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Effects of a Physical Therapy Program for a Patient with Shoulder Adhesive Capsulitis

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EFFECTS OF A PHYSICAL THERAPY PROGRAM FOR A PATIENT WITH SHOULDER ADHESIVE CAPSULITIS

by

Renee Aune
Bachelor in Science of Physical Therapy
University of North Dakota, 2008

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
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This Scholarly Project, submitted by Renee Aune 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.

(Graduate School Advisor)

(Chairperson, Physical Therapy)
PERMISSION

Title Effects of a Physical Therapy Program for a Patient with Shoulder Adhesive Capsulitis

Department Physical Therapy

Degree Doctor of Physical Therapy

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Date ______________________
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I would like to acknowledge all of those who helped me prepare this paper, including but not limited to my parents, peers, professors and advisor, Dr. Mark Romanick. I am appreciative of the support I have received while pursuing my education and career and the time they have all given to help facilitate my learning.
ABSTRACT

**Background & Purpose:** Adhesive capsulitis is a musculoskeletal condition that has a disabling capability. The physiological changes that occur within the relevant connective tissue drive the intervention for functional improvement. There is often recovery, but it is not known whether a targeted intervention aimed at this type of patient is better than another regarding recovery. The purpose of this case report is to examine the multiple effects of a physical therapy intervention program with emphasis on improved function and quality of life.

**Case Description:** A single-case study of a 56-year-old female demonstrating the effects of a physical therapy program in treating shoulder adhesive capsulitis. She was unable to perform her daily routine of instructing Chinese exercise dance, so treatment involved hot packs, stretching, joint mobilization, and strengthening.

**Intervention:** Intervention included hot packs, ultrasound, scapular stability training, glenohumeral stability training, passive range of motion, active range of motion, soft tissue and joint mobilization. The patient was seen two or three times per week for five weeks.

**Outcomes:** The patient achieved substantial increases in shoulder range of motion, shoulder strength and overall improvements in function and activities of daily living. Because of this progress, the patient was able to be discharged from physical therapy and return to independent living at home within 4 weeks.
Discussion: This patient experienced significant gains in motion following physical therapy intervention. More research into intervention for adhesive capsulitis is needed to establish a gold standard.
CHAPTER I

BACKGROUND AND PURPOSE

Adhesive capsulitis, also referred to as frozen shoulder, is the result of inflammation, scarring, thickening, and shrinkage of the capsule that surrounds the shoulder joint. It limits passive and active range of motion. Any injury to the shoulder, including tendinitis, bursitis, and rotator cuff injury, can lead to a frozen shoulder. Long-term immobility of the shoulder joint, such as a broken arm, may put people at risk as well. People who have certain medical conditions, such as diabetes, overactive thyroid (hyperthyroidism), underactive thyroid (hypothyroidism), cardiovascular disease, tuberculosis and Parkinson’s disease, appear to be predisposed to develop frozen shoulder.1 By far the most common comorbid condition accompanying frozen shoulder is diabetes mellitus, with an incidence of 10% to 36% and typically develops in females in her 5th to 7th decade of life, or 40 to 65 years of age.2

There are three stages to a frozen shoulder. Stage one, also known as the freezing stage has a slow onset of shoulder pain. As the pain progresses the shoulder starts to lose motion. Stage two is the frozen stage when the shoulder continues to be restricted in motion, but pain begins to decrease. Stage three is the thawing stage when the shoulder motion gradually returns.3

A frozen shoulder is diagnosed during examination when the shoulder range of motion is significantly limited, either with passive or active movements. Primary disease involving the shoulder can be diagnosed with history, examination, x-ray of the shoulder,
or blood testing. Diagnosis can be confirmed by arthrography (an x-ray with a contrast dye injected into the shoulder joint to show the distinctive shrunken shoulder capsule). Magnetic resonance imaging (MRI) is used to visualize the internal structure and function of the body. It provides a greater contrast of the soft tissues of the body and is therefore useful in evaluating the shoulder tissues.

Arthritis, or inflammation of the shoulder joint or muscles around it, can cause swelling, pain, or stiffness of the joint that can mimic the range of motion limitation of a frozen shoulder. Injuries to tendons around the shoulder (tendons of the rotator cuff) can limit range of motion but generally not in all directions like a frozen shoulder. Tendon injury with examination may indicate passive range of motion (PROM) into the capsular end feel. Capsular end feel is the end feel described for range of motion limited at the end by the joint capsule. The physical therapist is able to move the joint beyond the range the patient can independently, whereas in frozen shoulder, limitations to passive and active ROM are similar.

