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Effects of Physical Therapy Following a Right Shoulder Arthroscopy in the Outpatient Orthopedic Setting: A Case Study

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EFFECTS OF PHYSICAL THERAPY FOLLOWING A RIGHT SHOULDER ARTHROSCOPY IN THE OUTPATIENT ORTHOPEDIC SETTING: A CASE STUDY

by

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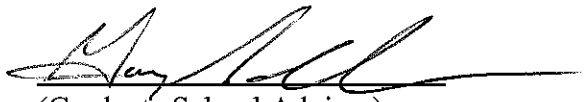

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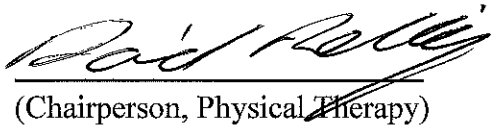

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ABSTRACT

Background and Purpose. Shoulder pain is the third most common complaint in the musculoskeletal system. Subacromial impingement syndrome consists of 44-65% of those complaints. This case study examines the effectiveness of physical therapy treatment following a right shoulder arthroscopy including a subacromial decompression, extensive intraarticular debridement, and subpectoral proximal biceps tenodesis in an outpatient orthopedic setting.

Case Description. This patient was a 57-year old male with past medical history of chronic shoulder and back pain. He presented to outpatient physical therapy post-operatively with right upper extremity guarding, pain, weakness, tenderness, and impaired functional mobility.

Intervention. Treatment addressed the patient's impaired functional mobility and limitations. Interventions included right upper extremity range of motion, glenohumeral mobilizations, strength training, postural awareness activities and education, and functional exercises.

Outcomes. The patient increased right shoulder and elbow strength and range of motion and returned to all activities with few restrictions following physical therapy. He was discharged with no pain.

Discussion. The patient made progress consistently during physical therapy. More research on the etiology of subacromial impingement syndrome will be beneficial to provide the most effective post-operative treatment.

CHAPTER I

INTRODUCTION

The shoulder is a complex joint made up of the clavicle, humerus, and scapula. These bones along with the sternum and thoracic vertebra articulate to create the acromioclavicular, sternoclavicular, glenohumeral, and scapulothoracic joints.[1] Passive mechanical forces of the shoulder joint include the joint capsule, ligaments, and intraarticular pressure. These structures are stabilizers of the shoulder joint, especially when there is injury. Dynamic stabilizers are made up of the rotator cuff muscles including the subscapularis, supraspinatus, infraspinatus, and teres minor along with other musculature surrounding the shoulder joint. The long head of the biceps also plays a role in the dynamic stability of the shoulder joint as it attaches to the scapula and reduces anterior translation of the humeral head.[2]

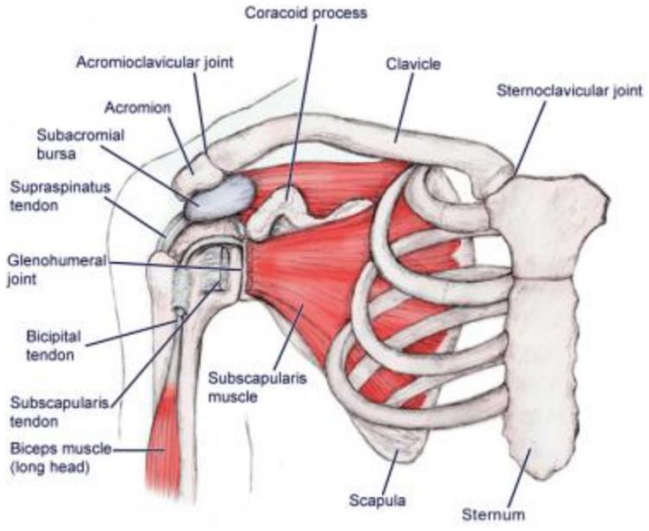


Figure 1. Anatomy of the Shoulder Joint.[3]

