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Physical Therapy Rehabilitation following Arthroscopic Rotator Cuff Repair

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by

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This Scholarly Project, submitted by Brittany E. Wirth 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	Physical Therapy Rehabilitation Following Arthroscopic Rotator Cuff Repair
Department	Physical Therapy
Degree	Doctor of Physical Therapy

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ABSTRACT

Background and Purpose: According to the American Academy of Orthopaedic Surgeons, previous studies have found the prevalence of rotator cuff tears may exceed 50% in individuals older than age 65. Since this age group is the fastest growing of the U.S. population, rotator cuff pathology is sure to become a more significant problem in the future. With this information, it is important to continue research on rotator cuff rehabilitation following arthroscopic surgery.

Case Description: This case report describes the physical therapy interventions and functional outcomes of a 58-year-old patient who underwent arthroscopic surgery to repair a partial tear of the supraspinatus tendon. The patient was scheduled to attend physical therapy sessions three times each week for seven weeks. During his sessions the main focus was on decreasing his pain and increasing the range of motion of his shoulder joint, as well as strengthening and stretching the musculature of the rotator cuff.

Outcome: Following seven weeks of physical therapy, the patient met all of the long-term and short-term goals that were set for him. He was cleared by the physician to return to work.

Discussion: This patient regained functional recovery in just over three months post surgery. I believe this patient recovered quickly due to several factors. These factors include his prior level of muscular strength, the size of the rotator cuff tear, his compliance with physical therapy and his home exercise program, and his high motivation to return to work.

CHAPTER I

BACKGROUND AND PURPOSE

According to the American Academy of Orthopaedic Surgeons, previous studies have found the prevalence of rotator cuff tears may exceed 50% in individuals older than age 65. Given that this age group is the fastest growing segment of the U.S. population, rotator cuff pathology is sure to become an even more significant problem in the future.[1] With this information, it is important to continue research on rotator cuff tears and rehabilitation for the rotator cuff following surgical repair.

The rotator cuff is made up of muscles and tendons that surround and stabilize the glenohumeral joint of the shoulder. The muscles that make up the rotator cuff are the supraspinatus, infraspinatus, teres minor, and subscapularis. The rotator cuff muscles function to initiate glenohumeral joint abduction, provide internal and external rotation, and contribute to dynamic glenohumeral stability.[2]

Rotator cuff tears are a common injury to a complicated joint. Risk factors commonly associated with rotator cuff tears include older age, certain sports or jobs, and family history.[3] Rotator cuff tears are much more common among people over 40 years of age. Certain sports that regularly require the use repetitive arm movements, such as baseball and tennis, have a greater risk of developing shoulder issues including rotator cuff tears. Occupations, such as carpenters or painters, that require repetitive overhead movements are more likely to develop rotator cuff tears. There may also be a genetic component involved with rotator cuff injuries, as they may occur more commonly among certain families.

Many rotator cuff tears can be treated conservatively with methods that include anti-inflammatory medication, steroid injections, and physical therapy. When conservative management fails to reduce pain and weakness it is often recommended that patients pursue surgery to repair the rotator cuff tear. Determining when surgery may be appropriate depends on the type of rotator cuff tear, the patient's activity level, and the treatments that have been attempted. Surgery is usually recommended for people who do a lot of overhead activities for their job or sports. Examples of jobs and sports include carpenters, painters, electricians, baseball pitchers, tennis players, and swimmers.

Physical therapy is often incorporated prior to rotator cuff surgery to increase strength in the musculature surrounding the shoulder joint. Increased strength in the shoulder musculature may help decrease rehabilitation time following rotator cuff repair surgery.

There are a few different surgical options for repairing rotator cuff tears. Advancements have been made in surgical techniques that allow surgeons to use less invasive procedures. The most commonly used surgical techniques include the traditional open repair and the arthroscopic repair. Each type of procedure has advantages and disadvantages but they have the same goal of getting the tendon to heal. The open repair is usually required if the tear is large or complex, and it requires the surgeon to make an incision over the shoulder and detach the deltoid muscle to allow access to the torn tendon. The arthroscopic repair is much less invasive and involves inserting a small camera, called an arthroscope, into the shoulder joint. The camera allows the surgeon to guide surgical instruments into the area to repair the torn tendon. Usually there are 1 to 3 additional small incisions for the instruments to be inserted.[4] Following surgery, recovery

can take anywhere from three to six months. Rehabilitation is usually successful at relieving pain and increasing strength and range of motion of the shoulder.

