2018

Treatment of Subacromial Impingement Syndrome in a 53-Year-Old Female: A Case Study

Jarad Syrstad

University of North Dakota

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TREATMENT OF SUBACROMIAL IMPINGEMENT SYNDROME IN A 53-YEAR-OLD FEMALE: A CASE STUDY

by

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Bachelor of Science in Exercise Science
Bemidji State University, 2015

A Scholarly Project Submitted to the Graduate Faculty of the

Department of Physical Therapy
School of Medicine
University of North Dakota

in partial fulfillment of the requirements for the degree of

Doctor of Physical Therapy

Grand Forks, North Dakota
May, 2018
This Scholarly Project, submitted by Jarad Syrstad in partial fulfillment of the requirements for the Degree of Doctor of Physical Therapy from the University of North Dakota, has been read by the Advisor and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.

\[\text{Signature}\]
(Graduate School Advisor)

\[\text{Signature}\]
(Chairperson, Physical Therapy)
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Title TREATMENT OF SUBACROMIAL IMPINGEMENT SYNDROME IN A 53-YEAR-OLD FEMALE: A CASE STUDY

Department Physical Therapy

Degree Doctor of Physical Therapy

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Date 9-29-17
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ACKNOWLEDGEMENTS

I would like to take time to thank all of the people that have supported my educational career. Firstly, my family for being there for me and shaping who am I today. My clinical instructor, Dr. Ryan Lorenz, for his mentorship and guidance during this case study. The faculty, staff, and classmates at the University of North Dakota Physical Therapy Department for providing me the resources and education to develop professionally. Finally, Dr. Dave Relling, scholarly project advisor and Chair of the UND Physical Therapy Department, and classmates, Mackenzie Mears, and Colin Teichert, who put in countless hours of critiquing throughout the development process of this project.
ABSTRACT

Background and Purpose. Subacromial impingement syndrome (SAIS) is a common shoulder pathology. The purpose of this case report is to discuss the outcomes of subsequent physical therapy after operative treatment for SAIS and the clinical decision making involved in seeking surgical intervention.

Case Description. This case report describes a 54 y/o female who participated in eight weeks of physical therapy after undergoing shoulder decompression surgery while failing conservative physical therapy prior to surgical intervention.

Intervention. Physical therapy interventions were designed to strengthen the rotator cuff and shoulder, increase range of motion, decrease pain, and improve functional activity.

Outcomes. The patient increased strength, and range of motion to near normal limits, and had decreased pain and functional limitations.

Discussion. Physical therapy intervention after shoulder decompression surgery can improve strength, range of motion, pain, and functional activity. The patient would have benefitted from continued therapy for further improvements of strength and range of motion, but opted to continue therapy with a home exercise program. Further research is needed to determine early diagnostics to provide the most appropriate plan of care.
CHAPTER I

BACKGROUND AND PURPOSE

Shoulder pain is a common musculoskeletal complaint in health care. One reason for the prevalence of shoulder pathology is the anatomy of the glenohumeral joint allowing more mobility than stability. Of the diverse types of shoulder pathologies, subacromial impingement syndrome (SAIS) is the most common disorder of the shoulder, accounting for 44-65% of all complaints of shoulder pain.¹ The height of the subacromial space is approximately 1-1.5 cm, and any abnormality causing a decreased subacromial space may lead to impingement.² SAIS encompasses a spectrum of subacromial space pathologies including partial thickness rotator cuff tears, rotator cuff tendinosis, calcific tendinitis, and subacromial bursitis.³ According to Neer, there are three stages of impingement.⁴ Stage one is characterized by acute inflammation, edema, bursal rupture, and hemorrhage of the rotator cuff tendon. This stage is most common in people younger than twenty-five years old and usually has good outcomes with conservative treatment alone. The second stage is defined as further rotator cuff pathology, such as fibrosis and tendonitis, in people between twenty-five and forty years of age. Stage three includes mechanical issues involving rotator cuff tears and osteophytes related to chronic impingement.

A patient with SAIS may present to the clinic with pain at the anterolateral aspect of the shoulder radiating to the lateral mid-humerus. Pain may also be present
with activities involving glenohumeral elevation as well as complaints when sleeping on the affected extremity. These signs and symptoms may arise from a traumatic event, such as a fall, or develop insidiously over time.

