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Physical Therapy Management Of A Patient After A Subacromial Decompression with Acromioplasty And Bursectomy: A Case Report

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The patient signed an informed consent allowing the use of medical information 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: Subacromial impingement results from repetitive trauma to structures underneath the subacromial arch leading to a decrease in the subacromial space, impingement of soft tissue, and ultimately a decrease in functional abilities. Conservative treatment includes physical therapy, nonsteroidal anti-inflammatory drugs, and corticosteriod injections. If improvements are not observed, there is a surgical option of a subacromial decompression (SAD). Conclusive evidence supporting surgery over conservative measures does not exist[1]. Literature is lacking regarding SAD without rotator cuff (RTC) repair and performing SAD with both an acromioplasty and bursectomy. Therefore, the purpose of this case report was to investigate the functional outcomes of a patient after SAD with an acromioplasty and bursectomy without RTC involvement.

Case Description: SA was a 52 year old female presenting to outpatient physical therapy after left arthroscopic SAD. SA reported onset of shoulder pain in 2013. Conservative physical therapy was successful in improving symptoms until a fall exacerbated her symptoms. She continued conservative therapy but it failed to improve her pain and function. Two months later she had a SAD with an acromioplasty and bursectomy. Physical therapy treatments included therapeutic exercises, home exercise program, functional activities, modalities, manual therapy, and posture re-education with the primary focus of reducing pain, improving ROM and improving functional ability.

Outcomes: Improvements were observed in left shoulder active and passive ROM, strength, pain, and functional outcomes.

Discussion*:* Outcomes indicated that therapeutic exercises, manual therapy, and modalities following arthroscopic SAD with both an acromioplasty and bursectomy were beneficial for a patient without RTC involvement. More research is needed to support the advantages of this procedure combined with physical therapy in improving functional outcomes.

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Background

Subacromial impingement results from repetitive trauma to structures underneath the subacromial arch leading to a decrease in the subacromial space, impingement of soft tissue, and ultimately a decrease in functional abilities. Soft tissue structures that may be involved include: rotator cuff (RTC) muscles and tendons, the long head biceps brachii, the coracoacromial ligament, subacromial bursa, and glenohumeral capsule. Impingement can also occur from weakness or imbalances in the RTC and the scapular musculature resulting in poor mechanics of shoulder movement which stresses and compresses the subacromial structures. Other causes include tightness of the glenohumeral capsule, bony abnormalities, and poor posture. Approximately 44-65% of complaints of shoulder pain at a physician's office can be attributed to subacromial impingement, making it the most common disorder of the shoulder[2].

Treatment of subacromial impingement includes both conservative and surgical options. Conservative options include physical therapy, nonsteroidal anti-inflammatory drugs (NSAIDS), and corticosteriod injections. Due to the variety of structures involved and in the mechanism of injury, the literature on success of conservative treatment also varies. Outcomes examined included pain, strength, ROM, functional activities, and occurrence of surgery. Studies by Hallgren et. al[3] and Litchfield[4] found similar results in that specific exercise group had more reports of successful outcomes than the control group of unspecific exercise. Furthermore, fewer patients in the specific exercise group went on to have surgery after completion of the program. Exercises used included eccentric strengthening of the RTC in addition to concentric and eccentric strengthening of the scapular stabilizers. However, there is still need for literature containing higher

levels of evidence to support physical therapy as an effective treatment of subacromial impingement[5]. Before resorting to surgery, most surgeons trial conservative options for roughly 6 months to see if any improvements can be made[6].

When conservative treatment fails, subacromial decompression (SAD) is a surgical option. SAD can be performed with or without an acromioplasty or bursectomy. If there is a tear or damage to the tendons, a debridement or repair can be performed.

A systematic review in 2013 reported that 3 studies compared physiotherapy or exercises to arthroscopic or open SAD. Short and long term follow ups showed no differences in pain, function, or time for recovery[1]. In contrast, a perspective study by Lunsjo et al[7], it was found that improvements seen in the Disability of the Arm Shoulder and Hand questionnaire (DASH) and the Visual Analog Scale (VAS) 6 months after SAD were maintained or improved further 6 years after the surgery. Three additional studies found that early initiation of dynamic strengthening exercises yielded greater gains in range of motion (ROM) at 3 week and 12 week follow ups, although, however, found no difference in reduction of pain[1]. A main concern is that damage can occur with early initiation of exercises. However, a pilot study by Klintberg et al[8] found that it is safe to initiate the rehabilitation process the same day as the surgery.