The small contact surface of the glenoid when compared to the humeral head allows for the shoulder to be the most mobile joint in the body.[2] The glenohumeral and acromioclavicular joints allow for 180 degrees of combined elevation. Shoulder elevation includes the movements of abduction and flexion. The shoulder joint also produces movements of adduction, internal and external rotation, and horizontal adduction and abduction.[4] Increased mobility of this joint causes a decrease in stability, leading to a risk of injury.[5]

Shoulder pain is the third most common musculoskeletal complaint.[6] Subacromial impingement syndrome constitutes 44-65% of those complaints and is the most common impairment of the upper extremity in the working population.[7,8] The subacromial space, which lies superior to the head of the humerus and inferior to the acromion, coracoacromial ligament, and coracoid process, includes the subacromial bursa and rotator cuff muscles.[6] Degeneration and inflammation of these structures cause impingment.[7] The etiology of subacromial impingement syndrome is still up for debate between extrinsic compression or intrinsic degeneration.[9] Extrinsic mechanisms result from compressive forces from structural and biomechanical abnormalities such as different acromion types and the thoracic spine anatomy.[10] The various types of acromion shapes are as follows: type I or the flat acromion, type II or curved acromion, and type III or hooked acromion. A type III acromion is linked to impingement syndrome.[11] Intrinsic degeneration results from ischemia at the supraspinatus tendon dubbed the "critical zone".[10] Diminished vascular supply to this tendon is common with age and tensile forces leading to failure of the rotator cuff tendons.[9]

The mechanism of injury can determine the impingement syndrome being classified as primary or secondary. Primary impingement syndrome occurs when the space is narrowed by osteophytes, structural changes after a fracture of the greater tuberosity, or any kind of

inflammation of the tendons and bursa. Secondary impingement syndrome is caused by muscular imbalances and humeral head displacement.[6]

The subjective history, along with the physical examination are the first steps in diagnosing subacromial impingement syndrome. According to Garving et al[6], the diagnostic sensitivity of the physical examination is 90%. Risk factors contributing to subacromial impingement syndrome include being an active smoker, having a Type III acromion, sleeping in a decubitus position, and being associated with an occupation which requires repetitive abduction.[12] Common signs of impingement include shoulder pain with no origin of trauma as well as localized pain in the anterolateral part of the shoulder radiating towards the inferior portion of the humerus.[6,13]

Examination techniques should include passive and active range of motion of the cervical spine, shoulder, and elbow to clear the peripheral joints as well as special tests of the shoulder.[13] Neer, Hawkins-Kennedy, painful arc, empty can, and the external resistance test are five special tests of the shoulder used to diagnose subacromial impingement syndrome. According to Michener et al[11], if three of the five special tests are positive, it is safe to confirm the diagnosis of subacromial impingement syndrome.

The physical examination usually finds patients having had pain between 70 and 120 degrees of elevation. This is due to the lateral acromion impinging on the rotator cuff tendons during elevation of the arm. This range is dubbed the “painful arc.” Other indicative findings include painful overhead movement, pain with lying on the affected shoulder, and weakness with abduction and external rotation.[6]

Radiographs and magnetic resonance imaging (MRI) can be utilized to diagnose subacromial impingement syndrome, with radiographs historically being used initially. Further

referral and MRIs are indicated when there is continued functional limitations or pain for more than six weeks while attending physical therapy or taking analgesic medicine.[6] According to Mayerhoefer et al[14], MRIs are being used more frequently due to opportunity to view the acromion shape along with degenerative changes of the soft tissue structures.