Initial treatment for SAIS consists of conservative interventions and then surgical intervention if the non-operative outcomes are poor. Current conservative care for SAIS includes rest, non-steroidal anti-inflammatory drugs (NSAIDs), corticosteroid injections, physical therapy, and manual therapy. According to Senbursa et al., patients had more improvement with manual therapy and exercise than with just exercise alone. The most common surgical intervention for impingement is subacromial decompression or acromioplasty. Following the subacromial decompression, subsequent physical therapy management is essential for optimal patient outcomes. Therapeutic exercise that incorporates strengthening of the rotator cuff and periscapular musculature is utilized during conservative and post-operative physical therapy. Post-operative rehabilitation considers the tissue healing process when prescribing exercise and other interventions such as manual therapy and modalities. Current literature suggests that there is no difference in the outcomes between conservative physical therapy and subacromial decompression. Also, most cases of rotator cuff disease (stage II impingement) can be managed with supervised exercise, arthroscopic subacromial decompression, and post-operative physical therapy. It is recommended when patients do not improve within six months during a supervised exercise program to be evaluated for surgery. At the same time, the physical therapist should recognize patient/client factors of SAIS.
requiring immediate surgical intervention to produce optimal functional outcomes. The physical therapist should employ a clinical decision making process to arrive at the optimal recommendation for surgical evaluation or continuing conservative therapy.

The purpose of this case report is to discuss the outcomes of the operative and non-operative treatment for SAIS and the clinical decision making involved in seeking surgical intervention.
CHAPTER II

CASE DESCRIPTION

The patient was a 54 y/o Caucasian female who was throwing a ball for her dog when she felt a pop in her right shoulder in April. She was referred to physical therapy for right shoulder pain. The patient participated in conservative physical therapy treatment for one month, which resulted in poor outcomes due to high levels of pain. She then had a shoulder arthroscopy performed in July where a bone spur was removed and a subacromial decompression was performed. The patient reported no previous issues or a medical history with her right shoulder. The patient described her general health as “good” other than being obese. Her chief complaint included pain with right shoulder elevation, extension, and functional internal rotation. The patient stated all activities of daily living involving shoulder elevation, such as dressing and fixing her hair, were painful. Upon palpation, her primary complaint was pain in her anterior right shoulder, which was described as dull or achy. Her shoulder felt the best when she was able to rest it. She had not noticed any radicular symptoms. The patient was a computer programmer and stated her shoulder did not affect her much at work, but occasionally would ask for help carrying heavy boxes or objects when needed.

Examination, Evaluation and Diagnosis

Prior to the post-surgical initial examination, the patient was given a consent to treat form, a Quick Disabilities of the Arm Shoulder and Hand (DASH) outcomes measure, and a pain scale while in the waiting room. The DASH provides a measure of
treatment effectiveness after surgery for subacromial impingement and carpal tunnel syndrome. Similarly, the Quick DASH, a shortened version of the DASH, can replace the DASH with similar precision in upper extremity disorders thus saving clinical examination time. The patient consented to treatment and scored 39/100 on the Quick DASH form. On the 10-point pain scale, the patient stated her pain was 6/10 with activity and 3/10 with rest. Upon observation, the patient had rounded shoulders and occasionally would perform a shoulder hike to limit pain with movement. She had palpable tenderness at the anterior and lateral right shoulder. All special tests and manual muscle testing were withheld from the right shoulder due to the recent surgery. The patient's left shoulder manual muscle testing results demonstrated 5/5 strength with flexion, abduction, internal rotation and external rotation. When impingement special tests are contraindicated, palpation is a highly sensitive (92%) assessment tool indicating a pathology is likely to be present.

All range of motion measurements were performed using a goniometer and referenced from Cram Session in Goniometry and Manual Muscle Testing by Van Ost. The patient's cervical active range of motion was within normal limits. The patient's active range of motion of the right and left shoulders, which were measured in standing, can be found in Table 1. Although the standing is not the traditional ROM testing position, standing was chosen for increased examination efficiency. Bilateral shoulder flexion, extension, abduction, external rotation, and internal rotation range of motion were tested. Examination techniques were demonstrated and explained for each testing
position prior to patient execution. For shoulder flexion, the patient retained the thumb in the sagittal plane while raising the arm forward with the elbow extended. Shoulder extension was performed with the patient bringing the arm backwards, opposite of shoulder flexion. For shoulder abduction the patient was again cued to lead with the thumb in the frontal plane, moving the arm out to the side with the elbow extended. External rotation was measured with the patient's shoulder in neutral position (0° of flexion, abduction, internal, and external rotation), and the elbow at 90° of flexion in neutral pronation and supination. Internal rotation was measured as a functional reach in which the patient was asked to reach behind her back and up the spine as far as possible (shoulder extension, adduction, and internal rotation). The measurement was recorded as the distance where the superior most fingertip reached on the spine. Compensatory movements were de-emphasized. According to Mullaney et al., goniometric measurements of the shoulder are a reliable method to track outcomes over time.13

The initial evaluation concluded that the patient had concurrent signs and symptoms of post-operative shoulder arthroscopy that consisted of bone spur removal and sub-acromial decompression. The patient was limited in shoulder range of motion. Although strength was not specifically assessed in the right shoulder, the patient demonstrated functional limitations in strength. The patient had pain upon palpation to the right anterior and lateral shoulder which was also consistent with the surgical operation.
Prognosis and Plan of Care

The patient was to be seen 2-3 times a week for 45-minute treatment sessions for 8 weeks. There were a few occasions when the patient did not attend scheduled appointments due to personal conflicts. The primary problems included pain, decreased activity level, decreased tolerance to activity and work, the need for a supervised and guided exercise program, poor functional abilities related to the right shoulder, and impaired right shoulder range of motion and strength. The goals of therapy were to decrease pain to 2/10 at all times, normalize range of motion and strength, improve functional mobility, and return to prior level of function. The interventions to be included in the plan of care were therapeutic exercise and activity, neuromuscular rehabilitation, manual therapy, and modalities to address pain, inflammation, blood flow, and tissue healing.