Conclusive evidence supporting surgery over conservative measures does not exist[1]. Furthermore, a randomized controlled trial by Haahr et. al[9] reported that surgery did not yield better results than physiotherapy, even after a one year follow up.

Research indicates that an arthroscopic SAD is a successful measure in reducing pain and signs of impingement[10]. According to a systematic review by Donigan, Fellow and Wolf[11] in 2011, there is limited literature available regarding SAD

being performed with an acromioplasty or bursectomy, as a result, there is little to no literature supporting which procedure yields more improvements. While there is conflicting evidence on the benefits of SAD, almost all cases reviewed involved the RTC. A study by Olsewski and Depew[10] found an 81% satisfactory rate among patients who had an arthroscopic SAD without rotator cuff involvement, suggesting SAD is beneficial even without RTC pathology. Literature is lacking supportive evidence of SAD without RTC repair or performing SAD with both an acriomioplasty and bursectomy. Therefore, the purpose of this case report was to investigate the functional outcomes of a patient after SAD with an acromioplasty and bursectomy without RTC involvement.

Case Description

SA was a 52 year old female presenting to outpatient physical therapy after a left arthroscopic SAD. In 2013 she began having left shoulder pain. An MRI revealed a labral tear. She began physical therapy as a conservative measure that consisted of RTC and scapular strengthening exercises which was successful until a fall exacerbated her symptoms. Upon continuation of therapy, she found it failed to improve her pain and function. Two months later she had a SAD with an acromioplasty and bursectomy.

An MRI indicated that SA had a RTC tear and superior labral tear from anterior to posterior (SLAP) lesion. Though surgery discovered neither pathology was present, the surgeon concluded the SAD with an acromioplasty and bursectomy was still a viable option to improve function and symptoms.

SA reported no limitations prior to initial injury and date of onset. After surgery, she required assistance for all activities of daily living (ADL's) as well as instrumental activities of daily living. She was unable to work secondary to pain and surgery. SA's personal goal for physical therapy was to regain her independence with ADL's and return to work.

SA denied any known family history of cancer, coronary artery disease, diabetes, or stroke. She generally in good health but had high blood pressure controlled by medication and occasional experienced palpitations. Other past medical history included hypothyroidism, Gastroesophageal reflux disease (GERD), and hiatial hernia. There was no pertinent past surgical history.

SA she lived in a home with her husband and two teenage children. SA's worked as a hospital's quality data analyst. No other clinical testing had been performed. SA was on medications for high blood pressure, enlarged thyroid glands, GERD, and Ibuprofen, as needed for pain.

Table 1 describes the review of systems performed on SA at her initial physical therapy evaluation.

Clinical Impression 1

Based on on subjective reports of difficulty with performing ADL's and pain with movement of the left upper extremity and a report of feeling stiff in the neck, it was hypothesized that SA had deficits in shoulder and neck ROM, strength, and functional mobility. Since the surgical area was red and inflamed, it was also hypothesized that SA may complain of tenderness with palpation to bony shoulder structures and soft tissue.

Due to these expected impairments and limitations, further tests and measures were warranted and it was suspected that SA would benefit from skilled physical therapy. It was hypothesized that therapy would focus on passive and active ROM, pain reduction, and strengthening of the RTC muscles as well as other supporting shoulder stabilizers, in order to improve functional mobility and activity.

Tests and measures included active and passive ROM, manual muscle testing (MMT), skin integrity palpation, and joint play assessment. After identifying specific impairments, an individualized physical therapy treatment plan was created.

SA was a good candidate for a case report because there is limited literature available on SAD for a patient without RTC involvement. Similarly, there is no literature regarding the benefits of performing both an acromioplasty and bursectomy. As a result, this case report will add to the literature by reporting the outcomes SA experienced from a physical therapy treatment plan which included therapeutic exercises, manual therapy, and modalities following a SAD with acromioplasty and bursectomy.

