, supraspinatus tendinopathy, and sub-acromial impingement could also have been suspected based on the history and systems review. The presence of the painful arc of motion noted during the systems review indicated the potential for sub-acromial impingement. Impingement is common in those who participate in overhead activities and it is a common contributing factor as well as result of rotator cuff pathology. Based on the review of systems and the prevalence of these comorbidities, it was decided that further specific tests and measures were necessary to confirm or reject this hypothesis. These tests included manual muscle testing (MMT), goniometric measurements, specific palpation, special tests and a functional index.

This patient provided a unique challenge due to her occupational situation. Her reluctance to notify her employer of her condition, due to fear of job loss, resulted in inadequate rest of her shoulder. She consistently participated in activities that exacerbated her symptoms. The dearth of information about the PT management of individuals in this situation and the many complex variables involved, lead to a conclusion that she was an ideal patient to document in a case report.

Examination

A physical examination was performed with an initial clinical impression of supraspinatus partial tear. Prior to entering the examination the patient filled out The Upper Extremity Functional Index (UEFI). This self-report questionnaire is intended to inquire about the patient's current upper extremity functional status during 20 common activities (Appendix 1).[15] Observational posture analysis was performed to understand if the patient's posture contributed to her current condition. The patient had a forward head posture, protracted scapulae and an elevated left shoulder that was held in a guarded position of adduction

and internal rotation. She reported this to be the most comfortable position. Palpation revealed significant tenderness at the distal portion of the left supraspinatus muscle and minimal tenderness along the proximal muscle belly. Screening of the cervical spine was performed to rule out neurological dysfunction. The screening included myotomal testing of C1-T1, reflex testing of C5, C6 and C7 and sensory testing of the upper extremities for crude touch, all were negative.[16] Passive and active range of motion assessments were conducted using goniometric measurements in sitting and standing respectively.[17] The patient's active motions were limited by pain in all directions except extension and adduction to neutral. Her active left shoulder flexion was limited to 145°, abduction 90° and external rotation 35° (Table 2). Passively full motion was achieved with pain at the end range of all motions. With the shoulder passively abducted slightly before end range the patient was able to adduct to 120° before pain was elicited, demonstrating a painful arc (Figure 2).[16]

Manual muscle tests (MMT) were performed utilizing the break test method to assess the strength of relevant upper extremity muscles of the patient (Table 3).[18] Upon testing the patient, strength measures of 3+/5 for external rotation, 4-/5 for flexion and abduction and internal rotation and 5/5 for extension and adduction were recorded. Pain presented with all tests that indicated impaired strength. See table 2 for MMT at initial evaluation and discharge.

Various special tests were selected to further investigate the source of the patient's symptoms. The supraspinatus test also known as the empty can test was initially selected based on the previously discussed hypothesis. This test was performed as described by Magee[19] with additional aspects reported by Park.[20] The patient was standing with her left arm abducted to 90°, horizontally adducted to 30° in the plane of the scapula and medially rotated until the thumb pointed at the floor hence; empty can test. The examiner provided force into adduction as the patient attempted to resist. Initially, the force generated by the patient matched that of the examiner, however based on the patient's demonstration of pain and quick withdrawal from the testing position the test was noted positive. According to Magee a positive test indicates a tear of the supraspinatus tendon or muscle. [19] Park however indicate that pain without

weakness is indicative of tendinopathy while pain and weakness to be consistent with tendon tear. [20] The test was interpreted to indicate tendinopathy secondary to the patient's ability to participate in upper level functional activities on a daily basis. The Neer and Hawkins Kennedy tests for impingement were both performed and returned positive results. The active painful arc and drop arm tests were implemented not because of any individual psychometric property but because of their 95% posttest probability for any degree of impingement syndrome when paired with a positive Hawkins Kennedy. [20] See table 3 for a review of special tests performed and their findings.