The patient’s prognosis was good due to the simplicity of the case and the patient's motivation to return to prior level of function. Upon discharge, the patient was to meet all goals and improve functional abilities related to the Quick DASH.
CHAPTER III

INTERVENTION

The patient was seen for eight weeks and a total of 14 visits. Following the initial evaluation, postural education was emphasized by verbally explaining and demonstrating proper posture. Postural education was appropriate with this patient due to her rounded shoulders which resulted from working as a computer programmer for numerous years. Improper posture decreases the amount of range of motion in the glenohumeral joint before impinging on the acromion process. When the rounded shoulder posture becomes a habit, the tendinous structures may also become damaged. The goal of achieving optimal posture is to increase the subacromial space to allow proper mechanics in dynamic movement therefore to prevent impingement.

The first two weeks of treatment included visits one through five. The patient completed the exercises for each given visit (Table 4). The patient started with the pendulum exercise (Figure 1). Pendulums produce passive motion by bending the upper trunk at the waist while standing, and supporting the upper trunk with the left arm on a table. The patient then shifts their body clockwise to elicit passive movement to the right shoulder for 20 rotations. This was repeated in the counterclockwise direction as well. Pendulums were followed by active range of motion of the right shoulder into flexion (Figure 8), external rotation (Figure 9), and abduction (Figure 10). In left side-lying, passive right shoulder extension was performed. Passive range of motion was performed during visits two through five in all shoulder directions in supine, besides
extension and adduction. The patient performed six-way right shoulder isometrics (Figures 2-7). Standing in a doorway, the patient performed isometric contractions in shoulder flexion, extension, abduction, internal rotation and external rotation by pushing appropriately for each motion into the door frame or wall. For shoulder adduction, the patient squeezed a pillow. The elbow was positioned at 90° of flexion and the shoulder was in neutral for all motions. Isometric contractions were held for five seconds and repeated ten times for two sets. Manual therapy was utilized during visit three, which consisted of inferior and posterior glides. For both of the glides, the patient was positioned in supine, and the shoulder in open packed position. The mobilizations administered were grade III forces that were progressed to grade IV. Right shoulder flexion active range of motion was initiated during visit three (Figure 8). Starting on the fifth visit and continuing until discharge, the patient began the treatment session by warming up on the upper arm bike ergometer (UBE) for five minutes in sitting position. The purpose of the UBE was to warm up the tissues of the upper extremities and to increase glenohumeral range of motion. Also initiated on the fifth visit was resisted shoulder internal (Figure 11) and external rotation (Figure 12) in standing. The first two weeks of interventions were appropriate due to the consideration of tissue healing after surgery.

According to the systematic review by Michener et al., therapeutic exercise to strengthen the rotator cuff and scapular muscles are effective rehabilitation techniques to improve functional activity and decrease pain. Also, interventions to stretch the soft
tissues of the anterior and posterior shoulder accommodate a decrease in functional limitations. The addition of joint mobilization techniques increases the overall effectiveness of treatment. The episode of care with this patient emphasized therapeutic exercise and manual therapy, therefore agreeing with the evidence of the systematic review.

In any shoulder rehabilitation program, emphasis on restoring normal scapulohumeral rhythm should be addressed. Specific musculature targeted should include the trapezius, serratus anterior, and the rotator cuff for regaining the normal rhythm of 120° of humeral elevation to 60° scapular upward rotation. Also, a balance between superior and inferior translating forces of the humeral head during elevation is of importance.

Moseley et al. performed a study with nine subjects whom underwent electromyographic (EMG) testing during 16 different exercises. They found that rowing, shoulder horizontal extension, extension, and abduction exercises produced optimal EMG activity in the trapezius. Exercises that elicited optimal serratus anterior EMG activity included shoulder elevation, such as flexion, abduction or scaption. In another study, 30 healthy subjects performed ten exercises for the trapezius and serratus anterior musculature while EMG was monitored. This research suggested that the shrug, shoulder horizontal extension with external rotation in prone, and prone overhead raise is best for the upper, middle and lower trapezius, respectively, and for maximal serratus anterior activation, any exercise involving
significant scapular upward rotation was ideal.\textsuperscript{16} This was found different from an EMG study where the serratus anterior forward punch exercise was recommended.\textsuperscript{17}

During dynamic movement, the humeral head must maintain proper positioning in the glenoid fossa. When the musculature acting on the glenohumeral joint becomes disproportionate, the humeral head tends to translate superior resulting in impingement. Addressing the musculature that depresses the humeral head is crucial. Muscles that inferiorly translate the humeral head include the infraspinatus, teres minor, and subscapularis. Therefore, exercises that address this musculature is of importance for an efficient force couple between the deltoid and rotator cuff muscles.