Treatment of a frozen shoulder requires aggressive combination of anti-inflammatory medication, cortisone injections, and physical therapy. Without aggressive treatment, a frozen shoulder can result in permanent motion restriction. Physical therapy treatment to restore function may include ultrasound, electrical stimulation, cold packs, range of motion, manual therapy, and strengthening exercises. It can take weeks to even months for recovery depending on the severity and stage of diagnosis. Individuals with frozen shoulders should avoid lifting heavy objects and avoid sudden jerking motions. Some patients’ shoulders may be resistant to treatment and therefore are candidates for release of the scar tissue by arthroscopic surgery or manipulation of the scarred shoulder.
to break up the scar tissue. With manipulation there is a chance of breaking the humerus; therefore a more conservative exercise program after the manipulation procedure is very important. The greatest likelihood of increased shoulder mobility and function will be with exercise. Frozen shoulder itself is often a self limiting process and can be difficult to treat. It often improves with the tincture of time and conservative treatment.\textsuperscript{4}

The purpose of this case report is to describe the aspects of a physical therapy program for a patient with shoulder adhesive capsulitis. This is done while acknowledging the physiological changes that occur with the diagnosis. The report aims to examine the multiple effects of a physical therapy intervention program with emphasis on improved function and quality of life.

This case study looks at the effects of a physical therapy intervention on an older adult patient who had left shoulder adhesive capsulitis. The patient was treated for approximately five weeks while at an outpatient facility, with a program primarily consisting of manual therapy and therapeutic exercises. With her increases in strength and range of motion the patient was able to be discharged home after the completion of her physical therapy program.
CHAPTER II

CASE DESCRIPTION

The patient is a 56-year-old right hand dominant female who had (L) shoulder pain for approximately 1 year and did not recall any incident or trauma to the shoulder that may have caused her pain and stiffness; however, she remembers noticing the pain while cooking one evening and has progressively worsened since. She and her husband are married with 2 grown children who do not live nearby. Both she and her husband are retired and are independent in the home and community. She enjoys participating in tai chi, as well as instructing Chinese exercise dance. Her past medical history is insignificant and she is overall a healthy woman with no problems. There is no alcohol or cigarette use and she enjoys any type of fitness (walking, dancing, and biking). She does not take any medication, prescribed or over the counter. Her husband attends every therapy session; because she cannot reach across her body to fasten her seatbelt and is unsafe driving on the roads, depending on him to drive her to and from physical therapy.

She had other treatments prior to receiving physical therapy. During the first week of her injury she received chiropractic care, which initially helped her symptoms, but in the long term her condition became progressively worse. She was seen in the emergency room the second week after symptoms arose. X-rays were taken in the emergency room with negative findings for anything dealing with her bones. She was also seen by an orthopedic surgeon shoulder specialist who found nothing that needed to be surgically repaired. The orthopedic surgeon suggested an injection; however, the patient declined
treatment. Since then the patient was seen by an acupuncturist in Thailand, whom she reports helped her pain but did not resolve her mobility symptoms. Her friend recommended that she see a physical therapist, and the patient spoke with her general practitioner for a referral. The disability of her shoulder and the amount of pain she was experiencing drove the patient to therapy. She was unable to instruct Chinese exercise dance for approximately 4 months prior to seeking physical therapy. Her goals were to increase her pain free range of motion in order to be able to move freely and participate in her activities, most importantly Chinese exercise dance, without pain.

**Examination, Evaluation, Diagnosis**

Patient was believed to be a candidate for skilled physical therapy services and was added to the case load. The physical therapist and I, the student physical therapist, accepted this patient for care due to her decrease in function, potential of at least a fair improvement, and ability to follow directions.

The examination identified no apparent muscle atrophy, asymmetries, or scapular winging; however, she had rounded shoulders and forward head posture. She complained of pain along the anterior shoulder that moved into her neck. Her pain was mainly in the left upper trapezius muscle and into her left lower cervical spine. She was unable to sleep through the night secondary to pain. Pain was rated on a 0-10 scale with 0 having no pain, and 10 being the worst possible pain. When the patient lies on her left side, she rates the pain at 5-6/10. At rest her pain rates 0/10. When reaching overhead, lifting anything weighted, and reaching back for her seat belt on the left side she rates her pain as 10/10.

With palpation of the left shoulder she had tenderness along the supraspinatus and subscapularis tendons. Grip strength was not measured using a grip dynamometer;
however it was measured by having the patient squeeze the therapist’s hands. If weakness or strength had been different from one side to the other, we would have performed manual muscle testing, or used a dynamometer to get a more accurate measurement.

Resisted isometric movements (RIMs) were tested to grossly assess muscle strength and determine whether the contraction was strong or weak and whether it was painless or painful. Grip strength was strong and pain free bilaterally. All RIMS at the shoulder and elbow were strong and pain free on the right side. Shoulder abduction and internal rotation provoked moderate pain on the left side in the shoulder. Elbow exercises provoked minimal pain in the left shoulder.