It is extremely important for patients to follow the precautions following rotator cuff repair surgery. Active range of motion should be avoided for the first 4-6 weeks, especially abduction and external rotation to allow for healing of the repaired tendon and muscle. Patients will receive a sling to help hold their arm in the appropriate position. When patients are lying on their back they should place a towel roll under their elbow to support the arm and maintain a more neutral position. Many patients find that sleeping in a recliner or in bed with a wedge to be the most comfortable during the first few weeks post-surgery.[5]

The rate of rehabilitation after rotator cuff repair is based on patient-centric factors, including tear chronicity, tissue quality, the ability to meet staged goals, and tolerance to rehabilitation stresses.[6] Most rotator cuff repair protocols are progressed through phases. The main goals initially after surgery are to control pain and swelling, protect the rotator cuff repair, protect wound healing, prevent shoulder stiffness, and begin early shoulder motion. This phase usually lasts 5-6 weeks. Early shoulder motion consists of a pendulum exercise. This exercise consists of having the patient flex their trunk and support their upper body with the uninvolved extremity; the involved extremity hangs down and is moved in a pendulum fashion through motion of the trunk. There is no active contraction of the shoulder muscles, as this is a passive exercise. The following phases progress as the patient reaches the goals of each phase. The protocol phases will be discussed in further detail later in this report.

Much of the research on rotator cuff repair rehabilitation focuses on one question. What is more beneficial to the patient, immobilization or early mobilization following surgery? Immobilization with a sling is common for 4-6 weeks post-surgery, but sometimes the surgeon will recommend early mobilization. Early mobilization refers to implementing passive range of motion exercises within a few days following surgery. One meta-analysis concluded that there are no identified significant differences in functional outcomes and relative risks of recurrent tears between delayed and early motion in patients undergoing arthroscopic rotator cuff repairs.[7]

The main purpose of this case report is to evaluate the results of physical therapy rehabilitation on a rotator cuff tear repaired by arthroscopic surgery and compare the results with typical outcomes. The patient in this case report was instructed to immobilize his shoulder for 5-6 weeks post-surgery to allow for proper tendon healing. After the initial 5-6 weeks he began physical therapy.

CHAPTER II

CASE DESCRIPTION

Subject History

The patient is a 58-year-old male who had recently undergone a left rotator cuff repair. He was employed as a fuel truck driver, which required him to lift heavy hoses on a daily basis. Patient reported that he slipped off of a platform, reached out and grabbed onto a rail as he was falling, at which time he felt a painful sensation in his left shoulder. This incident happened in the summer of 2014. He saw his doctor the following day, and was scheduled for an MRI. They found he had a tear in his left rotator cuff, specifically in his supraspinatus tendon. Conservative care, including physical therapy, was unsuccessful. He and his doctor decided surgery would be necessary, and he underwent arthroscopic surgery approximately seven weeks post injury. His initial physical therapy evaluation post-surgery was scheduled five weeks post surgery. The patient's past medical history included hypertension and type II diabetes, which were both controlled with medication.

Patient presented to physical therapy wearing his sling appropriately on his left arm. He was right hand dominant and rated his pain 4-5/10 at the worst, (0 = no pain and 10 = severe pain). Prescription pain medications alleviated his pain to 2/10. The pain was described as an aching muscle soreness located on his anterolateral shoulder. He had occasional numbness/tingling sensations into his arm, similar to his pre-surgical symptoms. Patient was not able to work and required assistance with some activities of daily living. The patient had some trouble sleeping due to pain. His preferred sleeping position was on his left side and he would habitually roll onto his left shoulder during the

night. The pain interrupted his sleep and prevented him from falling back to sleep. Patient stated his wife had been really supportive and helpful with assisting him at home with his ADLs. Patient's goals included decreasing the pain and returning to work as soon as possible.

Review of Systems

The patient's resting heart rate and respiratory rate were both within the normal range. Medications for hypertension were maintaining his blood pressure. His surgical incisions showed no signs of infection and were healing properly. Gross motor function and strength were normal in all extremities except the left upper extremity. Patient did not have any problems with balance or gait.