In a study of ten healthy subjects, EMG activity of the infraspinatus and teres minor was greatest during side lying shoulder external rotation while activation of the deltoid was minimal.\textsuperscript{18} The optimal infraspinatus and subscapularis positions are shown to be at lower abduction angles, whereas arm abduction has little effect on teres minor activity.\textsuperscript{19,20}

Another study examined 15 subjects in a healthy group and 15 subjects in a group diagnosed with subacromial impingement.\textsuperscript{21} After EMG analysis of the group with subacromial impingement, they found decreased activity of the rotator cuff and deltoid. Infraspinatus, subscapularis, and middle deltoid were found significantly decreased compared to the healthy counterparts.\textsuperscript{21}

This literature supports exercises that target muscles of the shoulder girdle, deltoid, and most importantly, the rotator cuff. The exercises described were selected
for this episode of care to target specific muscles while also eliciting optimal activation to restore scapulohumeral rhythm and decrease subacromial impingement.

For weeks three and four, the patient started with the UBE each day and the given exercises per each visit (Table 5). Also, a passive stretch was performed by the therapist to the right shoulder on visits six through eight. The supine flexion was progressed to a yellow Theraband™ (Figure 21). Side lying external rotation (Figure 13), and side lying abduction (Figure 14), were also progressed using two to three pound dumbbells. New exercises include side lying shoulder flexion (Figure 20), using a one-pound dumbbell, and standing flexion and extension (Figures 15-16) using yellow theraband™. Other exercises initiated include standing row, shoulder press, bicep curl, triceps extension, prone superman and shoulder extension with scapular adduction (Figures 17-19, 22-24). At the end of visits seven and eight, the patient was given education on application of an Activa® iontophoresis patch. Iontophoresis uses an electrical current to transport a solute via a transdermal route. The patch delivered 1.5 mL dexamethasone for 2.5 hours at 80 mA per min and was applied to the anterior shoulder and bicipital groove, where she had the most discomfort. Dexamethasone is a corticosteroid drug used to combat inflammation. The patient was informed to remove the Activa® patch if side effects were experienced and then contact our office.

During weeks five and six, the patient performed the existing exercise routine (Table 6). On visits nine and ten, passive stretching was performed on the right shoulder in all directions with emphasis on shoulder extension and internal rotation.
There was no progression in supine flexion with the theraband™. The resistance was increased for side-lying external rotation and abduction using three to four pounds. Also, standing shoulder flexion (Figure 25) and shoulder press (Figure 26) progressed using one to two pound dumbbells instead of theraband™. The prone exercises were progressed by increasing to three sets. New exercises initiated include serratus anterior punch (Figure 27), wall lift-off (Figure 28), and standing abduction (Figure 29). For the standing serratus punch, I held a green theraband™, and stood behind the patient while the patient held onto the other end of the band then punched forward, emphasizing scapular abduction. It is reported that patients with shoulder impingement have decreased EMG activity in the serratus anterior versus increased EMG activity in the trapezius, therefore exercises to elicit serratus anterior are appropriate for ideal scapular upward rotation.\textsuperscript{22} For the standing shoulder flexion wall lift off, the patient stood facing a wall with her arm in full flexion and attempted to lift her hand off the wall, only moving at the shoulder in order to decrease compensatory movements. A progress evaluation was performed on the 11\textsuperscript{th} visit (Table 2). After the evaluation the patient performed the current exercises (Table 6), corresponding to the 11\textsuperscript{th} visit.

The last two weeks, seven and eight, consisted of only one visit per week. As usual, the patient started on the UBE, and passive stretching was administered. The patient performed the exercises shown in Table 7 that correspond to the visits. Exercises that were not progressed from the previous visits were standing flexion, abduction, shoulder press, and wall lift off. Exercises that were progressed included
side-lying external rotation, side-lying abduction, side-lying flexion, serratus anterior punch, standing row, and standing internal and external rotation. Side-lying exercises increased the pounds of weight lifted. The serratus anterior punch, standing row, and internal and external rotation exercises increased the resistance band. The only new exercise performed was standing shoulder horizontal abduction (Figure 30), which was performed with a green theraband™.
CHAPTER IV

OUTCOMES

Over the 8 weeks of therapy, the patient increased strength, range of motion, and functional abilities, while at the same time decreasing pain. Consistently throughout the episode of care, the patient had complaints of increased soreness in her shoulder either after an increase in activity or after an increase in exercise intensity. After week 4, the patient had the most trouble in the functional internal reach position, otherwise her pain was starting to decrease. At week 6 during the progress note, the patient improved the Quick DASH to 4/100. The patient had also progressed her right shoulder range of motion. The patient’s range of motion findings over the course of treatments can be found in Figure 2. Strength was also assessed on the progress visit for the first time. The patient had limitations in right shoulder flexion (4+/5), abduction (4+/5), and external rotation (4/5). Internal rotation of the shoulder was equal bilaterally. According to the patient, work activities were not bothering her, but there was anterior pain with end range positions and with functional internal reach or extension motions.