Reflexes were tested using a reflex hammer. Reflex tests are simple physical tests to determine nervous system function, and to make sure all parts of the pathway are functioning. The patient was seated at the edge of the plinth for testing. The biceps reflex, tests the C6 nerve root. Bilaterally, the biceps reflex was a grade 2 (normal). The triceps reflex which tests the C7 nerve root was also tested. Bilaterally, the triceps reflex was grade 2 (normal). Reflexes are tested using the tendon reflex grading scale found in figure 1.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Absent</td>
</tr>
<tr>
<td>1</td>
<td>Hypoactive-diminished</td>
</tr>
<tr>
<td>2</td>
<td>&quot;Normal&quot;</td>
</tr>
<tr>
<td>3</td>
<td>Hyperactive without clonus</td>
</tr>
<tr>
<td>4</td>
<td>Exaggerated with clonus</td>
</tr>
</tbody>
</table>
Sensation was tested grossly on the patient. She was supine with her eyes closed. The therapist used her hands to measure bilaterally any differences in light touch following the dermatome pattern. A dermatome is an area of the skin supplied by nerve fibers originating from a single dorsal nerve root. Sensation was normal bilaterally.

During the last few decades, increased focus has been placed on evidence-based medicine in the orthopedic disciplines. This development has made it essential to utilize instruments and methods that can detect clinically relevant changes. In shoulder research, measurements of range of motion (ROM) have been used as outcome measures in the vast majority of reported trials.\textsuperscript{5} Range of motion (ROM) was tested at the shoulder and the cervical spine. A goniometer (an instrument used to measure the angle of a body part) was used at the shoulder. At the cervical spine, restriction level and pain level were the objective measurement tools used. The patient was sitting in a chair for cervical ROM testing. She was tested bilaterally and her findings are as follows:

<table>
<thead>
<tr>
<th>Table 1. Initial Cervical ROM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left Rotation</td>
</tr>
<tr>
<td>--------------</td>
</tr>
<tr>
<td>45% restricted &amp; painful at end range in upper trapezius and into shoulder</td>
</tr>
</tbody>
</table>

Right rotation and extension of the cervical spine were not restricted (normal) and pain free. Shoulder ROM was measured while the patient was supine on the plinth, using a goniometer for all motions. Findings are as follows:
Table 2. Initial Shoulder ROM

<table>
<thead>
<tr>
<th>Forward Flexion</th>
<th>Abduction</th>
<th>Scaption</th>
<th>External Rotation (Prepositioned in 90° abduction)</th>
<th>Internal Rotation (Prepositioned in 90° abduction)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L) AROM=125°</td>
<td>(L) AROM=100°</td>
<td>(L) AROM=115°</td>
<td>(L) PROM=50°</td>
<td>(L) PROM=65°</td>
</tr>
<tr>
<td>(L) PROM=120°</td>
<td>(L) PROM=95°</td>
<td>(L) PROM=125</td>
<td>(R) PROM=90</td>
<td>(R) PROM= 85</td>
</tr>
<tr>
<td>(R) AROM=185</td>
<td>(R) AROM=150</td>
<td>(R) AROM=165</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Special tests were performed to rule out other pathologies of the shoulder, such as tendonitis, rotator cuff injury, impingement, and bursitis. Examination tests for other shoulder abnormalities can also be positive. For example, testing for impingement may be positive with a Hawkins or a Neer test; however, the pain is likely from the intrinsic process of impingement or capsular stretch rather than from adhesive capsulitis. Tests and outcomes are listed in Table 3.

The Hawkins-Kennedy test is indicative of impingement between the greater tuberosity of the humerus against the coracohumeral ligament, trapping all structures which intervene. A positive test is pain located at the subacromial space. The Neer test is indicative of impingement by elevating the arm in external or internal rotation, causing critical areas to pass under the coracoacromial ligament or anterior acromion causing impingement of the shoulder. A positive test is pain located at the subacromial space or anterior edge of acromion. A compilation and critique on diagnostic accuracy of individual orthopedic physical examination tests to allow clinicians to judge if these tests were valuable to their practice produced the following pooled sensitivity and specificity.
for the Hawkins-Kennedy and Neer tests: Hawkins-Kennedy test was 0.79 (95% confidence interval (CI) 0.75 to 0.82) and 0.59 (95% CI 0.53 to 0.64), respectively. The Neer test was 0.79 (95% CI 0.75 to 0.82) and 0.53 (95% CI 0.48 to 0.58), respectively. However, the pooled diagnostic odds ratio (DOR) for both tests is around 1 and the 95% confidence interval crosses 1 indicating that neither test has diagnostic utility for impingement. The area under the curve (AUC) for the Hawkins-Kennedy test is 0.76 (95% CI 0.72 to 0.80) and for the Neer test is 0.74 (95% CI 0.70 to 0.78) confirming the limited usefulness of these tests in diagnosis of impingement. The Empty Can test tests the integrity of the supraspinatus tendon. A positive test is pain located at the subacromial region and/or weakness. Several tests to assist in the diagnosis of rotator cuff impairment have been described; however, controversy still exists as to the accuracy of these tests, including the empty can test. A study was conducted to determine the reliability of the rotator cuff muscle tests. Reliability was tested using sensitivity and specificity tests. The sensitivity for all tests, including the empty can test was high (80%), but the specificity was low (20% to 40%), implying that a large number of false positive diagnoses can be made. The manual muscle tests were not as reliable as expected, but concurrent pathologies may be the main factor influencing the results. The empty can test could be recommended in predicting a torn supraspinatus tendon. This confirms the usefulness of the empty can test in ruling out a supraspinatus tendon tear, and helps confirm the diagnosis of adhesive capsulitis. Pain during ROM may be the only physical finding. Usually abduction and external rotation are most severely affected. Scapulothoracic motion is not affected with this diagnosis. Diagnostic criteria include loss of 30° external
rotation and having less than 130° of flexion. These physical exam findings along with ruling out other pathologies confirmed our diagnosis of adhesive capsulitis.