Clinical Impression

The patient was an acceptable candidate for physical therapy intervention due to the knowledge and experience of the physical therapist as well as a fully equipped facility to provide for this patient's needs. The patient's primary physician and surgeon referred him to physical therapy following arthroscopic surgery. He was very determined to return to work and regain independence in all activities of daily living.

Examination Plan

The patient was re-assessed at each physical therapy session by the physical therapist and student physical therapist. A more formal re-examination occurred following four weeks of physical therapy sessions. This amount of time allowed the

patient to make significant and noticeable progress. At this time, range of motion was re-assessed and strength testing was completed. The patient was shown the amount of improvement he had made to help keep his motivation level high and show that his hard work in physical therapy was beneficial.

Examination

The patient completed active range of motion (AROM) of the cervical spine and right shoulder, both were within functional limits (WFL). AROM of the left shoulder was deferred due to post surgery protocol. Passive range of motion (PROM) of his right and left shoulders was also assessed. His right shoulder PROM was recorded to use as a reference for his left shoulder. PROM measurements of his left shoulder were limited in each motion as displayed in the Table 1. Patient's grip strength was measured using a handheld dynamometer and was recorded as 84 pounds on the R, and 60 pounds on the L. Manual muscle testing (MMT) was used to assess the patient's strength of his right arm and his strength was recorded as 5/5 for all right arm movements including motions of his shoulder, elbow, and wrist. Strength testing of left arm was deferred due to post-surgery protocol.

Table 1. Initial Evaluation PROM and Adult Shoulder ROM Norms

PROM	Right Shoulder	Left Shoulder	Adult Norms
Shoulder Flexion	172°	115°	0-180°
Shoulder Abduction	170°	98°	0-180°
Shoulder External Rotation*	88°	56°	0-90°
Shoulder Internal Rotation*	70°	52°	0-70°

*Shoulder external and internal rotation were both completed with patient's shoulder in 90° abduction.

Patient was educated on correct posture, correct usage of arm sling, and the various shoulder precautions that included lifting restrictions and no sudden movements of shoulder. Following the initial physical therapy evaluation the patient was supplied with a home exercise program that consisted of gentle PROM exercises. He was instructed to complete his exercises two to three times a day. Patient was scheduled for physical therapy three times per week.

Evaluation

The patient's problem list included increased pain, decreased range of motion, and decreased strength. He was unable to complete all of his activities of daily living independently and some activities could be completed independently, but at a slower pace than before his injury. Occasionally he had trouble sleeping at night due to pain. The patient was not able to go to work and provide for his family, which caused him added stress.

Both long-term and short-term goals were set for the patient by the physical therapist. The short-term goals were to be met within two weeks and included decreasing and maintaining a tolerable pain level, and becoming independent with his home exercise program, which included passive and active assistive range of motion exercises. Long-term goals were to be met within four weeks and included increasing ROM by 10-15° in all motions of the left shoulder, and increasing strength of all left shoulder motions to 3-4/5.

Diagnosis

The patient's diagnostic classification according to the Guide to Physical Therapy Practice would be pattern 4I: Impaired Joint Mobility, Motor Function, Muscle Performance, and Range of Motion Associated with Bony or Soft Tissue Surgery.[8] Because this patient had already been diagnosed by his physician and had already had the arthroscopic surgery to repair the rotator cuff tear, the physical therapist did not have to complete any special tests to rule in or rule out various diagnoses. If this patient had been seen by the physical therapist prior to the MRI or surgery, the physical therapist would have been more involved in the diagnosis of his shoulder pathology. There are several special tests that are used for the examination of the rotator cuff. However, it is not practical or feasible to use every special test when examining a patient with a possible rotator cuff tear. The following table provides a list of common special tests used to help with the diagnosis of rotator cuff pathology. These tests have been rigorously assessed for sensitivity and specificity.[9]

Table 2. Sensitivity and Specificity of Special Tests for Rotator Cuff Tears.[9]