Examination

Tests and measures performed during the initial examination included ROM, MMT, palpation, VAS pain scale, and the American Shoulder and Elbow Surgeons Survey (ASES). Special tests were deferred because SA was seen post surgically. As hypothesized, SA had significant deficits for neck ROM, left shoulder ROM, and left upper extremity strength. Refer to Tables 2 and 3 for measurements obtained.

With palpation, SA reported tenderness and tightness bilaterally in her posterior cervical musculature. There was increased density and tone of musculature of the left shoulder. All left bony prominences shoulder muscles were tender to touch.

SA had fair resting standing posture with slight forward head and rounded shoulders. SA was wearing a sling and displayed active muscle guarding to protect the operated shoulder. SA scored a 9.99 when rating her left upper extremity's ability on the ASES, which correlates to poor function and severe limitations. Several studies have found the ASES to be valid, reliable and responsive to significant changes for patients with shoulder dysfunction[12, 13].

The VAS 0 to 10 scale was used to assess pain. At initial examination, SA reported a constant 9/10 pain. Typically it was a dull ache, but occasionally was sharp. The VAS has been found to be valid and reliable for acute and chronic musculoskeletal pain[14, 15].

Several studies are published in the literature supporting high reliability and validity of ROM using a goniometer. Kolber and Hanney[16], found that goniometer and digital inclinometers could be used interchangeably, with an expected range between tools to be 2º. Both were found to have high interrater reliability as well as good concurrent validity. MMT was used to assess muscle strength and has been found to be reliable and valid for neuromuscular and musculoskeletal disorders. Several randomized control trials have demonstrated high inter-rater reliability[17].

Clinical Impression 2

After her evaluation, the initial hypothesis was supported. Refer to Table 4 for a list of findings. These are expected and consistent with physical therapy practice pattern Pattern 4I: Impaired Joint Mobility, Motor Function, Muscle Performance, and Range of Motion Associated With Bony or Soft Tissue Surgery.

Based on information gathered during the history and interview, SA had excellent potential for improvement by participating in physical therapy. SA had a very supportive family. There were no complications with the surgery and all suspected impaired structures from the MRI were found to be intact and undamaged. There was no anticipated delay in the healing process. SA was very motivated to regain her independence with functional activities and to return to work. Though SA had hypertension, it was controlled through medications and not expected to complicate her recovery.

Biberthaler et al[18] investigated the impact of age on an individual's potential to benefit from SAD. Their study had a patient population with a mean age of 57 years old who saw significant benefits from arthrocsopic SAD. At 52 years old, this article suggested that SA's age would not be a limiting factor in her recovery.

Factors that may negatively impact her prognosis include her medical history of hypertension, hypothyroidism, palpitations, GERD, and a hiatial hernia. Hypertension and palpitations increase the amount of stress blood vessels receive, potentially compromising delivery and diffusion of blood and nutrients to the left shoulder, and could delay the healing process and rehabilitation because increased risk for a stroke or a heart attack. SA's BMI of 28.3 classifies her as overweight, potentially indicative of

improper nutrition habits which could lead to impaired healing process. A delay in the healing process can prolong her sensitivity and inflammation period. The longer she stays immobile, the higher chance for increased scar formation and adhesion to surround structures which could lead to adhesive capsulitis.

Hypothyroidism is associated with symptoms such as weight gain, fatigue, cold intolerance, and depression. As a side effect she may have a decreased activity tolerance and become easily fatigued during treatment sessions. Being a 52 year old female she could possibly be going through menopause. The combination of the two hormone imbalances could cause a delay in her body's ability to respond to the surgery and initiate the proper immunologic response. She may experience an imbalance and become depressed decreasing her motivation and willingness to participate in therapy. All these factors could result in a delay of the healing process, increasing the time to achieve goals and outcomes. Potentially, these comorbidities could lead to a referral for further consult or testing which could put a hold on the rehabilitation process.

SA appeared to be a very anxious individual which could be a limiting factor. She was afraid to re-injure herself or cause any damage. This could lead to non-compliance with a home exercise plan (HEP), increased muscle guarding or avoidance of using the left upper extremity. Anxiety attacks can lead to increase blood pressure, palpitations, and unhealthy eating habits. It is believed her anxiety became a limiting factor and prevented her from attaining higher ROM with stretching, progressing her strength exercises, and deterred her from fully participating in her HEP.