Conservative care including physical therapy was shown to have satisfactory results in 60% of patients over the course of two years.[7] The goal of this treatment is to restore function and pain free movement of the shoulder. Symptoms such as pain, extent of damage, and functional disturbance will predict if the patient will need surgery.[6]

The history of surgical treatment for subacromial impingement dates back to Neer's description in 1972. Neer's acromioplasty removed spurs or ridges on the inferior surface of the acromion to allow increased space for soft tissue structures.[7] A bursectomy will debride the inflamed subacromial bursae in hopes of relieving the patient's pain.[15] The bursectomy and acromioplasty were considered the gold standard for treatment of subacromial impingement.[7] That soon changed when Harvard Ellman performed the first arthroscopic subacromial decompression in 1985. It is now considered a routine procedure.[16]This non-invasive surgery includes debridement of the subacromial bursa along with the resection of the coracoacromial ligament, anterolateral edge of the acromion, and osteophytes.[7] The change in procedures has resulted in a decrease in morbidity rates.[13]

During the arthroscopy, an anterior, lateral, and posterior portal will be entered into the patient's shoulder. Adhesions and the subacromial bursa will be shaved and debrided. Soft tissue such as rotator cuff tendons will be repaired. If necessary, the coracoacromial ligament will be resected or debrided based upon damage. The anterior acromion should be shaved to be flush with the posterior side.[17]

Following surgery, the patient will be sent home in a sling due to the contraindication of internal rotation greater than thirty degrees in the first six weeks following surgery. After four to six weeks, full muscle activity of the glenohumeral joint is restored and the patient can resume regular activities.[17] According to Boston Shoulder Institute, precautions should be taken during shoulder abduction in the first two weeks along with care to avoid poor movement patterns. Precautions following the two-week post-operative mark include care with overhead activities and heavy lifting.[18]

Research has reported promising prognoses following subacromial decompression arthroscopies. Parameters of pain, shoulder range of motion, and the ability to perform activities of daily living were assessed through the Constant-Murley Shoulder Outcome Scale. Improvements in these three parameters measured pre-operatively and post-operatively were significant according to research. The duration of symptoms before surgery was found to be the most significant predictor of outcome.[19] In an additional study, when asked about relief of symptoms, 85% of patients will report good or excellent results at the one-year post-operative mark.[20]

Biceps tenodesis surgery is indicated in events such as biceps tendinopathy, biceps instability, and biceps tendon tears. The procedure includes releasing the biceps brachii muscle at the origin and extracting the muscle, while the insertion is still intact, from a small incision on the anterior shoulder. The surgeon will then remove approximately 20 mm of the tendon and reattach the origin of the muscle to the humerus instead of the glenoid labrum.[21] Outcomes of this procedure have included reduction of pain along with return to function and work.[22] Post-operative protocol include precautions with external rotation and extension of the shoulder along with strengthening of the shoulder flexors and elbow flexors/supinators for four weeks.[23]

This case study will focus on the outpatient rehabilitation management of a patient following a right shoulder arthroscopy. The purpose of the current case study is to discuss the role of physical therapy in the evaluation and treatment of this patient's recovery. The case study will describe the effects physical therapy had on the patient's range of motion, strength, and functional mobility post-operatively.

CHAPTER II

CASE DESCRIPTION

The patient was a 57 year-old Hispanic male who arrived at physical therapy following a right shoulder arthroscopy including a subacromial decompression, extensive intraarticular debridement, and subpectoral proximal biceps tenodesis. The patient had a history of chronic right shoulder pain, as well as chronic low back pain. He worked full time as a general contractor and lived at home with his wife.

The patient had sought conservative treatment through physical therapy for several years with no relief of right shoulder pain before deciding to have surgery performed. According to his chart, the patient's surgery was successful and physical therapy was ordered to begin two weeks following. Physical therapy orders were provided by the orthopedic surgeon to evaluate and treat the patient. Post-operative protocol contraindicated internal rotation of the right shoulder more than thirty degrees in the first six weeks and encouraged caution with any lifting.

To begin, a brief review of systems was completed. The integumentary system was compromised during surgery resulting in scar tissue around the incision sites on the right upper extremity. The musculoskeletal system was directly affected through damage to the muscle, tendons, ligaments, and bones surrounding the shoulder joint. After taking the history, the patient was deemed acceptable and necessary for physical therapy.