Test	**Range of Diagnostic Values (%)**
Subscapularis	
Lift-off test (and lag sign)	Sensitivity: 17-100 Specificity: 60-98
Belly Press test	Sensitivity: 40-43 Specificity: 93-98
Belly-off sign	Sensitivity: 14-86 Specificity: 91-95
Bear hug test	Sensitivity: 60 Specificity: 92
Supraspinatus and Infraspinatus	
External rotation lag sign	Sensitivity: 46-98 Specificity: 72-98
Jobe's test	Sensitivity: 53-89 Specificity: 65-82
Drop arm test	Sensitivity: 10-73 Specificity: 77-98
Teres Minor	
Hornblower's sign	Sensitivity: 100 Specificity: 93

Prognosis

The prognosis for this patient was a full recovery within 3-6 months. The patient had good strength prior to his injury, and had a partial tear as opposed to a large or full-thickness tear. Both of these factors are helpful when it comes to the time frame of recovery. The patient was extremely motivated to return to work to continue providing for his family.

Interventions

The focus of the plan of care was to decrease pain, and increase ROM and strength of the shoulder. Interventions consisted of therapeutic exercise, manual therapy, modalities, and a home exercise program. This patient's rehabilitation was completed in phases using a protocol provided by the surgeon. A similar protocol to the one used for this patient is located in Appendix 1 of this report. The primary goal of phase I was to protect the repaired tissues while also increasing ROM of the shoulder, thus, initial sessions focused on PROM of the left shoulder. Gentle stretching at end-range was used to help increase range of motion. Intermittent cryo-compression (Game Ready® device) was applied at the end of each therapy session to reduce shoulder edema and decrease pain. A narrative review on cryo-compression therapy stated, "Almost without exception, the use of cold compression therapy following either acute musculoskeletal injury or orthopedic surgery results in improved clinical outcomes compared to no treatment."[10]

In phase II, active assistive range of motion exercises (AAROM) were implemented using a wooden dowel and a pulley system. The patient would complete internal and external rotation by lying supine and holding a wooden dowel in both hands. Flexion would also be completed in supine, but with the assistance of the uninvolved arm. The pulley system was used to help complete shoulder flexion and abduction while seated in a chair. The patient was given a pulley system to use at home and his HEP progressed by adding the AAROM exercises. Some active range of motion (AROM) was completed by the patient during this phase, but it was done very slowly and not through the full available range.

Phase III was initiated approximately 8-9 weeks post-surgery. At this time the tendon was healed enough to endure the initiation of strengthening exercises while continuing with PROM, AAROM, and AROM exercises. Warm-up consisted of 5 minutes on the upper extremity ergometer, followed by shoulder flexion and abduction AAROM using a pulley system. Other exercises included: wall walking into shoulder flexion and abduction, 3-way rowing with theratubing, AROM shoulder flexion and scaption with dumbbells, side lying external rotation with dumbbells, ladder push-ups, bicep curls, tricep kick-backs, and horizontal abduction with dumbbells. Each exercise was initiated with very light resistance and then progressed as the patient tolerated. The patient would usually complete each exercise for 10-15 repetitions prior to increasing the amount of weight or resistance. The patient's HEP was progressed often throughout this phase with added exercises or increased repetitions, resistance, or weight. Patient was given theratubing to use at home and was also educated on using various household objects for strengthening exercises. One example being the use of a soup can for exercises involving a one-pound dumbbell.

Outcomes

After 4 weeks of physical therapy the patient had been to 10 sessions, he missed one session due to a scheduling conflict and another due to not feeling well. The patient was re-evaluated and had made significant progress. His AROM for shoulder flexion, abduction, and scaption were still limited. These limitations were found to be attributed to muscle weakness, due to his PROM measurements of his left shoulder measuring: flexion 150°, abduction 125°, ER 75°, and IR 65°. His left shoulder and elbow strength

measurements are included in the table below. Grip strength was 85 lbs. on the right and 70 lbs. on the left. Normative data for grip strength in men aged 50-59 years old is approximately 99 lbs. for the right and 95 lbs. for the left.[11] Pain was rated 2/10 at the worst.

After seven weeks (19 sessions) the patient had his final therapy session. The patient reported minimal pain 0-1/10. AROM of his left shoulder improved to WFL. Upper extremity strength testing improved for all motions. The patient met all functional goals by this session. He reported compliance with his HEP throughout the course of his rehabilitation and his results seemed to confirm his report. He only missed a couple of therapy sessions and stated he completed his HEP on those days. The patient was very motivated to get back to work resulting in no compliance issues. He was also encouraged to continue his home exercise program following his discharge. The patient saw the clinic's physician following the last physical therapy session. The physician lifted all restrictions and cleared the patient for regular work duties.