Hospital protocols for SAD suggest 3 to 6 months recovery time after surgery, similar to the recovery time after RTC surgery. SA was anticipated attending physical therapy for at least 6 months post-surgery.

There was no indication that SA required a referral to any other health care professionals. No additional tests and measures were indicated, however, revaluations occurred once every month to monitor progress and reassess treatment plan. Interventions included therapeutic exercises, stretching, strengthening, HEP, functional activities, modalities for pain management, manual therapy, posture re-education, joint mobilizations, and soft tissue mobilization with the primary focus of reducing pain, improving ROM and improving functional ability.

SA's short term goals included increasing her active cervical and left shoulder ROM, increasing strength for left upper extremity MMT, report a decrease in pain and to discontinue wearing the sling. Goals for discharge included returning to work with minimal to no pain, have left shoulder ROM within normal limits, demonstrate strength of at least a 4+/5 for all left shoulder MMT, and to be independent with her HEP.

Interventions

SA received 15 treatment session status post arthroscopic SAD lasting 30 minute s, 2 times per week. Due to pending insurance approval, 1 week was missed. Two treatments were re-evaluations and as a result few exercises were performed.

Each session was documented using the hospital's electronic medical system and exercises were documented on a flow sheet in SA's paper chart. Progress was communicated to her referring surgeon through faxing evaluation and re-evaluation

notes on a monthly basis. In order to gain approval, similar documentation had to be communicated to the insurance company. Coordination and communication with other PT and PTA's was accomplished verbally in order to maintain consistent care of SA throughout treatment.

During her initial evaluation, SA was educated on the findings of the evaluation, how physical therapy would help address the deficits identified, and the plan of care that had been determined. She was also instructed on sling usage, the application and benefits of ice and heat, and good posture.

Upon completion of the evaluation, SA was instructed using a teach back method on cervical ROM exercises and stretches to perform at home as part of her HEP. This was decided because SA complained of significant neck pain and stiffness during the history portion of the evaluation and when examined, she presented with significant deficits.

Subsequent treatment began with a moist hot pack applied to heat soft tissue surrounding the left shoulder joint in preparation for PROM and stretching. Codman's pendulums were performed to help promote blood flow to the area in order to improve the healing process as well as provide distraction of the glenohumeral joint which can provide some pain relief. PROM was performed to increase the available range in the left shoulder, to encourage mobility to prevent adhesive capsulitis, promote ligament and capsular remodeling, and inhibiting pain through stimulation of mechanoreceptors. PROM was progressed to active assisted (AAROM) and active (AROM) as pain reduced and SA was able to actively participate in therapy sessions. AROM and AAROM benefits include prevention of clot formation by helping to keep blood moving,

increasing proprioceptive input of shoulder, and reduction of effects of immobility. Due to capsular tightness, joint mobilizations were included into the plan of care. Using joint mobilization, PROM and stretching in conjunction has been shown to have more of an impact and increase in range achieved[19]. As pain was reduced and range improved, strength training was initiated in functional movements for the shoulder complex, elbow, and wrist. Treatment was concluded with a cold pack, with or without IFC electrical stimulation. Please refer to Chart 1 for a flowsheet of exercises performed for each visit.

There was no indication that SA will require a referral to any other health care professionals.

Outcomes

Improvements were observed in left shoulder ROM, strength, pain, and functional outcomes. Chart 2 demonstrates improvements in shoulder ROM from initial evaluation to the two re-evaluations. At the initial evaluation, end feel for all left shoulder ROM were empty and limited by pain. At second re-evaluation, range was still limited by pain, but the end feel was capsular. Internal and external rotation were taken at 45º of abduction but as range was gained, patient was able to attain 90º of abduction to measure rotation. Functionally, she was only able to reach her left hand behind her back (internal rotation) to rest at her left mid gluteal region. This motion improved to the L4 spinous process after two months of treatment. Improvements were also seen with cervical ROM as well as with right shoulder ROM.

Similarly, SA saw significant improvements in strength of her left upper extremity. Changes from initial visit to the re-evaluations can be seen in Table 3. With her left

upper extremity, SA was unable to perform the range against gravity due to significant pain after surgery. By two months, SA demonstrated measurements of similar muscle grades of her right upper extremity.