At discharge, the patient decreased her activity pain from 6/10 to 2/10 with the pain descriptor as a dull or achy feeling and changing to a light stretch feeling. She had no pain with rest, which decreased from 3/10 pain. Improvements in functional activity were demonstrated with the Quick DASH, as the patient decreased functional limitations from 39/100 initially to 2/100 at discharge. The only limitations in range of motion were in the right shoulder abduction and functional internal reach positions, otherwise range
of motion was equal bilaterally. The patient's shoulder range of motion at discharge can be found in Table 3. Right shoulder strength measured at 4+/5 in the positions of right shoulder flexion, abduction, and external rotation. Internal rotation strength was strong and equal bilaterally. As far as meeting the goals, the patient did not meet normal range of motion or strength. The patient was satisfied with the progress made and suggested to complete her rehabilitation at home. There were no limitations in daily activities per the patient, and no limitations at work. The only complaint the patient left with was functional internal reach pain, which only bothered her when she had to get dressed.
CHAPTER V

DISCUSSION

This case report describes physical therapy intervention of a 53-year-old patient after a subacromial decompression and poor outcomes from conservative treatment for shoulder impingement. The purpose was to explore the outcomes of a patient who experienced both conservative and post-surgical physical therapy and discuss clinical decision making in these episodes of care.

According to Brox et al., patients should attempt conservative physical therapy for 6 months prior to seeking surgical intervention for SAIS.\(^9\) A more recent publication suggests surgical evaluation as soon as 3 months after poor outcomes from conservative interventions.\(^{23}\) Surgery is performed in about 30% of all patients when conservative treatment fails.\(^{24}\) In the case of significant pathology, immediate surgical intervention is warranted. For instance, people with stage II SAIS may benefit from initial surgery more so than with conservative treatment.\(^{25}\) This may be due to the extent of the pathology in stage II. In the study by Haahr et al., 90 subjects with either stage I or II SAIS, with the majority being stage II, were divided into a subacromial decompression surgery group and an exercise group. The results concluded surgery was not superior to an exercise program.\(^{25}\) The study did not divide the subjects into stages of SAIS, but advised future studies to do so. In this case study, the patient was not diagnosed with a specific stage of SAIS, but may have very well been in stage II, which the patient could have had better outcomes initially undergoing surgery right away to save time and
money in the process.

In the study performed by Brox et al., they examined 125 subjects that were specifically in stage II SAIS. They compared effectiveness of subacromial decompression, exercise, and a placebo. Both the surgical and exercise groups improved significantly and equally compared to the placebo group, therefore surgery or exercise produce relatively the same outcomes. They did not state that stage II SAIS patients may benefit from initial surgery. Literature suggests that surgical outcomes and exercise outcomes are significantly equal. There may be a fine line within stage II SAIS patients when determining surgery versus therapy. Early diagnostics need to be found to provide an appropriate direction of care for people with SAIS while considering each specific case details.

Another factor for deciding on conservative care over surgical intervention initially would be the economic impact on the patient. For the conservative episode of care, the total cost was approximately $882. Depending on many factors, the cost for a subacromial decompression could reach up to $7,000. Post-operative physical therapy costs for this patient were $1,384. The patient had to pay an estimated $570 when insurance deductibles and co-pays for both conservative and post-operative therapy were considered. Also, indirect costs must be considered, such as time lost from work during both episodes of care. This cost differential between conservative and surgical intervention may be the primary reason for many patients to seek physical therapy prior to surgery. Another justification for seeking conservative care includes beneficial
outcomes of conservative physical therapy being similar to subacromial decompression as mentioned previously.\textsuperscript{5,7,8,25} Since the outcomes are usually the same between both interventions, it is reasonable to implement the least expensive plan of care and try to save time in the process.

One limitation to the post-operative episode of care was that the patient waited 3 weeks until receiving physical therapy. Improved outcomes may have occurred if physical therapy intervention would have been initiated on the day of surgery. In a study done by Klintberg et al., a traditional group and progressive group were studied on interventions after subacromial decompressions.\textsuperscript{26} The traditional group started with active assistive range of motion (AAROM) exercises on the day of surgery, dynamic exercises for the rotator cuff after six weeks and strengthening exercises after eight weeks. The progressive group started AAROM and dynamic exercises for the rotator cuff on the day of surgery and strengthening exercises after six weeks. The outcome measures were pain, patient satisfaction, AROM, and muscular strength. They found that there were significant improvements in pain during activity and at rest, in range of motion of extension and abduction, in strength of external rotation, and in function in both groups. In the progressive group, pain decreased more quickly but both groups were pain-free at six months. This literature may demonstrate the importance of early activation of the rotator cuff musculature on pain after subacromial decompression.