<table>
<thead>
<tr>
<th>Table 3. Special Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Performed</td>
</tr>
<tr>
<td>Hawkins-Kennedy</td>
</tr>
<tr>
<td>Empty Can</td>
</tr>
<tr>
<td>Neer Impingement</td>
</tr>
</tbody>
</table>

After ruling out many other shoulder pathologies that may have led to her problem, and observing the significant loss in shoulder range of motion, especially abduction and rotation, we arrived at the diagnosis of left upper extremity adhesive capsulitis.

Her problem list is comprised of the following:

1. Decreased left upper extremity (UE) ROM, specifically the glenohumeral joint
2. Decreased strength in left UE
3. Increased pain with left UE shoulder motions
4. Unable to sleep through the night
5. Decreased cervical range of motion

She was unable to instruct Chinese exercise dance 3 times a week, participate in tai chi 2 times a week, and perform household activities (cooking, cleaning, and laundry) due to her impairments of strength and range of motion. Carrying a load of laundry from her bedroom to the washer was very difficult and needed assistance from her husband because it was too heavy and caused pain in her shoulder. While cooking and cleaning she was unable to reach overhead to dust or get pots/pans out of cupboards. This became very limiting for her when her husband was not home to help her with everything. This prevented her from being able to instruct dance because she was unable to freely move
her left arm to perform different dance moves. Her shoulder prevented her from continuing instructing because she was in too much pain while dancing.

Diagnostic labels may be used to describe multiple dimensions of the patient/client, ranging from the most basic cellular level to the highest level of functioning as a person in society. Physical therapists use labels that identify the impact of a condition on function at the level of the system (especially the movement system) and at the level of the whole person. This patient was diagnosed with left shoulder adhesive capsulitis. She also showed signs of rotator cuff tendonitis associated with impingement, secondary to her adhesive capsulitis. According to the Guide to Physical Therapy Practice, the patient falls within patient/client classification of 4E (ICD-9-CM Code 726.0), impaired joint mobility, motor function, muscle performance, and range of motion associated with localized inflammation.

**Prognosis and Plan of Care**

Patient’s goals of returning to dance, and daily household chores were consistent with treatment goals of increasing ROM and decreasing pain to return to daily activities. Short term goals, which were set to be met within 2 to 4 weeks, were comprised of the following:

1. The patient’s elevation ROM will be greater than or equal to 130˚
2. The patient’s rotation ROM will be greater than or equal to 60˚ both externally and internally.
3. The patient will be independent with her home exercise program for scapular stability training, ROM, stretching, and glenohumeral stability training.
Long-term goals were set to be met within 6 to 8 weeks, were comprised of the following:

1. The patient will have less than or equal to 2/10 pain with washing her hair.
2. The patient will have less than or equal to 1/10 pain with dressing.
3. The patient will have less than or equal to 1/10 pain with performing normal work at home or on the job.
4. The patient will have less than or equal to 2/10 pain with placing an object to an overhead shelf.
5. The patient will experience less than or equal to 2/10 pain when carrying an object of 10 pounds or heavier at waist level.

Prognosis is defined as the determination of the predicted level of optimal improvement, specific interventions to be used, and proposed duration and frequency of the interventions that are required to reach the anticipated goals and expected outcomes.\textsuperscript{10}

Over the course of 2 to 4 months, the patient would demonstrate optimal joint mobility, motor function, muscle performance, and range of motion and the highest level of functioning in home, work, community, and leisure environment.\textsuperscript{10} We believed she had very good potential to reach her desired outcomes because of her hard work ethic and motivation to return to activity. Overall clinical impression confirmed the initial impression of the patient and her diagnosis. We felt she would benefit from physical therapy services, and her treatment consisted of the following: 1) manual therapies to include joint and soft tissue mobilization as appropriate for restoring normal joint biomechanics, increasing tissue extensibility, and managing pain, 2) therapeutic exercise to include passive range of motion (PROM), active range of motion (AROM), scapular
stability training, and glenohumeral stability training, 3) modalities to include ultrasound, electrical stimulation, and heat as appropriate for increasing tissue extensibility and decreasing pain.