Clinical Impression II

The examination revealed many signs and symptoms indicating involvement of the supraspinatus. Sub acromial impingement was not initially considered to be a contributing factor to the patient's condition. However, impairments of posture, strength, range of motion and positive special tests suggested the presence of impingement. The patient's slouched rounded shoulder posture in combination with frequent participation in repetitive overhead activities led to further testing. Utilization of the Hawkins Kennedy, Drop Arm and Active Painful Arc Tests, all of which were positive indicating a 95% probability of impingement. [20] The patient's high level of function in her daily activities suggested that a tear of the supraspinatus was not likely. To rule this out palpation, MMT, active painful arc test and the Empty Can Test were performed. Although the results of these tests suggested a tear of the supraspinatus, other factors contributed to the clinical decision. The ability of the patient to participate in demanding manual labor for months after the initial insult suggested that she might have had a chronic injury that was never allowed to fully heal. The fluctuating nature of the injury and her manual labor involvement could have led to murky test results. She had the ability to generate strength but secondary to pain would withdraw. Unclear test results required much of the diagnosis to be left up to clinical judgment of multiple PT's. A diagnosis of sub acromial impingement and supraspinatus tendinopathy were ultimately concluded. As proposed by the Guide to PT Practice she would fall under the diagnoses of practice patterns 4B, 4C and 4D.

Her prognosis was not favorable secondary to her comorbidities and lack of ability to rest her affected shoulder. She had strong family support with ADLs but her occupational responsibilities outweighed the positive influence of her family. A referral to her primary care physician for further medical imaging was desired by the PT. The patient however desired to wait to see if her condition improved with conservative PT intervention and due to the possibility of her financial support from her employer. A discussion between the patient and her employer regarding a possible change in duty to allow decreased provocative activities was proposed. An interventional approach similar to that of a pre-operative protocol was initiated with the primary goal of decreasing pain through rest, modalities, manual therapy and passive range of motion. The initial plan of care consisted of 2 visits a week for 8 weeks. Goals (See Table 4).

Interventions

The patient was scheduled for PT twice a week, typically every Monday and Friday. The plan of care was initially intended for 8 weeks but ended after 6 weeks due to insurance logistics. Throughout the episode of care the appointments were cancelled by the patient on 3 separate occasions, 1 of which was rescheduled and made up resulting in a total of 10 treatment sessions. Physical therapy interventions that allowed for healing and remodeling of the supraspinatus tendon were focused on. Symptom management, soft tissue mobility and integrity, postural correction and deficits in strength were addressed in the process.

Visit 1

Upon initiation of treatment it was clear the patient was in a great deal of discomfort. The goal at the start was to decrease pain in the left shoulder, to promote healing, and allow for progression of PT treatment. Gentle active assisted range of motion (AAROM) table slides in the motion of shoulder flexion and abduction were performed to maintain the integrity and mobility of the soft tissue and to serve as pain control (Appendix 2).[21] Pendulums were also performed to inhibit pain via grade II joint distraction and oscillation[21] These exercises were also the first of the home exercises. Patient education regarding

avoidance/ modification of the environment and activities that provoked symptoms was emphasized. Education regarding the likely course of rehab was discussed.

Visit 2

Treatment was initiated with a six minute warm up on the upper body ergometer (UBE). Three minutes were spent pedaling forward and three minutes backward at the patient's self-set pace. Multiple angled isometric muscle setting exercises were initiated to stimulate the stabilizing function of the rotator cuff and scapular muscles. These were done standing using a wall or doorway as the resistance with a small towel roll between the upper arm and torso to improve posture. Efforts focused on ensuring the intensity level was within a pain free range (25% assumed full force). The patient reported no problems with her home exercises so the AAROM exercises were progressed by adding seated pulley AAROM exercises which allowed for a greater range of left shoulder flexion and abduction. Interferential (IFC) electrical stimulation was applied to the patient's left shoulder while seated in an arm chair for 15 minutes at level 10 set to a 100% scan in attempt to decrease symptoms and promote healing of the supraspinatus tendon. Electrodes were placed over the distal upper trapezius and supraspinatus insertion (channel 1) and over the proximal supraspinatus and anterior deltoid (channel 2).[22] A cold pack (CP) was concurrently placed over the patients left shoulder for the 15 minutes IFC was applied to manage symptoms post treatment. [22] These modalities continued throughout the episode of care.