The patient presented to physical therapy with a guarded right upper extremity and slightly rounded shoulders bilaterally with the right shoulder presenting as more depressed when compared to the left. During palpation, the patient complained of tenderness around the incision

on his anterior right shoulder close to the proximal attachment of the biceps brachii tendon. The surgical incision was observed to be closed and healing correctly. There were no signs of redness or warmth to suspect any infection. Palpation of the left shoulder was completed with no complaints of tenderness or pain. The patient had a follow up physician appointment the day prior to initiating physical therapy and was allowed sling removal at that time. He was also experiencing stiffness in the anterior and lateral portion of his right shoulder. Activities such as reaching overhead, right side lying, and reaching behind his back were deemed painful and difficult to complete. The patient's occupation as a general contractor involved heavy lifting, carpentry, and tiling.

Examination

The examination began by testing the patients shoulder range of motion bilaterally with a goniometer. Adequate shoulder range of motion is essential for performing activities such as dressing, bathing, and eating. Goniometric measurements of shoulder flexion, abduction, external rotation, and internal rotation were taken on the initial evaluation of this patient, during a re-evaluation, and at discharge. Cervical range of motion was assessed to be within normal limits. Table 1 lists the shoulder range of motion measurements during the initial examination, which were measured with the patient in standing.

Table 1. Initial Shoulder Range of Motion Measurements (In Degrees and Landmarks).

	Right	Left
Flexion	127	159
Abduction	100	176
External Rotation (Behind Head)	T2	T5
Internal Rotation (Behind Back)	L2	T4

The functional assessment used for this patient was the Focus On Therapeutic Outcomes (FOTO). FOTO is a questionnaire based on the impaired body part through self-reporting by a patient. Patient perception is found to be the most important factor in functional ability.[24] With the results from this assessment, the health care provider can gain insight on the number of visits recommended for the patient as well as identification of the functional ability of the patient. Research has found the internal consistency reliability to be between 0.57 and 0.89.[25] According to FOTO, the patient was able to function at 33% of his prior level of function.

Left shoulder and elbow strength (shoulder flexion, extension, abduction, adduction, internal/external rotation, and elbow flexion/extension) equaled 5/5 via manual muscle testing (MMT). MMT was deferred on the right due to the acute nature of surgery. Although it was not completed, 2/5 was documented due to the patient's available range of motion. The patient reported 5/10 pain at the time of examination. A handheld dynamometer was also used to assess grip strength in bilateral hands. The patient generated 46 kilograms of force when holding the dynamometer in his left hand and only 25 kilograms of force in his left.

Special tests were also deferred due to the patient's post-operative status. Prior to surgery, special tests of the shoulder could have been performed to diagnose the patient with subacromial impingement syndrome. According to Michener et al[26], Neers, Hawkins-Kennedy, painful arc, empty can, and external rotation resistance tests were the five more useful tests when ruling in or out subacromial impingement syndrome. Furthermore, research identified external rotation resistance, painful arc, and Neer's tests as the best tests to rule in the diagnoses when used independently with specificity coefficients of 0.87, 0.67, and 0.54 respectively. In addition, the tests to rule out subacromial impingement syndrome when used independently were painful

arc, external rotation resistance, and empty can with sensitivity coefficients of 0.75, 0.56, and 0.50 respectively.

The initial examination data obtained was consistent with post-operative subacromial decompression surgery. Using the International Classification of Functioning (ICF), the patient's health condition was related to his impairments (see Appendix A). The post-operative nature impacted the patient's body structure and function. The patient had decreased range of motion and strength, which affected his activities such as reaching overhead and behind his back along with carrying objects. Getting dressed, working, and household chores were some of the patient's participation restrictions.

Evaluation, Diagnosis, and Prognosis

The initial examination gave essential information on problems the patient was facing along with a comprehensive representation of what his prognosis would look like. The primary problem was decreased range of motion, which prevented the patient from working as a general contractor. Additional problems included pain, tenderness around the incision sites, restricted joint mobility, and forward head posture.

Furthermore, a home exercise program (HEP) was sent home with him which included pulleys and active assisted flexion and extension with a dowel to be completed twice daily. Additional exercises were added to the HEP such as cervical and scapular retractions after a week of therapy.