Table 3. Discharge Data

PROM (L) Shoulder	**Initial Evaluation**	**Re-evaluation (4 weeks)**	**Discharge**
Flexion	115°	150°	170°
Abduction	98°	125°	163°
External Rotation*	56°	75°	83°
Internal Rotation*	52°	65°	74°
AROM (L) Shoulder	**Initial Evaluation**	**Re-evaluation (4 weeks)**	**Discharge**
Flexion	Deferred due to healing precautions	125°	165°
Abduction	Deferred due to healing precautions	120°	160°
External Rotation*	Deferred due to healing precautions	Not assessed	80°
Internal Rotation*	Deferred due to healing precautions	Not assessed	70°
Strength of (L) Shoulder	**Initial Evaluation**	**Re-evaluation (4 weeks)**	**Discharge**
Flexion	Deferred due to healing precautions	4/5	5/5
Extension	Deferred due to healing precautions	5/5	5/5
Abduction	Deferred due to healing precautions	3/5	5/5
External Rotation*	Deferred due to healing precautions	3/5	5/5
Internal Rotation*	Deferred due to healing precautions	4/5	5/5

*Shoulder external and internal rotation were both completed with patient's shoulder in 90° abduction.

CHAPTER III

DISCUSSION

A study was done on 201 patients who had undergone arthroscopic rotator cuff repair surgery. Of those patients, 31% took less than 3 months to regain functional recovery, 40% took between 3 and 6 months, and 28% took greater than 6 months. Functional recovery is related to several factors including age, rotator cuff tear size, preoperative muscle weakness, and joint mobility.[12] This patient regained functional recovery in just over three months post surgery. I believe this patient recovered fairly quickly due to several factors. These factors include his prior level of muscular strength, the size of the rotator cuff tear (partial tear), his compliance with physical therapy sessions and home exercise program, and his motivation. If this patient's diabetes was not controlled it would likely have caused problems with tissue healing. Diabetes has been found to have a detrimental effect on tendon healing using a rat rotator cuff tear model. Modification of serum cholesterol levels and blood glucose levels may play a role in improving healing after repairs.[13] This patient also affirmed he has never been a smoker which was also helpful for his recovery. Smoking has been shown to delay tendon-to-bone healing in a rat model and clinical studies have demonstrated inferior outcomes after repair in smokers.[13] This patient was extremely motivated to return to work so he could continue providing for his family. Patient was very satisfied with the results of his physical therapy rehabilitation.

It is important to keep in mind that some patients who undergo arthroscopic rotator cuff repair will not have a positive outcome like this patient. Some rotator cuffs do not heal fully and continue to have stiffness, weakness, and chronic pain. The poorer

results are usually due to one or more of the following factors: larger tears; older age (over 65 years old); noncompliance with post-surgery procedures and precautions; not following post-surgery exercise and instructions properly; smoking; weak rotator cuff prior to the injury; and workers' compensation claims.[4]

There are several different protocols for rotator cuff repair rehabilitation. Most of the protocols consist of phases similar to the phases used with this patient. An article titled, "Rehabilitation After Arthroscopic Rotator Cuff Repair: Current Concepts Review and Evidence-Based Guidelines" discusses the various aspects of rotator cuff repair.[14] The article contains a proposal of an evidence-based approach to rotator cuff rehabilitation using a protocol with four phases. The phases are very similar to those used with this patient, with the exception of a phase four. The fourth phase consists of advanced strengthening exercises. If our patient had been younger and/or an athlete getting back to a sport, we would have utilized exercises that are included in this phase. Due to the patient's age and desire to return to work, we did not feel it was necessary or appropriate to add the advanced strengthening exercises like plyometrics for the upper extremities.

Functional assessments are very useful objective measures for rehabilitation outcomes. A limitation of this study is that it lacks a functional assessment. I would recommend adding a functional assessment such as the Shoulder Pain and Disability Index (SPADI).[15] (See Appendix 2) The SPADI is a self-administered questionnaire that looks at two different dimensions, one being pain and the other being functional activities. There are five questions regarding the severity of the patient's pain and eight questions that assess functional activities that require the use of the upper-extremities.