Visit 3

The patient reported having a day off from work prior to her PT session and her shoulder symptoms had improved. Treatment was initiated on the UBE as performed last visit. AAROM exercises modified by substituting an AAROM bolster exercise for the table slides (Appendix 2). Isometrics were discontinued secondary to progression to AROM. The therapeutic exercise was progressed with the addition of standing resistance band rows to strengthen back musculature and cue proper posture. Cross friction massage was initiated to the L supraspinatus to increase blood flow and support accelerated healing.[23]

Visit 4

Progression of resistance training with addition of resistance band IR/ER to her HEP were added after the patient reported all home exercises were going well. Supine, manually resisted rhythmic stabilization exercises were added to increase stabilization of the scapular and rotator cuff muscles at an intensity tolerated by the patient. Supine serratus punches were performed supine with a cane held bilaterally to increase scapular stability. Throughout the session the patient began to experience a mild soreness/tightness behind the L shoulder, addressed by performing a posterior deltoid stretch.[24]

Visit 5

The patient reported hearing a "pop" in her shoulder at work followed by an intense burning pain. Patient education regarding avoidance of symptom provocation was reiterated. Treatment was initiated with an eight minute warm up on the upper body ergometer (UBE). At a slow pace four minutes were spent pedaling forward and four minutes backward. AAROM exercises continued. Treatment was regressed to six way shoulder isometrics against the wall at a pain free intensity.

Visit 6

Communication with the patient's primary care physician (PCP) regarding work restriction resulted in lifting limitations of nothing > ten pounds and no lifting overhead. The patient was still in a great deal of discomfort from her prior incident at work. Treatment was initiated with an eight minute warm up on the upper body ergometer as performed during visit five. AAROM exercises continued. Manual treatment included supine manually resisted shoulder flexion, abduction, IR and ER in a pain free range and intensity. Application of IFC to the L shoulder with a CP was repeated per the patient's report of symptom relief post treatment during prior visits.

Visit 7

Education regarding a muscle tear vs. tendonitis was discussed after the patient saw the worker's compensation doctor and where she was diagnosed with Rotator Cuff Tendonitis. Education regarding optimal sleeping position was discussed to assist the patient to sleep at night. Treatment was initiated with an eight minute warm up on the upper body ergometer (UBE). There was a noted decrease in functional ability today due to the patient experiencing increased symptoms secondary to provocative tests during her doctor's appointment. AAROM exercises continued. Pendulums with a one pound weight were initiated to help relax shoulder muscles in order to optimize results.[21] Posterior shoulder stretch continued. Scapular retractions were performed to increase postural awareness and to decrease tension on the supraspinatus at rest. Cross friction massage was performed to the left supraspinatus to increase blood flow and influence accelerated healing.

Visit 8

Treatment was initiated with an eight minute warm up on the UBE as before. AAROM exercises continued. AROM retraction and ER with shoulder supported on table at 90 degrees of abduction were used to work back muscles in a pain free range.

Visit 9

Patient reported an increase in occupational workload which provoked 8/10 pain. Home exercise program progressed in order to transition to Worker's Compensation insurance and work sanctioned PT clinic. Ultrasound to left supraspinatus was performed to decrease edema.

Visit 10 (D/C)

Education regarding a follow up with PCP considering further diagnostic imaging and/or a potential series of anti-inflammatory injections was discussed. IFC and CP were continued. The patient opted to stop

PT at this time because of Worker's Comp Insurance logistics. Discharge summary completed and faxed to PCP.

Outcomes

The patient's functional ability, pain, and ROM fluctuated from treatment to treatment. Her presentation was most often related to her recent activity. During the 3rd appointment the patient reported having the day off from work. On this day she reported her shoulder "feeling a lot better," and she was able to progress her therapeutic exercise with the addition of standing resistance band rows which resulted in no change in symptoms. The next visit the patient communicated her success with her home exercises and was able to add standing resistance band internal and external rotations. Visit five did not continue on the prior upward trend. The patient was in a great deal of discomfort secondary to strenuous activities performed at work. She was unable to participate in AROM exercise and her therapeutic exercise was regressed to her isometric exercises previously performed. Her condition did not return to her peak functional ability which was observed during her 4th appointment. On the 7th visit she also demonstrated a new decrease in functional ability and report of 8/10 pain secondary to an evaluation performed by a doctor she saw regarding workman's compensation insurance.