At the start of therapy, the patient was in very good health with very few comorbidities. His job as a general contractor allowed him to be active. According to Patel et al[19], 75% of patients report satisfaction with their outcomes at the 19-month mark regarding parameters of

pain, range of motion, and the ability to perform activities of daily living. The most significant predictor of prognosis following surgery was the duration of symptoms prior to surgery.

Initial patient goals were to increase his shoulder range of motion, increase joint mobility, decrease pain, increase upper extremity strength on the right, and improve patient posture. Interventions will assist in meeting these goals allowing the patient to return to work without limitations.

CHAPTER III

INTERVENTION

The interventions chosen for this patient included the traditional post-operative exercises following the surgeon's protocol and recommendations along with functional activities. Initial exercises included glenohumeral mobilizations, pulleys, passive range of motion, scapular exercises, and unweighted strengthening activities.

The patient was seen twice a week for 60-minute sessions for four weeks. Each session began with the patient having completed an arm ergometer warm up for ten minutes to mobilize the joint and musculature surrounding the shoulder. Following proper warm up, pulleys were utilized to complete active assisted scaption (combination of flexion and abduction) for ten minutes as tolerated.

A technician at the facility would take the patient through his exercises, as was the standard at this clinic. The primary physical therapist would check in as time allowed. These exercises included scapular retractions to improve the patient's posture, active assisted flexion and extension using a dowel, and other unweighted strengthening activities.

Passive shoulder range of motion through flexion and abduction was introduced to the patient during the first week of treatment. The degree of flexion and abduction was determined by the patient's tolerance. It was noted the patient initially was guarding and apprehensive to passive range of motion and required cueing to relax his right upper extremity. A cold pack was utilized to control inflammation. The patient was sent home with a HEP to be completed twice daily consisting of pulleys and dowel exercises.

The second week of physical therapy treatment included therapeutic exercises to address shoulder range of motion and strengthening activities such as serratus anterior punches in supine and submaximal isometrics of shoulder extension, abduction, and adduction against a wall. Serratus anterior punches and isometric holds were completed for three sets of ten repetitions. The patient was instructed to hold at end range for three seconds. Postural awareness activities were also included such as cervical and scapular retractions. Glenohumeral joint mobilizations were introduced to the patient which have been found to alleviate pain as well as improve osteokinematics and arthrokinematics of the joint post operatively by engaging the mechanoreceptors.[27] Grade I and II joint mobilizations were performed to the right glenohumeral joint in a posterior and inferior direction in order to reduce pain. The patient's HEP was updated to include cervical and scapular retractions as well as the pully and dowel exercises.

Additional shoulder stabilization exercises were introduced during the third week of treatment. The patient was instructed to stand with his shoulders flexed to 90 degrees with his hands pressed against a wall. The therapist applied perturbations to the patient's shoulder and trunk while he maintained his posture. Research has found the patient population who perform these exercises post-operatively have significant differences compared to those who do not. The differences were found in active and passive flexion and abduction, visual analogue scale, simple shoulder test, activities of daily living, muscle strength, and the Constant-Murley Scale, which is used to evaluate shoulder function.[28] Strengthening exercises were incorporated into this week's activities using resistance bands and other weighted techniques to the patient's tolerance.

In addition, functional exercises were emphasized during treatment. The patient was educated on the correct technique of bending at the knees and hips with his back as straight as possible while lifting. The patient began returning to his activities of daily living. Per protocol

precautions, the patient was still restricted on weighted shoulder flexion and elbow flexion/supination until week four due to the biceps tenodesis performed along with the subacromial decompression.

Grade III glenohumeral joint mobilizations were introduced to improve shoulder flexion and abduction active range of motion. Active shoulder flexion and abduction were measured prior to manual therapy having been performed and were recorded as 148 degrees and 136 degrees respectively. Following manual therapy, shoulder flexion and abduction were recorded as 152 degrees and 143 degrees respectively.