A recent study suggests a specific exercise strategy for patients with SAIS.\textsuperscript{27} The study was a randomized controlled trial with 102 patients with persistent SAIS in which
conservative treatment had failed. All subjects received a corticosteroid injection and proceeded to their appropriate exercise program. There was a control and specific exercise group. The control group consisted of six unspecific exercises for the neck and shoulder without external loading and repeated ten times for the movements, and three times for stretches twice a day. The exercises were not progressed. The specific group focused on eccentric strengthening of the rotator cuff and both concentric and eccentric strengthening of the scapular musculature. There were six different exercises that were performed 15 times for three sets twice a day for eight weeks. Each exercise was individually progressed. They found that there was significant improvement or success in the specific exercise group, thus solidifying a need for a specific program of eccentric and concentric exercises for the rotator cuff and scapular stabilizers.

Another limitation was that the patient did not follow through with supervised physical therapy visits to complete her goals due to the patient’s satisfaction of therapy at the time. There was no follow-up with the patient to identify progress she had made or possible complications she may have had. The patient was offered to contact the clinic if she had any questions or concerns.

Reflective Practice

Although the patient’s outcomes were at a satisfactory level at the time of discharge, I believe there could have been improvements throughout the case management. Initially, posture was addressed during the first few visits due to its importance in SAIS. Due to the patient working a desk job, she could easily return to
poor posture that could lead to complications in the future. With future patients with SAIS, I will emphasize posture throughout the episode of care. The exercise intensity may have been under prescribed and not progressed appropriately at times. Addressing limitations earlier with consistency should have produced a greater benefit to the patient. I could have utilized manual therapy more for the range of motion limitations. In hindsight, I felt the exercises seemed monotonous for the patient. I would incorporate proprioceptive exercises in future patients with SAIS. Another area that I could have inquired upon, regarding exercise, more often was her home exercise program.
APPENDIX
Table 1. Initial Shoulder Range of Motion

<table>
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<tr>
<td>Internal Rotation</td>
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<td>Gluteals T5 or Greater</td>
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Table 2. Week 6 Progress Visit Shoulder Range of Motion

<table>
<thead>
<tr>
<th></th>
<th>Right</th>
<th>Left</th>
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<td>Flexion</td>
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<td>Extension</td>
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<td>60°</td>
</tr>
<tr>
<td>Abduction</td>
<td>140°</td>
<td>160°</td>
</tr>
<tr>
<td>External Rotation</td>
<td>65°</td>
<td>65°</td>
</tr>
<tr>
<td>Internal Rotation</td>
<td>T12</td>
<td>T5 or Greater</td>
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Table 3. Week 8 Discharge Shoulder Range of Motion

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<thead>
<tr>
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<th>Right</th>
<th>Left</th>
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<tr>
<td>Flexion</td>
<td>150°</td>
<td>150°</td>
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<td>Extension</td>
<td>60°</td>
<td>60°</td>
</tr>
<tr>
<td>Abduction</td>
<td>154°</td>
<td>160°</td>
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<tr>
<td>External Rotation</td>
<td>65°</td>
<td>65°</td>
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<tr>
<td>Internal Rotation</td>
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### Table 4. Weeks 1-2 Exercise Interventions

<table>
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<th>Exercise</th>
<th>Intensity/Time</th>
<th>Reps/Sets</th>
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<tr>
<td>UBE (Visit 5)</td>
<td>5 minutes</td>
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<tr>
<td>Pendulums (Visits 1-5)</td>
<td>5 second hold</td>
<td>20x1 each</td>
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<tr>
<td>6-Way Isometrics (Visits 1-5)</td>
<td>5 second hold</td>
<td>10x2 each</td>
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<tr>
<td>Supine Right Shoulder Flexion AROM (Visits 3-5)</td>
<td>5 minutes</td>
<td></td>
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<tr>
<td>Side Lying Right Shoulder Abduction &amp; External Rotation AROM (Visits 3-5)</td>
<td>Yellow Theraband™</td>
<td>10x2</td>
</tr>
<tr>
<td>Standing Right Shoulder Internal &amp; External Rotation (Visit 5)</td>
<td>Yellow Theraband™</td>
<td>10x2</td>
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### Table 5. Weeks 3-4 Exercise Interventions