Reliability coefficients of ICC ≥ 0.89 have been found in a variety of patient populations using the SPADI. "The SPADI demonstrates good construct validity, correlating well with other region-specific shoulder questionnaires. It has been shown to be responsive to change over time in a variety of patient populations and is able to discriminate adequately between patients with improving and deteriorating conditions."[15]

Historically, surgeons would recommend early passive range of motion after rotator cuff repair surgery to decrease the likelihood of the patient developing adhesions or shoulder stiffness. More recent research has shown that although early passive range of motion can reduce the chances of postoperative stiffness, it may not be ideal for the early phases of tendon healing. A prospective randomized study evaluated patient outcomes and rotator cuff healing after arthroscopic rotator cuff repair by using a postoperative physical therapy protocol with early passive motion compared with a delayed protocol that limited early passive motion.[16] Keep in mind the patient in this case study would be in the group with limited passive motion as he was instructed to keep shoulder immobilized for 5-6 weeks post-op. The results of the study showed both groups had similar improvements in preoperative to postoperative American Shoulder and Elbow Surgeons scores and Simple Shoulder Test scores. There were no significant differences in patient satisfaction, rotator cuff healing, or range of motion between the early and delayed groups.[16] There are several studies done on early vs. delayed motion following rotator cuff repair. The general consensus shows there are really no significant differences to the outcomes. Surgeons continue to use clinical experience and expertise when making recommendations for their patients following surgery.

With the high prevalence of rotator cuff tears, I will likely encounter many patients similar to the one in this case report. This patient's recovery was unremarkable and he did not have any set backs or problems along the way. I know this won't always be the case when treating patients following arthroscopic rotator cuff repair, but I will be able to use this case as a general guideline of how to treat this type of impairment. In the future, I will use some form of functional assessment with all of my patients in order to objectively show the amount of improvement they make throughout their recovery.

Conclusion

This case report describes the physical therapy interventions and functional outcomes of a patient who underwent arthroscopic rotator cuff surgery to repair a partial tear of the supraspinatus tendon caused by trauma. The patient made great progress throughout his rehabilitation. He increased his strength and ROM to WFL following seven weeks of physical therapy. This specific patient was instructed by his surgeon to keep his shoulder immobilized for five-six weeks prior to beginning physical therapy. The patient was highly motivated to return to work to continue providing for his family.

Appendix 1.

REHABILITATION PROTOCOL 3-2

Arthroscopic Rotator Cuff Repair Protocol for Partial-Thickness Tear and Small Full-Thickness Tears

This protocol was developed to provide the rehabilitation professional with a guideline of postoperative rehabilitation course for a patient who has undergone an arthroscopic rotator cuff repair of a *partial-thickness* or a *small full-thickness* rotator cuff tear. It should be stressed that this is only a protocol and should not be a substitute for clinical decisionmaking regarding a patient's progression. Actual progression should be individualized based upon your patient's physical examination, individual progress, and the presence of any postoperative complications.

The rate limiting factor in arthroscopic rotator cuff repair is the biologic healing of the cuff tendon to the humerus, which is thought to be a minimum of 8 to 12 weeks.

Progression of AROM against gravity and duration of sling use is predicated both on the size of tear and quality of tissue and should be guided by referring physician. Refer to initial therapy referral for any specific instructions.

Phase I: Immediate Post Surgical Phase (Weeks 0–4)

Goals

Maintain/protect integrity of repair
Gradually increase passive range of motion (PROM)
Diminish pain and inflammation
Prevent muscular inhibition
Independence in modified activities of daily living

Precautions

No active range of motion (AROM) of shoulder
No lifting of objects, reaching behind back, excessive stretching or sudden movements
Maintain arm in brace, sling; remove *only* for exercise
Sling use for 4 to 5 weeks; repaired partial to small tear size
No support of body weight by hands
Keep incisions clean and dry