SA also demonstrated improvements pain with palpation and the tonicity of the neck and shoulder musculature. At initial evaluation, SA was hypersensitive to touch. At the second re-evaluation, SA continued to present with slight tenderness at bony landmarks and the RTC muscles of the left shoulder. Some increased tone was still present in the left upper trapezius and rhomboids, however, tenderness was no longer present.

There were no noticeable improvements in SA's posture, despite reporting compliance and independence with postural correction at home.

Initially, SA reported to be a 9/10 at all times. By the second re-evaluation, SA reported at best her pain was a 2/10, with occasional 7/10 pain.

Lastly, SA saw improvements with her functional outcome scores on the ASES. At initial visit, she scored a 9.99 on the ASES and after two months of participating in therapy, she scored a 34.989 which indicates a huge improvement in functional activities.

Discussion

As expected, improvements were observed with left shoulder and cervical ROM and left shoulder strength, pain, and functional outcomes. However, it was not anticipated to see improvements in right shoulder ROM. It is hypothesized that improvements were a result of regaining functional abilities of her left shoulder and reducing the tonicity in the posterior shoulder muscles bilaterally. Due to immobility of

her left upper extremity after surgery, the right upper extremity was compensating and put under more stress. Since exercises were performed bilaterally, the right upper extremity also benefited from physical therapy.

The change in end feel from empty to capsular indicates that deficits in ROM were no longer due to pain, but rather capsular and/or soft tissue tightness. Improvements in the tonicity of the shoulder musculature was attributed to a decrease in active muscle guarding as pain and anxiety of re-injury was reduced. The decrease in cervical stiffness and musculature tonicity was hypothesized to be the result of discontinued use of the sling on the left upper extremity.

SA's ASES score went from 9.99 upon initial examination to 34.989 after two months of physical therapy. This increase in ASES score and subjective data gathered indicated that SA was showing functional improvement in her ability to perform daily tasks with respect to her left upper extremity and was satisfied with how the surgery improved her quality of life. Similarly, reductions in pain and symptoms indicate the surgery was successful. These results support those found by Olsewski and Depew[10] for participants with impingement who underwent SAD but did not have a tear in the RTC. Though not performed, a quality of life and satisfaction survey would have been beneficial to note actual changes.

A long term follow up was not performed. However, due to similar improvements seen in outcomes by Lunsjo et al[7] with DASH and VAS, it is hypothesized that SA would maintain her improvements years after the surgery. The participants included in this study also had subacromial pain with failed conservative measures, and were excluded if there was a tear of the RTC.

Physical therapy began roughly 2 weeks after SAD, which is a relatively early initiation. However, this case report did not yield similar results found by Tashjian[1] in regards to greater gains in ROM. This may be due to SA's anxiety, fear, and difficult relaxing during stretching.

The outcomes of this case report indicate that therapeutic exercises, manual therapy, and modalities for shoulder impingement without involvement of the RTC following an arthroscopic SAD with both an acromioplasty and bursectomy is beneficial. More research is needed to support the advantages of this procedure combined with physical therapy over other treatments in improving ROM, strength and functional outcomes.

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Tables and Figures

Cardiovascular/Pulmonary System	
Impaired	High blood pressure controlled with medication.
Integumentary System	
Impaired	There were three incision scars (anterior, lateral and posterior L shoulder) which all appeared to be healing well with no signs of infection or delayed healing process.
Musculoskeletal System	
Impaired	•Gross L upper extremity range of motion (ROM) and gross strength were impaired. •Gross R upper extremity ROM and gross strength were impaired. •Bilateral lower extremity ROM and strength were within functional limits (WFL). •Grossly symmetrical: No visible/noted differences •Height = 154.94 cm •Weight = 68.237 kg •BMI = 28.3
Neuromuscular System	
Not Impaired	(ie. Balance, gait, locomotion, transfers, transitions, motor control and learning)
Communication, Affect, Cognition, and Learning Style	
Not Impaired	•Patient was alert and oriented x 3 (person, place, time). •Patient was right handed. •Her preferred learning style was with pictures and demonstrations. There were no known barriers. Her educational needs include: safety/precautions, use of sling, general rehabilitation process/plan of care, and application of heat.