Re-examination of the patient was performed throughout the course of her treatment, and included strength tests and ROM measurements. ROM measurement was performed at least once a week and sometime at all therapy sessions during the week. Strength was tested once a week using a free-weight to determine how long and far she was able to carry the weight pain free. This indicated if she would be able to carry a load of laundry from her bedroom to the washer pain free. Indications for re-examination included new clinical findings or failure to respond to physical therapy intervention. She did acquire benign paroxysmal positional vertigo (BPPV) during her therapy sessions for adhesive capsulitis. BPPV is a dizziness thought to be due to debris, called ear rocks, which has collected within a part of the inner ear. This occurred near the end of her therapy, so we started treating her symptoms of benign paroxysmal positional vertigo BPPV. Treatment for BPPV was successful, and her dizziness subsided. She was discharged from physical therapy services with a one month follow-up, and was instructed to continue independent management at home.
CHAPTER III
INTERVENTION

Many intervention techniques were used with the patient. Modalities used include ultrasound and hot packs. The goals of these modalities were to increase tissue extensibility of the shoulder and decrease the pain. Modalities influence pain and muscle relaxation; therefore, they might enhance the effect of exercises and manual techniques.11 Therapeutic exercise included scapular stability training, glenohumeral stability training, passive range of motion (PROM), and active range of motion (AROM). Manual therapies included soft tissue mobilization, joint mobilization using posterior and inferior glides, and thoracic extension rocking. The goal of manual therapy was to restore normal joint biomechanics, increase tissue extensibility, and help manage pain. She was seen two or three times a week depending on her schedule for five weeks.

This patient was very energetic and ready to begin treatment the moment we saw her. She was a very motivated lady, who wanted to heal her shoulder. We began intervention week one. Treatment began with a hot pack to help relax the patient and the shoulder muscles. Application of moist heat in conjunction with stretching has been shown to improve muscle extensibility. This may occur by a reduction of muscle viscosity and neuromuscular-mediated relaxation.11 ROM measurements were taken for flexion and abduction at the left shoulder. Flexion measured 145° and abduction 110°. PROM to all planes at the glenohumeral joint was performed to help increase the
patient’s shoulder flexibility. Posterior and inferior glides were performed to help increase ROM and decrease pain. Posterior glides increase internal rotation, flexion, and horizontal adduction, while inferior glides increase abduction.\textsuperscript{12} To perform the mobilizations the patient was positioned supine with her shoulder off the plinth in abduction with the elbow flexed to 90\textdegree.\textsuperscript{13} Grades II, III and IV were used for all joint mobilizations to manage pain, control muscle spasms, and to stretch the joint capsule and connective tissue structures. Joint mobilization grading can be found in Table 4.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Amplitude</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Small movement</td>
<td>Performed at beginning</td>
</tr>
<tr>
<td>II</td>
<td>Large movement</td>
<td>Performed within range but not reaching the limit of the range</td>
</tr>
<tr>
<td>III</td>
<td>Large movement</td>
<td>Performed up to the limit of the range</td>
</tr>
<tr>
<td>IV</td>
<td>Small movement</td>
<td>Performed at the limit of the range</td>
</tr>
<tr>
<td>V (Manipulation- non-oscillatory motion)</td>
<td>High velocity thrust</td>
<td>Performed at limit of the range</td>
</tr>
</tbody>
</table>

Specific joint mobilization techniques are believed to selectively stress certain parts of the joint capsule.\textsuperscript{11} The following study examined the effects of joint mobilization in patients with frozen shoulder. Nicholson\textsuperscript{11} compared a group of patients who received joint mobilization and active exercise to a group receiving exercise alone. They found significantly improved motion and pain reduction in both groups but the mobilization group had greater improvements with passive movement. A home exercise program was issued to the patient and her husband. They were instructed in the performance of the exercises and given picture handouts as a guide. The patient performed the exercises in
the clinic prior to leaving to demonstrate understanding. We began with theraband exercises for rotator cuff strengthening using external rotation, internal rotation, and adduction. Using the wall and a home pulley she performed stretches on her own to loosen the posterior and superior portions of the joint capsule.