The final week of physical therapy emphasized return to work tasks with correct techniques. The patient's tolerance to exercises in physical therapy along with his improvement in range of motion and strength constituted this. Weighted shoulder flexion and elbow flexion/supinated with a five pound dumbbell were introduced to the patient during his first session this week. The patient completed three sets of ten repetitions. The following session, the patient was able to increase the weight of the dumbbell to eight pounds and performed three sets of eight repetitions. The patient had achieved almost full range of motion on the right shoulder and elbow. According to the orthopedic surgeon's protocol, the only restrictions remaining were military press, wide grip bench press, and any anterior capsule stress to avoid injury to the biceps brachii muscle.

Overall, the patient tolerated treatment well with minimal complaints of pain during exercises throughout the four weeks. Occasionally he would come to therapy with complaints of soreness. The patient was always open to try new exercises and stated consistently throughout physical therapy how pleased he was with his progress. He noticed improvement in the motion of his shoulder as well as better tolerance to exercises.

CHAPTER IV

OUTCOMES

The results of four weeks of physical therapy intervention were favorable for this patient. The patient met all of his short-and long-term goals and ended his final physical therapy session with 0/10 pain. The patient had returned to work with only the limitations of military press, wide grip bench press, and any anterior capsule stress. The patient reported having felt ready to transition from skilled physical therapy to independent HEP completion. A HEP was progressed and issued to the patient with a follow up appointment scheduled once all restrictions were lifted.

Objective measures such as range of motion, strength, and functional outcomes were completed at discharge. Shoulder active range of motion was reassessed at discharge and listed in Table 2. The measurements were taken in standing with improved motion noted throughout the course of treatment.

Table 2. Shoulder Range of Motion Measurements at Discharge (In Degrees and Landmarks).

	Right	Left
Flexion	175	178
Abduction	173	180
External Rotation (Behind Head)	T5	T5
Internal Rotation (Behind Back)	T4	T4

Manual muscle testing of bilateral shoulders and elbows was performed. Shoulder flexion, abduction, extension, adduction, internal rotation, and external rotation, as well as elbow flexion/extension were graded as a 5/5 bilaterally. A handheld dynamometer was used to

measure grip strength. The patient generated 48 kilograms of force in his left hand and 42 kilograms of force in his right.

FOTO, the functional outcome measurement was given to the patient to complete at discharge. According to his self-reported answers, he had returned to 97% of his prior functional ability.

The patient's guarded right upper extremity had improved along with his posture. The mobility in his glenohumeral joint had become less restricted during joint mobilizations when compared to the second week of therapy. Improvements were noted around the house and during activities of daily living such as reaching and dressing according to the patient. The patient reported no problems during overhead or behind the back reaching and stated sleeping through the night with zero interruptions.

The patient had no adverse effects to physical therapy intervention strategies and was motivated to return to work. He was healthy with minimal comorbidities. Exercises were completed with moderate pain initially. The patient had decreased pain and edema as the treatments progressed. The patient was compliant and reported having completed his HEP twice daily. Overall, the patient was satisfied with the care he received along with the results.

CHAPTER V

DISCUSSION

The patient made progress in physical therapy following his right shoulder arthroscopy including a subacromial decompression, extensive intraarticular debridement, and subpectoral proximal biceps tenodesis. During the initial evaluation, the patient presented with decreased right shoulder range of motion, decreased right shoulder and elbow strength, increased pain in the right upper extremity, and impaired function. The interventions provided in physical therapy allowed the patient to meet his goals as well as return to work full time and independently complete all of his ADLs.

Manual muscle testing of the right shoulder and elbow were deferred at the initial examination due to the patient's post-operative status. Left upper extremity strength equaled 5/5 with MMT for all motions of the shoulder and elbow. The patient's goal was to match the strength on his left upper extremity following physical therapy. Over the course of treatment, testing was completed and documented bilaterally as 5/5 for motions including flexion, extension, adduction, abduction, external rotation, and internal rotation at the shoulder as well as elbow flexion and extension. Handheld dynamometer strength on the right improved from 25 kilograms of force to 42 kilograms of force.