Throughout the entire episode of care, her condition showed no significant improvements or deteriorations. As demonstrated by the Upper Extremity Functional Index (UEFI), she did not progress the standardized 9 points that would demonstrate the minimal clinically important difference. Results from tests and measures performed at initial examination and discharge are included in Table 2.

Discussion

Although it was anticipated that the patient would improve her upper extremity strength and ROM in order to increase her functioning, the patient made no significant improvements. It was hypothesized that the patient did not make any progress with therapy due to her continuation with work activities that

aggravated her injury. She was discharged on her 10th visit secondary to insurance logistics. Because she was planning to pursue the possibility of Workmen's Comp, her employer informed her to discontinue PT services in order to apply for coverage.

This case report demonstrated the difficulties of assisting a patient balancing rehabilitation with work-related duties. Although her best option for recovery included rest with decreased activity at work, this was not a viable option for this patient. Further research regarding the difference between conservative PT management of patient's who participate in proper rest intervals to facilitate healing compared to those participating in activities similar to the patient outlined in this case report is warranted.

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Tables

Rotator Cuff Muscle Function

Muscle	Glenohumeral Motion
Supraspinatus	▪ Abduction. ▪ External Rotation. ▪ Stabilizes humeral head in glenoid cavity during motion.
Infraspinatus	▪ External Rotation. ▪ Stabilizes humeral head in glenoid cavity during motion.
Teres Minor	▪ External Rotation. ▪ Stabilizes humeral head in glenoid cavity during motion.
Subscapularis	▪ Internal Rotation. ▪ Stabilizes humeral head in glenoid cavity during motion.

Table 1.
Rotator cuff muscle function and resultant glenohumeral motion.

Initial Examination Re-Evaluation and Discharge Shoulder AROM and MMT and Pain

	Initial Evaluation			Re-Evaluation/Discharge*		
	MMT	AROM	Pain**	MMT	AROM	Pain**
Flexion	4-	145°	**Current** 6/10	4-	155°	**Current** 6/10
Extension	5	50°		4+	50°	
Abduction	4-	90°	**Best** 4/10	4-	110°	**Best** 4/10
Adduction	4	35°		4	35°	
Ext. Rotation	3+	35°	**Worst** 8/10	4-	45°	**Worst** 6/10
Int. Rotation	4-	70°		4+	70°	

Table 2.
Results of MMT and AROM performed as described by Kendall[18] and Magee [19] respectively.
*Re-evaluation occurred on the patient's 10th visit, 6 weeks post initial evaluation. The re-evaluation was the patient's last treatment session. She was discharged 12 days later secondary to insurance logistics.
**Measured by the Visual Analog Scale (VAS).

411 **Selected Upper Extremity Special Tests**

Test	Indication	Procedure	+ Test	Result	Sensitivity	Specificity
Empty Can Test	Supraspinatus integrity	The patient places a straight arm in 90° of abduction and 30° of forward flexion, and internally rotates the shoulder completely. The clinician then attempts to adduct the arm while the patient resists.	Pain and weakness = Tear Pain and no weakness =tendinopathy	+	44.1%	89.5%
Hawkins Kennedy	Impingement	The examiner stabilizes the shoulder at 90° forward flexion with one hand and with the patients elbow flexed 90° internally rotates the shoulder with the other hand.	Pain upon internal rotation.	+	71.5%	66.3%
Neer Impingement	Impingement, Overuse injury to supraspinatus	Patient's arm is passively elevated in the scapular plane while the shoulder is prevented from shrugging with the arm medially rotated by the examiner.	Pain	+	68.0%	68.7%
Drop Arm Test	Supraspinatus integrity	Examiner passively elevates patient's arm to full abduction. The patient attempts to lower their arm to their side.	Unable to lower the affected arm with the same smooth characteristic as the unaffected side.	+	27%	88%
Active Painful Arc Test	Supraspinatus Tendon Integrity	Standing, the patient actively abducts their arm in a neutral plane.	Pain beyond 90°	+	*	*

412

413 **Table 3.**

414 Special Test Sensitivity and Specificity as reported by Park.[17]

415 *The active painful arc test was not selected based on individual psychometric properties, but for its 95%

416 posttest probability of the presence of sub acromial impingement when paired with a positive Hawkins