During week 2 hot packs were not used. Instead, ultrasound (US) was performed on the shoulder to see if we could obtain more tissue extensibility of the shoulder capsule to get better results with manual therapy techniques. Ultrasound has two physiological effects: it enhances inflammatory response and tissue repair, and it heats soft tissues. Ultrasound energy is absorbed in tissues with high collagen content, such as bone, periosteum, cartilage, ligaments, capsules, tendons, fascia, scar tissue, and tissue interface, i.e., bursa and synovium, all of which are found in the shoulder.15 One study aimed at looking at whether the addition of deep heating or superficial heating to stretching exercises would produce better clinical outcomes than stretching alone in the management of frozen shoulder.16 The findings suggest that the addition of deep heating, such as ultrasound to stretching exercise is more effective than superficial heating, such as hot packs or stretching alone in improving shoulder pain and function. Also, the addition of deep heating to stretching produces a significantly greater gain in shoulder ROM than does the use of superficial heating plus stretching.16

Ultrasound was performed using the settings found in the appendix. After performing ultrasound, posterior and inferior mobilization glides at the glenohumeral joint were performed. A study comparing the effectiveness of manual therapy and ultrasound with manual therapy and placebo ultrasound in new episodes of shoulder pain concluded that the addition of US was not superior to placebo US when
used with multiple physical therapy interventions in management of shoulder pain. Ultrasound is commonly used by physical therapists in treatment of shoulder pain. This study suggests that US provides no clinical benefit beyond that of placebo US in the physical therapy treatment of shoulder pain referred from primary care.\textsuperscript{17} Another study tried to determine the efficacy of physiotherapy interventions for disorders resulting in pain, stiffness, and/or disability of the shoulder. Twenty-six trials met inclusion criteria. There is no evidence of the effect of ultrasound in shoulder pain, adhesive capsulitis, or rotator cuff tendinitis. When compared to exercises, ultrasound is of no additional benefit over and above exercise alone, and there is no evidence that physiotherapy alone is of benefit for adhesive capsulitis.\textsuperscript{18}

This may support why our patient did not respond well to US; however she did respond well to the hot packs, so week 3 we continued using hot packs prior to performing our manual therapy techniques. Range of motion was measured with all active movements and results are as follows: flexion 150°, external rotation 70°, internal rotation 45° and abduction 125°. We performed the same mobilization of posterior and inferior glides to increase ROM. A study comparing the effectiveness of anterior versus posterior glide mobilization techniques for improving external rotation ROM showed that individuals in the posterior mobilization group had a mean improvement of 31.3° (SD, 7.4°; \textit{P}< .001) versus the individuals in the anterior mobilization group, which had a mean improvement of 3.0° (SD, 10.8°; \textit{P} = .40).\textsuperscript{19} All participants received therapeutic ultrasound, joint mobilization, and upper body ergometer exercise. Their results confirmed our use of the posterior glide mobilization, which had good outcomes for us and our patient.
Week four treatment sessions were the same as prior sessions with PROM in all planes to the glenohumeral joint and posterior/inferior glide mobilization at the glenohumeral joint. She reached full range of motion with all movements except internal rotation, which was near full range at 70°. The patient met all her goals. She returned to instructing dance, driving, and regular household activities. We approved the patient’s request for independent management at home with a one month follow-up for her shoulder. She was very pleased with her progress but requested the follow-up for her own ease of mind.

We tested her for BPPV using the Dix-Hallpike maneuver because she had been complaining of dizziness when she moved her head. For this test, a person is brought from sitting to a supine position, with the head turned 45 degrees to one side and extended 20 degrees backward. Once supine, the physical therapist observes the eyes of the patient for 30 seconds to look for nystagmus. If no nystagmus ensues, the person is brought back to sitting. There is a delay of about 30 seconds again, and then the opposite side is tested. A positive Dix-Hallpike test consists of a burst of nystagmus (jumping of the eyes). In classic posterior canal BPPV, the eyes jump superiorly as well as rotate so the superior part of the eye jumps inferiorly. She tested positive with the Dix-Hallpike maneuver.

To treat BPPV we used the Epley maneuver, also called the particle repositioning or canalith repositioning procedure. It involves sequential movement of the head into four positions, staying in each position for roughly 30 seconds. The patient experienced slight nausea and stated she did not enjoy this maneuver; but if it would resolve her dizziness symptoms, she would go through with it. After the treatment, the patient and
her husband received paper instructions on what she could or could not do for the first 48 hours after treatment. The Epley maneuver treatment was performed two times, and her dizziness was resolved. The referring physician was updated on her progress at approximately treatment session six and was informed about the discharge plan and her overall progress at the end of therapy. Prior to performing treatment for BPPV, the physician was contacted and informed on her status at the time and gave approval to begin BPPV treatment.
CHAPTER IV