Days 1 to 6

Use of abduction brace/sling (during sleep also); remove *only* for exercise
Passive pendulum exercises (three times a day minimum)
Finger, wrist, and elbow AROM (three times a day minimum)
Gripping exercises (putty, handball)
Cervical spine AROM
Passive shoulder (PROM) done supine for more patient relaxation
Flexion to 110 degrees
External rotation/internal rotation (ER/IR) in scapular plane < 30 degrees
Educate patient on posture, joint protection, importance of brace/sling, pain medication use early, hygiene
Cryotherapy for pain and inflammation
Days 1 to 3: as much as possible (20 minutes/hour)
Days 4 to 7: postactivity, or as needed for pain
Days 7 to 35
Continue use of abduction brace until DC from physician.
Continue with full time use of sling until end of week 4.
Pendulum exercises
Begin PROM to tolerance (supine, and pain free)
May use heat prior to ROM
Flexion to tolerance
ER in scapular plane ≥30 degrees
IR in scapular plane to body/chest
Continue elbow, hand, forearm, wrist, and finger AROM
Begin resisted isometrics/isotonics for elbow, hand, forearm, wrist, and fingers
Begin scapula muscle isometrics/sets, AROM
Begin GH submaximal rhythmic stabilization exercises in "balance position (90–100 degrees of elevation) in supine position to initiate dynamic stabilization
Begin gentle rotator cuff submaximal isometrics (4 to 5 weeks)
Cryotherapy as needed for pain control and inflammation
May begin gentle general conditioning program (walking, stationary bike) with caution if unstable from pain medications.
No running or jogging
Aquatherapy may begin approximately 3 weeks postoperatively if wounds healed

Criteria for Progression to Next Phase (II)

Passive forward flexion to ≥ 125 degrees
Passive ER in scapular plane to ≥ 60 degrees (if uninvolved shoulder PROM >80 degrees)
Passive IR in scapular plane to ≥ 60 degrees (if uninvolved shoulder PROM >80 degrees)
Passive abduction in scapular plane to ≥ 90 degrees
No passive pulley exercise

Phase II: Protection and Protected Active Motion Phase (Weeks 5–12)

Goals

Allow healing of soft tissue
Do not overstress healing soft tissue
Gradually restore full passive ROM (approximately week 5)
Decrease pain and inflammation

Precautions

No lifting
No supported full body weight with hands or arms
No sudden jerking motions
No excessive behind back motions
No bike or upper extremity ergometer until week 6

Weeks 5 to 6

Continue with full time use of sling/brace until end of week 4
Continue periscapular exercises
Gradually wean from brace starting several hours/day out progressing as tolerated
Use brace/sling for comfort only until full DC by end of week 6
Initiate AAROM shoulder flexion from supine position
Progressive PROM until full PROM by week 6 (should be pain free)
May require use of heat prior to ROM exercises/joint mobilization
Can begin passive pulley use
May require gentle glenohumeral or scapular joint mobilization as indicated to obtain full unrestricted ROM

Arthroscopic Rotator Cuff Repair Protocol for Partial-Thickness Tear and Small Full-Thickness Tears (Continued)

Initiate prone rowing to a neutral arm position
Continue cryotherapy as needed post-therapy or -exercise

Weeks 7 to 9

Continue AROM, AAROM, and stretching as needed
Begin IR stretching, shoulder extension, and cross body, sleeper stretch to mobilize posterior capsule (if needed)
Continue periscapular exercises progressing to manual resistance to all planes
Seated press-ups
Initiate AROM exercises (flexion, scapular plane, abduction, ER, IR); should be pain free; low weight; initially only weight of arm
Do not allow shrug during AROM exercises
If shrug exists continue to work on cuff and do not reach/lift AROM over 90-degree elevation
Initiate limited strengthening program
*Remember rotator cuff (RTC) and scapular muscles small and need endurance more than pure strength
ER and IR with exercise bands/sport cord/tubing with adduction pillow (under axilla)
ER isotonic exercises in side lying (low-weight, high-repetition)
Elbow flexion and extension isotonics

Criteria for Progression to Phase III

Full AROM

Phase III: Early Strengthening (Weeks 10–16)

Goals

Full AROM (weeks 10–12)
Maintain full PROM
Dynamic shoulder stability (GH and ST)
Gradual restoration of GH and scapular strength, power and endurance
Optimize neuromuscular control
Gradual return to functional activities

Precautions

No lifting objects >5 lbs, no sudden lifting or pushing
Exercise should not be painful