Active range of motion of the right shoulder improved in all planes following four weeks of physical therapy. The patient's shoulder flexion improved from 127 degrees to 175 degrees while abduction increased from 100 to 173 degrees. Internal and external rotation improved from landmarks of L2 to T4 and T2 to T5 respectively.

The patient reported his pain on his initial evaluation as 7/10 in the area surrounding his right shoulder. At discharge he reported his pain as 0/10. This can be attributed to physical therapy intervention, a decrease in edema, as well as healing of the soft tissue around the joint. Overall, the patient met his physical therapy goals and was independent in his activities of daily living. He returned to work full time with precautions including military press, wide grip bench press, and any anterior capsule stress.

Although this case study did provide certain comprehensive aspects, limitations still existed. For example, it would have been beneficial to know more about the patient's living environment as well as hobbies he engaged in to address additional goals. A tailored HEP could have been given to him to continue if the patient had any additional hobbies he would have liked to return to. Edema measurements of the shoulder and elbow would have been helpful to record at the initial evaluation. This would have helped determine the effectiveness of the therapeutic interventions and pain modalities.

An additional limitation to his treatment was the patient's schedule. He would often show up late, which reduced his manual therapy treatment time. Often times, the patient would receive calls from work and would immediately have to leave therapy. This decreased the time for therapeutic exercises as well as time at the end used for cryotherapy or manual depending on the session.

Overall, the research for prognosis and interventions of subacromial decompression arthroscopy is limited due to the unknown etiology. In the future, more research on cause of this pathology would be beneficial along with having a standardized protocol. In this patient's case, it was difficult to follow a protocol due to the nature of his surgery and the impact it had on his biceps brachii muscle.

Reflective Practice

Evaluation and treatment of the shoulder following surgery requires extensive knowledge of anatomy. The shoulder girdle is a very complex structure comprised of many joints, muscles, and ligaments. Along with being familiar with anatomy, a therapist has to understand specific surgical protocol and reasons behind the protocols. The additional impairment of the patient's biceps brachii muscle affected the protocol and plan of care. Shoulder flexion, elbow flexion, and elbow supination were required to be performed with precaution.

Modification that may have allowed for greater patient outcomes include the primary physical therapist having been present during all the patient's therapeutic exercises. This clinic utilized technicians which allowed the therapists to treat more patients each day. Consequently, this did not allow the primary physical therapist to be with the patient during his exercises to make sure he was completing all exercises correctly and to provide correction if needed. In addition, having incorporated more shoulder and scapular stabilization exercises may have improved overall function, especially since research supports the use of stabilization for improving range of motion and pain.[28]

The initial evaluation of this patient took place during week-1 of the clinical experience. The clinical instructor performed the evaluation while student observation was completed. At time of discharge, the patient's manual muscle testing and goniometry measurements were completed by the student physical therapist. When using a goniometer, intrarater reliability is less than interrater reliability.[29] This consequently could have led to differences in measurements at the initial evaluation and discharge due to the different therapists completing these measurements. Although the patient displayed improved strength, motion, and pain levels at