Table 1: Systems Review

Cervical Spine Motion (degrees)	ROM Value
Flexion	18
Extension	21
Left lateral flexion	17
Right lateral flexion	17
Left rotation	26
Right rotation	29

Shoulder Motion (degrees)	Right		Left	
	AROM	PROM	AROM	PROM
Flexion	133	NT	35	54
Extension	28	NT	10	NT
Abduction	100	NT	45	56
Internal rotation	60	NT	11	20
External rotation	33	NT	11	15

Table 2: Cervical and *Shoulder ROM, initial evaluation*

Pain limited all cervical ROM. Flexion, extension, left and right side bend were performed in a seated position. Rotation was performed supine.

Elbow and Wrist ROM values not taken because WFL. Extension was measured in standing. Flexion, abduction, IR, and ER were measured in supine. Pain limited left shoulder ROM. Soft tissue restriction/end feel with IR and ER. Empty end with flexion and abduction. IR/ER taken at 45º shoulder abduction because patient unable to reach 90º. Soft end feel for all R shoulder motions.

Shoulder	Right			Left		
	6/13	7/11	8/8	6/13	7/11	8/8
Flexion	4 -	4 -	4	2-	3+	4 -
Extension	4+	4+	4+	2-	3+	4
ABD	4 -	4 -	4	2-	3	4 -
ADD	NT	NT	NT	NT	NT	NT
IR	4+	4+	4+	2-	3+	4
ER	4 -	4+	4+	2-	3+	4 -

Table 3: ***Shoulder MMT***
Visit 6/13 was the initial examination; 7/11 was at first re-evaluation; and 8/8 was second re-evaluation.
Please refer to Appendix B for explanation of MMT grades.
All performed standing. Pain with all L MMT.

Impairments	Functional Limitations	Disabilities
•Decreased cervical ROM •Decreased L shoulder ROM •Decreased L upper extremity strength •Pain, tenderness, sensitivity •Posture •Decreased flexibility •Increased muscle tone	•Dependence or assistance for all ADL's •Difficulty sleeping •Unable to reach arm behind back •Decreased Activity tolerance •Difficulty with bed mobility •Difficulty with functional mobility and activities	•Unable to work

Table 4: ***ICF Classification of SA's findings***

Exercise\Visit #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
moist hot pack to L shoulder, anterior and posterior	Initial Eval	8 min	8 min	8 min	8 min	8 min	8 min	8 min	8 min	8 min	8 min	8 min	8 min	8 min	8 min
Codman's pendulums		15x each	15x each	HEP	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PROM - shoulder (flex/ext/abd/IR/ER) - elbow (flex/ext/supination/pronation) - wrist (flex/ext)		15x each	15x each	15x each	15x each	15x each	15x each	15x each	15x each D/C wrist and elbow PROM	15x each	15x each	15x each	15x each	15x each	15x each
Scapular AROM (elevation/depression/pronation/retraction)		10x each	15x each	20x each	20x each	20x each	D/C	-----	-----	-----	-----	-----	-----	-----	-----
seated stretches: shoulder flex/abduction/ER		15x each	15x each	HEP	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
AAROM cane exercises: flex, ER, abduction			Initiate next visit	10x each with 5 sec hold	10x each with 5 sec hold	10x each with 5 sec hold	D/C	-----	-----	-----	-----	-----	-----	-----	-----

Exercise\Visit #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
ER cane stretch							Initiate next visit	3x 20 sec	------	------	------	------	------	------	------
IR towel stretch				Initiate next visit	3x 20 sec	3x 20 sec		3x 20 sec	------	-----	------	------	------	------	------
elbow and wrist flex/ext			Initiate next visit	10x with 1#	10x with 1#	10x with 1#	D/C	------	------	-----	------	------	------	------	------
joint mobilization : inferior and posterior glides						Initiate next visit	30 sec hold x 5 each	30 sec hold x 5 each	30 sec hold x 5 each	30 sec hold x 5 each	30 sec hold x 5 each				
standing rows (scapular retraction)							Initiate next visit	yellow band 10x		blue band 2x10	blue band 2x10	blue band 3x10	blue band 3 x12	grey band 2 x 10	grey band 2 x 11