417 Kennedy and Drop Arm Test. [17]

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Short and Long Term Goals

Impairment	Short Term Goal (4 weeks)	Long Term Goal (8 weeks)
Pain – 6/10	Patient will experience decreased pain from 6/10 to 4/10 to be able to sleep > 5 hours/ night.	Patient will experience decreased pain from 6/10 to 2/10 to be able to sleep through the night.
Active Range of Motion – L Shoulder Abduction = 90°	Patient will improve active left shoulder abduction from 90° to 100° to allow patient to perform ADL's with increased independence.	Patient will improve active left shoulder abduction from 90° to 130° to allow patient to perform ADL's independently.
Strength – L Shoulder Abduction = 4-/5	Patient will improve strength of L shoulder abduction to 4/5 to allow for lifting ≥ 25 pounds without increased pain.	Patient will improve strength of L shoulder abduction to 5/5 to allow for lifting > 50 pounds without increased pain.

Table 4.
Short and long term goals.

Figures

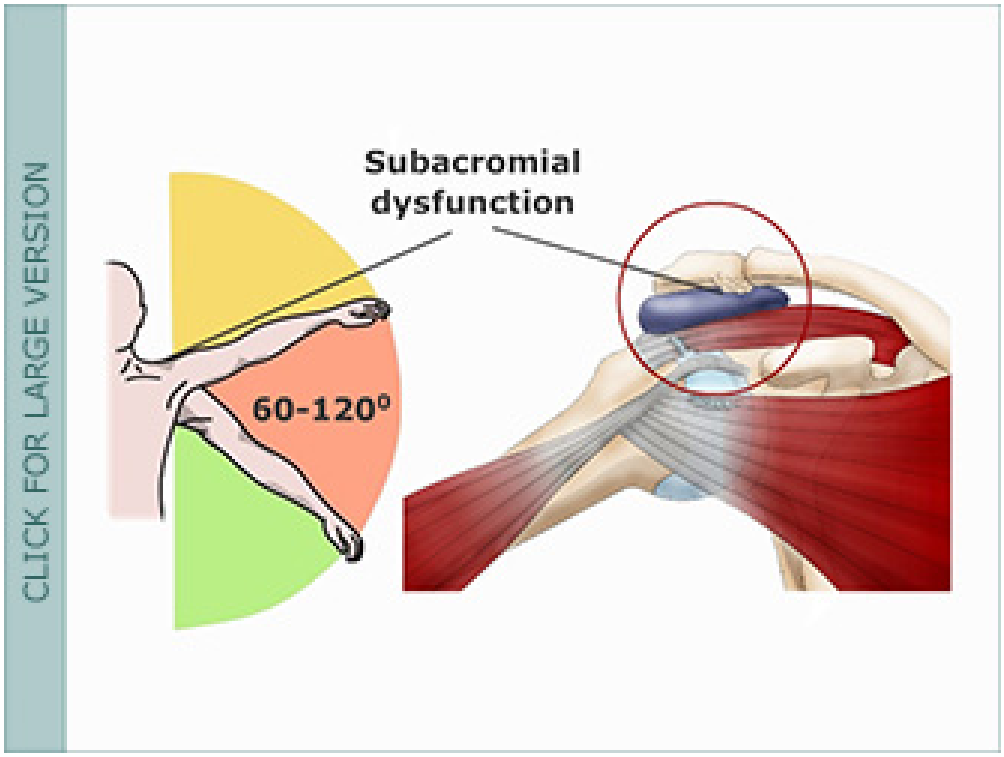
Worker's Compensation Insurance Weekly Benefits

Figure 1.

Temporary Total Disability	Permanent Total Disability	Temporary Partial Disability	Permanent Partial Disability
• Employee is still recovering, and is expected to get better. • Cannot work at any type of employment. • Completely disabled.	• Employee's condition is stable, and is not expected to improve. • Cannot work at any type of employment. • Completely disabled.	• Employee is still recovering, and is expected to get better. • Has some sort of work capacity. • Perhaps sedentary or light duty.	• Employee's condition is stable, and is not expected to improve. • Has some work capacity. • Perhaps sedentary or light duty.
How Much? **Total Disability** • (2/3) x Pre-Injury AWW = Weekly Benefit • Example ○ .66 x $1000 = $660 • **Weekly $ = $660** • AWW = Average Weekly Wage ○ Average of 52 weeks /# Weeks ○ Some states cap AWW @ $1000		**How Much?** **Partial Disability** • Pre- Injury AWW – Current Earning Capacity X Total Disability % = Weekly $ • Example ○ ($1,000 - $500) X .66 = ○ $500 X .66 = $300 • **Weekly $ = 300** • Note: With partial disability the employee is still capable of working. ○ Current Earning.	