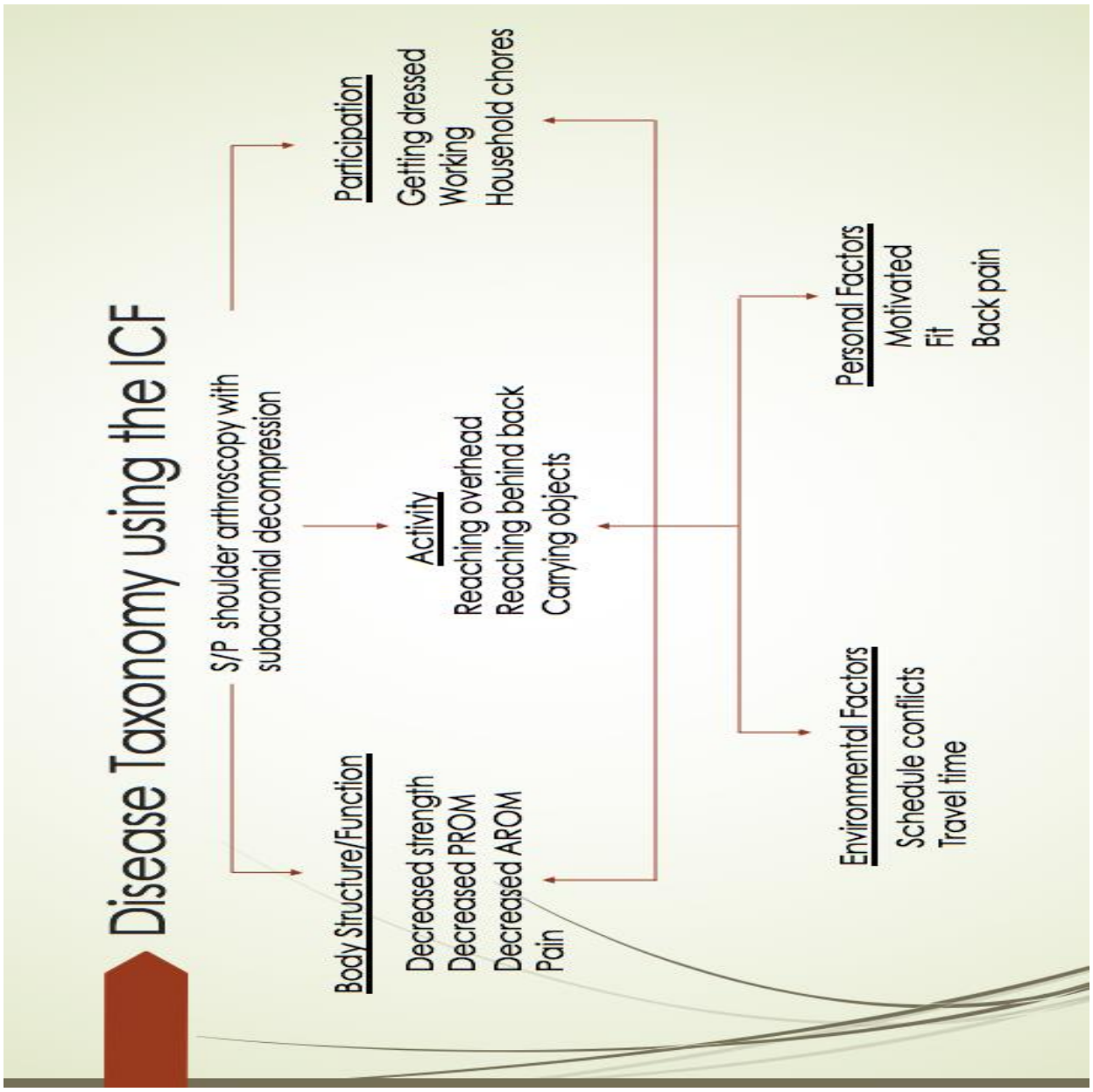
discharge, one of the few drawbacks was the patient being unable to supervise his crew, therefor, the onsite jobs may not have been completed up to his standard during this time.

The patient's total number of visits was eight. Codes such as manual therapy, therapeutic exercise, therapeutic activity, and neuromuscular re-education were the most common billed. The estimated cost of physical therapy was $777.70. The total cost to the third-party payor was calculated out to be $583.27, while the cost out of pocket to the patient was $194.43. As a general contractor, the patient's annual salary was around $75,500.[30]

During the four weeks of therapy, the patient was able to supervise his crew as a general contractor without performing any manual labor. Over the four weeks, he made approximately $5,800 compared to the $194.43 he spent on rehabilitation.

This case enhanced professional development through many different aspects. An active search for recent literature regarding post-subacromial decompression and biceps tenodesis surgery was completed. This allowed the opportunity to implement creative and new interventions and assess how the interventions were assisting the patient to progress. It became very clear the importance of individualized treatment plans, staying up to date on evidence-based practice, and providing the highest level of care to patients.

APPENDIX A.
DISEASE TAXONOMY USING THE ICF



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