OUTCOMES

Initial findings for the examination are found in Table 1 (Cervical ROM), Table 2 (Shoulder ROM), and Table 3 (Special Tests). All interventions performed with the patient are found in the intervention chapter. Interventions performed with the patient addressed many of the functional disabilities acquired as a result of the frozen shoulder pathology. The functional disabilities, which were difficulty using her (L) upper extremity for instructing Chinese exercise dance; tai chi; and performing household activities like cooking, cleaning, and laundry; were all addressed during intervention. All disabilities were functional and pain free at discharge. Before addressing the functional disabilities, impairments like decreased ROM and strength, were assessed to help aid in the recovery and get back to functional activities. Prior to improvement of the impairments, the stimulus and any internal tissue response that may have been the cause of the disability needed to be addressed. This is why the hot packs were very useful. We used them to help increase tissue extensibility and help relax the patient so we were able to stretch out the shoulder capsule to increase range of motion. This may be a slow or fast process depending on the patient. Determining what is triggering the response to the frozen shoulder is important before any progress can be made. Interventions aiding in treating the frozen shoulder may allow for an earlier recovery by stretching out the capsule which has tightened and has consequently resulted in diminished motion in the shoulder.\textsuperscript{4} The final outcome of the patient was positive. All short term and long term
goals were met by time of discharge, and she was able to return to instructing Chinese
exercise dance, which was her main reason for coming to physical therapy. Goals for
ROM were met by the end of week 3 and continued to improve throughout the rest of the
treatment. The first goal that showed functional improvement was washing her hair and
getting dressed independently and was met by the end of week 2. Functional activities
continued to improve with physical therapy and when she was able to fasten her seat belt
and place objects in overhead shelves at home, we knew she was improving. Some of the
successes in reaching the goals could be attributed to the fact that the patient was very
motivated and therefore compliant with the prescribed treatment. Additionally she had
the support of her husband, daughter, and the therapy staff. Overall, she was very
satisfied with the outcomes of her shoulder care. She couldn’t believe how long it took to
get the treatment she needed to fix her shoulder because she had been seen by many other
health professionals prior to physical therapy and they were unsuccessful.

Prior to any intervention and again at discharge, she was instructed on how to
prevent and take care of her shoulder. Because adhesive capsulitis is so painful and has a
very slow progression of resolution, patient education is critical for success. Patients
should be educated in the chronicity of this condition. If they know and understand ahead
of time that it can be several years before symptoms are completely resolved,
apprehension and a feeling of urgency for functional return may be decreased.\(^2\) We
recommended continuing home exercises to maintain strength and range of motion. This
would help prevent any stiffness from occurring or a possible relapse of the frozen
shoulder. She was also set up for a one month follow-up, but if no concerns or problems
arose in that time, then she was instructed to call and cancel her appointment.
Final examination findings at discharge are found in the tables below.

Table 5. Discharge Cervical ROM

<table>
<thead>
<tr>
<th></th>
<th>Left Rotation</th>
<th>Flexion</th>
<th>Right Side Bending</th>
<th>Left Side Bending</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Within functional limits (WFL), pain free</td>
<td>WFL, pain free</td>
<td>WFL, pain free</td>
<td>WFL, pain free</td>
</tr>
</tbody>
</table>

Table 6. Discharge Shoulder ROM

<table>
<thead>
<tr>
<th>Forward Flexion</th>
<th>Abduction</th>
<th>Scaption</th>
<th>External Rotation (prepositioned in 90° abduction)</th>
<th>Internal Rotation (prepositioned in 90° abduction)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(L) AROM=150°</td>
<td>(L) AROM=135°</td>
<td>(L) AROM=165°</td>
<td>(L) PROM=70° (R)</td>
<td>(L) PROM=85° (R)</td>
</tr>
<tr>
<td>(L) PROM=180°</td>
<td>(L) PROM=170°</td>
<td>(L) PROM=175°</td>
<td>(R) PROM=90°</td>
<td>(R) PROM=85°</td>
</tr>
<tr>
<td>(R) AROM=185°</td>
<td>(R) AROM=170°</td>
<td>(R) AROM=165°</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A quality of life clinimetric instrument was not performed with this patient. However, if one was going to perform a clinimetric, the Disabilities of the Arm, Shoulder, and Hand (DASH) would be a very beneficial instrument to use, especially with this patient. In a clinimetric evaluation of shoulder disability questionnaires, overall, the DASH received the best ratings for its clinimetric properties (that is, 9 positive scores out of 12).\(^{21}\) The DASH outcome measure is a 30-item self-report questionnaire designed to measure physical function and symptoms with any or several musculoskeletal disorders of the upper limb.\(^{22}\) Improvement of patient self report of health-related quality of life (HRQL) over an episode of physical therapy care represents a measure of treatment effectiveness. Aggregated HRQL data can be used to target and evaluate quality improvement interventions at the level of the therapist, clinic or organization.\(^{23}\)
CHAPTER V
DISCUSSION

This case report describes the importance of a physical therapy program for a patient with shoulder adhesive capsulitis. Adhesive capsulitis is self-limiting, and most individuals recover with conservative treatment within 1 to 2 years; however, during this time, affected individuals can be significantly limited in shoulder activities. About 60% of individuals are left with some permanent loss of shoulder motion. With this disability there is a high percentage of patients who undergo physical therapy intervention. Although there is variation in treatment programs, treatment is likely to be similar, including strength exercises, ROM exercises, and the use of modalities. Exercises and the ROM techniques may be different depending on the therapist.