Benefits to which an injured worker is entitled under worker's compensation laws and the calculations used to determine the amount. [7]

Painful Arc



NAME OF PATHOLOGY: Painful arc syndrome / Sub-acromial impingement

Definition: Painful arc syndrome depicts pain at the superior aspect of the shoulder between 60º and 120º abduction of the upper limb with the palm facing down.

Causes: Abduction of the arm between 60º and 120º opposes the structures within the sub-acromial space with the inferior aspect of the acromion. This opposition can elicit pain in the region of the sub-acromion if one the structure within this area is damaged. For example: tendinosis of the supraspinatous muscle, sub-acromial spur, sub-acromial bursitis, and a thickening or calcification of the coracoacromial ligament.

Examination: Painful arc syndrome is indicative of numerous shoulder pathologies, therefore the practitioner should aim to elucidate and diagnose the pertinent condition with which the patient has presented. The most common symptoms in impingement syndrome are pain, asthenia and a reduced range of motion in the affected shoulder. Usually, the pain is aggravated by overhead activities. The nature of the impingement can be determined by MRI and ultrasonography.

Figure 2.
Painful arc of motion reprinted from Clinicalexams.co.uk[15]

Appendix 1. The Upper Extremity Functional Index

- **Description**
  - The Upper Extremity Functional Index (UEFI) is a self-report questionnaire intended to inquire about individual's current upper extremity functional ability to participate in various activities.
  - The UEFI consists of 20 items that are rated on a 5 point Likert scale (0-4).
  - Very easy to administer. Requires no specific training or certification. Accurate meaningful interpretation of the results and clinical implications requires professional education.
  - **Population** – Individuals with upper extremity dysfunction of musculoskeletal origin.

- **Scoring**
  - 20 items rated on a 5 point Likert scale (0-4).
  - Scores range from 0 to 80. Higher score = higher functional status.
  - The minimum clinical important difference of 9 points with 90% confidence.
- **Reliability**
  - Stratford and colleagues found the UEFI to have excellent test-retest reliability and internal consistency. They found the test-retest reliability coefficient to be0.95 and the internal consistency to be 0.94. [Appendix]
- **Validity**
  - In the same study conducted by Stratford et al. the UEFI and Upper Extremity Functional Scale (UEFS) determined the UEFI to have a discriminant cross-sectional validity of 6.65 with p=.003.[appendix]
  - The convergent cross-sectional validity between the UEFI and UEFS was 0.82.
  - The study also discovered the longitudinal validity coefficient between the UEFI and UEFS was 0.74; superior to that of the UEFS. [Appendix.]
- **Upper Extremity Functional Index**
- **Patient Results**
  - Initial Evaluation Score = 61
  - Discharge Score = 63

Appendix 2. Therapeutic Exercise: Description and Progression

- **AAROM Table Slide**

- Patient sat on a stool with wheels and used a chest level table to rest the affected upper extremity on. For flexion the patient faced the table and for abduction oriented the table to her left side. As the affected upper extremity was rested on the table the stool was then rolled toward and away from the table by the patient, assisting the upper extremity with the desired motions.

- **AAROM Bolster**
  - Performed similarly to the table slide however instead of using the table the patient utilizes a cylindrical foam roller placed perpendicular to the parallel bars. The patient allows the foam roller to roll under the upper extremity as each ROM is achieved.
- **AAROM with Shoulder @ 90° Abduction**
  - The patient sits to the side of the plinth with it elevated to a height that allows the upper extremity to rest on it at 90° abduction. With the extremity supported various motions were performed.
- **Supine Rhythmic Stabilization**
  - The patient was supine with the affected upper extremity actively held at 90° forward flexion or straight up in the air. The examiner then randomly initiated motion in all planes as the patient is asked to maintain the initial position.