Week 10

Continue stretching, joint mobilization, and PROM exercises as needed
Continue periscapular exercises
Dynamic strengthening exercises
Begin light isometrics in 90/90 or higher supine, PNF D2 flexion/extension patterns against light manual resistance
Initiate strengthening program
Continue exercises as in weeks 7 to 9
Initiate scapular plane elevation to 90 degrees (patient must be able to elevate arm without shoulder or scapular hiking before initiating isotonic exercises. If unable then continue cuff/scapular exercises)
Full can (no empty can abduction exercises)
Prone rowing
Prone extension
Prone horizontal abduction

Week 12

Continue all exercise listed
May begin BodyBlade, Flexbar, Boing below 45 degrees
Initiate light functional activities as tolerated
Initiate low level plyometrics (two-handed, below chest level, progressing to overhead and finally one-handed drills)

Week 14

Continue all exercises listed
Progress to fundamental exercises (bench press, shoulder press)

Criteria for Progression to Phase IV

Ability to tolerate progression to low-level functional activities
Demonstrate return of strength/dynamic shoulder stability
Reestablishment of dynamic shoulder stability
Demonstrated adequate strength and dynamic stability for progression to more demanding work and sport-specific activities

Phase IV: Advanced Strengthening Phases (Weeks 16–22)

Goals

Maintain full nonpainful AROM
Advanced conditioning exercise for enhanced functional and sports-specific use
Improve muscular strength, power, and endurance
Gradual return to all functional activities

Week 16

Continue ROM and self-capsular stretching for ROM maintenance
Continue periscapular exercises
Continue progressive strengthening
Advanced proprioceptive, neuromuscular activities
Light isotonic strengthening in 90/90 position
Initiation of light sports (golf chipping/putting, tennis ground strokes) if satisfactory clinical examination

Week 20

Continue strengthening and stretching
Continue joint mobilization and stretching if motion is tight
Initiate interval sports program (e.g., golf, doubles tennis) if appropriate

Brotzman SB, Manske RC. Clinical Orthopaedic Rehabilitation, An Evidence-based Approach. Elsevier Health Sciences; 2011.

Appendix 2.

Shoulder Pain and Disability Index

Please place a mark on the line that best represents your experience during the last week attributable to your shoulder problem.

Pain scale

How severe is your pain?

Circle the number that best describes your pain where: **0** = no pain and **10** = the worst pain imaginable.

At its worst?	0	1	2	3	4	5	6	7	8	9	10
When lying on the involved side?	0	1	2	3	4	5	6	7	8	9	10
Reaching for something on a high shelf?	0	1	2	3	4	5	6	7	8	9	10
Touching the back of your neck?	0	1	2	3	4	5	6	7	8	9	10
Pushing with the involved arm?	0	1	2	3	4	5	6	7	8	9	10

Total pain score _____ /50 x 100 = _____ %

(Note: If a person does not answer all questions divide by the total possible score, eg. if 1 question missed divide by 40)

Disability scale

How much difficulty do you have?

Circle the number that best describes your experience where: **0** = no difficulty and **10** = so difficult it requires help

Washing your hair?	0	1	2	3	4	5	6	7	8	9	10
Washing your back?	0	1	2	3	4	5	6	7	8	9	10
Putting on an undershirt or jumper?	0	1	2	3	4	5	6	7	8	9	10
Putting on a shirt that buttons down the front?	0	1	2	3	4	5	6	7	8	9	10
Putting on your pants?	0	1	2	3	4	5	6	7	8	9	10
Placing an object on a high shelf?	0	1	2	3	4	5	6	7	8	9	10
Carrying a heavy object of 10 pounds (4.5 kilograms)	0	1	2	3	4	5	6	7	8	9	10
Removing something from your back pocket?	0	1	2	3	4	5	6	7	8	9	10

Total disability score: _____/ 80 x 100 =_____ %

(Note: If a person does not answer all questions divide by the total possible score, eg. if 1 question missed divide by 70)

Total Spadi score: _____ 130 x 100 = _____ %

(Note: If a person does not answer all questions divide by the total possible score, eg if 1 question missed divide by 120)

Minimum Detectable Change (90% confidence) = 13 points
(Change less than this may be attributable to measurement error)

Breckenridge JD, Mcauley JH. Shoulder Pain and Disability Index (SPADI). J Physiother. 2011;57(3):197.

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