<table>
<thead>
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<th>Exercise</th>
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<th>Reps/Sets</th>
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<tbody>
<tr>
<td>UBE (Visits 6-8)</td>
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<tr>
<td>Supine Right Shoulder Flexion (Visits 7-8)</td>
<td>Yellow Theraband™</td>
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<tr>
<td>Side Lying Right Shoulder Abduction &amp; External Rotation (Visits 6-8)</td>
<td>2-3#</td>
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<td>Side Lying Right Shoulder Flexion (Visits 7-8)</td>
<td>1#</td>
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<td>Standing Right Shoulder Flexion, Extension, Internal &amp; External Rotation (Visit 6)</td>
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<td>10x3</td>
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<tr>
<td>Standing Row (Visit 6)</td>
<td>Yellow Theraband™</td>
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<td>Standing Right Shoulder Press (Visit 8)</td>
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<td>10x1</td>
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<tr>
<td>Standing Right Bicep Curl (Visit 8)</td>
<td>Blue Theraband™</td>
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<td>Standing Right Triceps Extension (Visit 8)</td>
<td>2x Blue Theraband™</td>
<td>10x1</td>
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<tr>
<td>Prone Superman (Visits 7-8)</td>
<td>5 second hold</td>
<td>10x2</td>
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<tr>
<td>Prone Shoulder Extension with Scapular Adduction (Visits 7-8)</td>
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<td>10x2</td>
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### Table 6. Weeks 5-6 Exercise Interventions

<table>
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<tr>
<td>UBE (Visits 9-12)</td>
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<td>Supine Right Shoulder Flexion (Visit 9)</td>
<td>Yellow Theraband™</td>
<td>10x1</td>
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<td>Side Lying Right Shoulder Abduction &amp; External Rotation (Visit 9)</td>
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<td>Standing Abduction (Visit 12)</td>
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<td>Standing Right Shoulder Press (Visits 9, 10, 12)</td>
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<td>10x2</td>
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<td>Serratus Anterior Punch (Visits 9-10)</td>
<td>Green Theraband™</td>
<td>10x2</td>
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<tr>
<td>Wall Lift Off (Visits 9, 10, 12)</td>
<td>5 second hold</td>
<td>10x3</td>
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<tr>
<td>Prone Superman (Visits 9-11)</td>
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### Table 7. Weeks 7-8 Exercise Interventions

<table>
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<td>UBE (Visits 13-14)</td>
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<tr>
<td>Side Lying Right Shoulder External Rotation (Visits 13-14)</td>
<td>4-5#</td>
<td>10x3</td>
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<tr>
<td>Side Lying Right Shoulder Abduction (Visits 13-14)</td>
<td>3-5#</td>
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<td>Side Lying Right Shoulder Flexion (Visits 13-14)</td>
<td>2#</td>
<td>10x3</td>
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<td>Standing Right Shoulder Flexion (Visits 13-14)</td>
<td>1-2#</td>
<td>10x3</td>
</tr>
<tr>
<td>Standing Abduction (Visits 13-14)</td>
<td>1-2#</td>
<td>10x3</td>
</tr>
<tr>
<td>Standing Right Shoulder Press (Visits 13-14)</td>
<td>2#</td>
<td>10x3</td>
</tr>
<tr>
<td>Serratus Anterior Punch (Visit 13)</td>
<td>Blue Theraband™</td>
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<tr>
<td>Wall Lift Off (Visits 13-14)</td>
<td>5 second hold</td>
<td>10x3</td>
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<tr>
<td>Standing Horizontal Abduction (Visits 13-14)</td>
<td>Green Theraband™</td>
<td>10x3</td>
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<td>Standing Row (Visits 13-14)</td>
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<tr>
<td>Standing Internal &amp; External Rotation (Visit 14)</td>
<td>Green Theraband™</td>
<td>10x2</td>
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</table>
Figure 1. Pendulum Exercise of the Right Shoulder
Let arm move in a circle by rocking body weight in circular pattern. Repeat clockwise and counterclockwise.

Figure 2. Isometric Right Shoulder Flexion
Facing the wall and using it to provide resistance, press fist forward into wall. Keep shoulder in neutral and elbow at 90°.
Figure 3. Isometric Right Shoulder Extension
Facing away from wall, press elbow back into wall. Keep shoulder in neutral and elbow at 90°.

Figure 4. Isometric Right Shoulder Abduction
With right arm closest to wall facing side-ways, press into the wall as shown. Keep shoulder in neutral and elbow at 90°.
Figure 5. Isometric Right Shoulder Adduction
Squeeze the pillow while holding pillow as shown. Keep shoulder in neutral and elbow at 90°.

Figure 6. Isometric Right Shoulder Internal Rotation
Using door frame to provide resistance, press palm of hand into door frame. Keep shoulder in neutral and elbow at 90°.
Figure 7. Isometric Right Shoulder External Rotation
Using door frame to provide resistance, press back of hand into door frame. Keep shoulder in neutral and elbow at 90°.

Figure 8. Supine Right Shoulder Flexion AROM
Lying on your back, lift your arm up and over head as far as tolerated. Keep elbow straight and lead motion with your thumb.
Figure 9. Side Lying Right Shoulder External Rotation AROM
While lying on your left side, lift arm up as shown as far as tolerated. Do not use weight. Keep shoulder in neutral and elbow tucked at 90°.