Unfortunately, some patients will have multiple comorbidities or previous medical conditions that will affect the treatment. Such patients may have side effects or contraindications from medications or prior procedures making it difficult to implement a regular physical therapy program. There is likely to be variation between presentations of different musculoskeletal causes such as rotator cuff tear, tendonitis, or bursitis. Moreover, not all patients who have adhesive capsulitis will present the same. These dissimilarities will likely affect the intervention and need to be altered to meet the specific needs of the patient.

The treatment approach designed in this case report was based upon previous positive results seen in the interventions of other patients. The positive results seen by
week 3 include ability to cook and dance pain free with an overall increase in strength and ROM. Her return to previous level of function led to improvements in psychological status and improved the patient’s overall quality of life. These results support the efficacy and need for physical therapy intervention in patients with adhesive capsulitis.

While the patient did show weekly improvements performing the mentioned interventions, it is not known if the patient would have improved more rapidly following a different intervention. It is not known whether a more aggressive exercise treatment would have been beneficial or detrimental. Although there were positive outcomes with this specific case study, future research on this topic is needed to determine the efficacy of physical therapy program specifically for patients with very few comorbidities. Possible research on specific mobilization techniques without the use of modalities may be beneficial for patients with adhesive capsulitis. Another patient with the same condition may not recover similarly.

Reflective Practice

From this single case study, I found that I would treat the next patient that came to the clinic with adhesive capsulitis the same way I did with the patient in this study. I would conduct the evaluation in the similar way, asking the same history questions, and having the patient complete an activities of daily living questionnaire before I began the examination. I would conduct the same examination techniques for strength, ROM, sensory, and special tests. The examination procedures gave me the information that I needed, and led to the diagnosis of the patient. If I were to change anything, I would add more special tests to the exam to make the diagnosis more definitive. There are many
other diagnoses that resemble adhesive capsulitis; therefore by using more special tests, I feel I would have been able to distinguish the adhesive capsulitis more quickly.

The plan of care that was provided to the patient was very well put together and had positive results. We began each treatment session with a hot pack to relax the patient and loosen up the shoulder joint. It is also psychological for the patient to begin with something that “feels good” to help with relaxation. I believe that performing manual therapy techniques with this type of patient was very beneficial, and it gave us good results.

If I were to seek further evidence in my case report, it would be in the area of intervention. There are many reports and evidence of what intervention to use, but they never use just a single intervention to help aid in the recovery of this type of patient. So, this makes it difficult to determine which portions are necessary for the outcomes they reported. And sometimes it was even difficult to find the outcomes of their studies. Most of the studies I found showed good results; however, almost all of them stated that they needed more evidence to support their choice of intervention.

When considering the cost benefit ratio for this single case study, the overall cost was very reasonable based on the outcomes. The patient was satisfied with the treatment interventions and the amount of time it took for her to become functionally independent. The cost for physical therapy was low in regards to the cost spent on multiple medical interventions prior to physical therapy. It was very affordable considering the functional disabilities the patient was suffering. The total cost for care was $1200, with an average cost per visit of $102. To try to further reduce the cost to the patient, I would try to see the patient 3 times per week versus only 2 times. I think if the patient had been seen more
often, causing less time between treatment sessions, the patient may have received greater benefits more quickly. A quicker recovery may have reduced the overall amount of treatment sessions and could have reduced the number of weeks she was seen.

My personal goals were influenced by this case report, as well as my professional development goals. It gives me personal satisfaction and confidence to treat any patient that presents with adhesive capsulitis who will come to my clinic. No patient with adhesive capsulitis will present the same; however it may be similar. It gives me satisfaction knowing that I helped a patient return to functional living from day one of physical therapy until discharge. My professional development will be influenced from this case because I plan on furthering my manual therapy skills with continuing education and manual therapy courses. This will allow me to treat all my patients, not only adhesive capsulitis, using advanced manual therapy techniques.
APPENDIX
<table>
<thead>
<tr>
<th>Depth</th>
<th>Mode</th>
<th>Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>3MHz: energy penetrates 1.5cm</td>
<td>Continuous: heats tissue, and scar breakdown</td>
<td>1.0 w/cm², superficial tissues</td>
</tr>
</tbody>
</table>
REFERENCES