Exercise\Visit #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
IE/ER therabands									Initiate next visit	IR = blue band 2x10 ER = red band 2 x10	IR = blue band 2x10 ER = red band 2 x10	IR = blue band 2x10 ER = red band 2 x10	IR = blue band 3x10 ER = red band 3 x10	IR= blue band 3 x 10 ER = red band 3 x10	IR = black 2 x 10 ER = red band 2 x10
shoulder flexion									Initiate next visit	10x with 1#	10x with 1#	10x with 1#	10x with 1#	2x 10 with 1#	2x 10 with 1#
Shoulder abduction											Initiate next visit	10x with 1#	10x with 1#	2x 10 with 1#	2x 10 with 1#
electrical stimulation, IFC		10 min	10 min	10 min	10 min	10 min	D/C	------	------	------	------	------	------	------	------
cold pack L shoulder anterior and posterior							10 min	10 min	10 min	10 min	10 min	10 min	10 min	10 min	10 min

Chart 1: ***Interventions performed each visit***

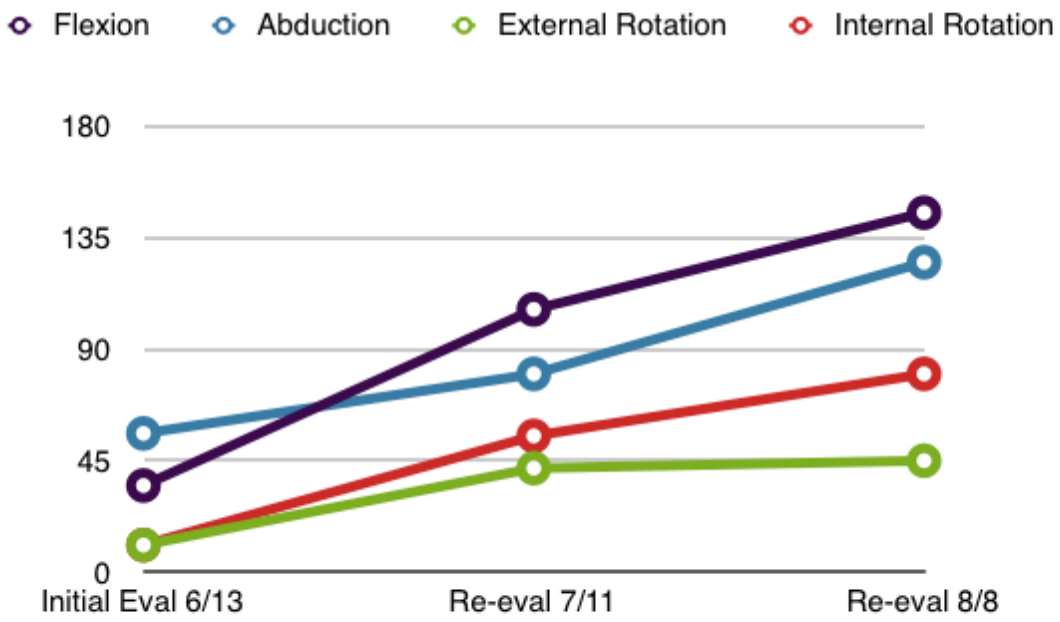

Chart 2: *Shoulder ROM at initial and re-evaluations*

444
445
446

Appendices

Appendix A: ASES form.

Score was calculated by entering SA's responses into the online website at:

http://www.orthopaedicscore.com/scorepages/patient_completed_score.html

Appendix B: Manual Muscle Test Grade Guide

From: Kendall FP. Muscles, Testing and Function with Posture and Pain. Lippincott Williams & Wilkins; 2005.

Grade	Meaning
0	No visible or palpable contraction
1	Trace: Visible or palpable contraction
2-	Poor -: Partial ROM, gravity eliminated
2	Poor: Full ROM, gravity eliminated
2+	Poor +: Gravity eliminated/slight resistance or < 1/2 range against gravity
3-	Fair - : > 1/2 but < Full ROM, against gravity
3	Fair: Full ROM against gravity
3+	Fair +: Full ROM against gravity, slight resistance
4-	Good - : Full ROM against gravity, mild resistance

Grade	Meaning
4	Good: Full ROM against gravity, moderate resistance
4+	Good +: Full ROM against gravity, almost full resistance
5	Normal: maximal resistance

458