Figure 10. Side Lying Right Shoulder Abduction AROM
Lying on your left side, lift arm straight up as shown as far as tolerated. Keep elbow straight and lead motion with your thumb.
Figure 11. Standing Theraband™ Right Shoulder Internal Rotation
Attach band to a stable object, such as a door knob. Stand with right side closest to the band. With band in right hand, pull band in toward your stomach as shown. Keep shoulder in neutral, elbow tucked at 90°, and thumb pointing up.

Figure 12. Standing Theraband™ Right Shoulder External Rotation
Attach band to a stable object, such as a door knob. Stand with left side closest to the band. With band in right hand, pull band in away as shown. Keep shoulder in neutral, elbow tucked at 90°, and thumb pointing up.
Figure 13. Left Side Lying Right Shoulder External Rotation with Dumbbell
While lying on your left side, lift arm up as shown as far as tolerated with weight in hand. Keep shoulder in neutral and elbow tucked at 90°.

Figure 14. Left Side Lying Right Shoulder Abduction with Dumbbell
Lying on your left side, lift arm straight up as shown as far as tolerated with weight in hand. Keep elbow straight and lead motion with your thumb.
Figure 15. Standing Theraband™ Right Shoulder Flexion
Attach band to a stable object, such as a door knob. Stand facing away from band and hold band in right hand. Lift right arm straight forward and up over head as tolerated. Keep elbow straight and lead with your thumb pointing up.

Figure 16. Standing Theraband™ Right Shoulder Extension
Attach band to a stable object, such as a door knob. Stand facing toward band and hold band in right hand. Pull band straight back with right arm as shown. Keep elbow straight and keep thumb pointing forward.
Figure 17. Standing Theraband™ Standing Row
Tie a knot in middle of band and attach band as shown in door. Stand facing door and grasp each end of the band with both hands as shown. Pull band back with arms, leading with elbows, while squeezing shoulder blades together.

Figure 18. Prone Superman
Lying in prone position, raise arms in front of head towards ceiling as shown with no weight. Concentrate on keeping shoulder blades down. Hold for five seconds at end range.
Figure 19. Prone Right Shoulder Extension with Scapular Adduction and Depression
Lying in the prone position with hands down by waist, raise arms up towards ceiling with no weight. Squeeze shoulder blades together and down during the motion. Hold for five seconds at end range.

Figure 20. Right Shoulder Flexion in Left Side Lying
Lying on your left side and holding weight in right hand, start from your waist and move right arm towards head making sure arm is parallel to the floor throughout motion. Concentrate on maintaining shoulder blade stability and keep thumb pointing towards head.
Figure 21. Supine Theraband™ Right Shoulder Flexion
In the supine position, attach band to foot as shown. Hold band in right hand and pull band over head as shown. Keep elbow straight and lead motion with your thumb.

Figure 22. Standing Theraband™ Right Shoulder Press
In standing, attach band to foot or step on band with foot. Hold band only in right hand and press up towards ceiling as shown. Elbow should be straight at end of motion.
Figure 23. Standing Bicep Curl with Theraband™
In standing, attach band to foot or step on band with foot. Hold band with right hand. Perform a curl by only bending at elbow, bringing hand toward the ceiling as shown.

Figure 24. Standing Theraband™ Right Triceps Extension
In standing, attach band to stable object at shoulder height. Hold band with right hand. Starting with a bent elbow, pull band by straightening your elbow as shown.
Figure 25. Standing Dumbbell Right Shoulder Flexion
In standing, start by holding weight in right hand by your waist. Lift weight straight forward, up to shoulder height as shown. Keep elbow straight and lead motion with thumb pointing up.

Figure 26. Standing Dumbbell Right Shoulder Press
In standing, hold weight only in right hand and press up towards ceiling as shown. Elbow should be straight at end of motion.
Figure 27. Standing Theraband™ Right Serratus Anterior Punch
Attach band to stable object behind or have someone hold the band. Facing away from band, hold the band with right hand and punch forward as shown. Concentrate on your shoulder blade moving forward with the motion.

Figure 28. Standing Bilateral Shoulder Flexion Wall Lift Off
In standing, move arms up on wall as shown. Feet and body should be 2 inches from wall. Lift both arms of the wall as shown and hold for five seconds. Maintain a straight elbow throughout motion.
Figure 29. Standing Bilateral Shoulder Abduction
In standing, hold weights in both hands. Start exercise with hands down by waist and raise arms out to the sides of your body as shown. Maintain a straight elbow and keep thumbs pointing up throughout motion.

Figure 30. Standing Theraband™ Right Shoulder Horizontal Abduction
In standing, attach band to solid object. Stand with left side of body toward the band. Hold band with right hand and pull across chest, away from body as shown. Maintain a straight elbow throughout motion.
REFERENCES


10. Gummesson C, Ward MM, Atroshi I. The shortened disabilities of the arm, shoulder and hand questionnaire (QuickDASH): Validity and reliability based on responses within the full-length DASH. BMC Musculoskelet Disord. 2006;7:44.


