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Use of Myofascial Release and Proprioceptive Neuromuscular Facilitation in Combination with a Rehabilitation Protocol For a Patient Following a Massive Rotator Cuff Tear and Repair: A Case Report

by

Bryan L. Arroyo, SPT

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 Bryan L. Arroyo 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.

Shawn Decker
(Graduate School Advisor)

_____
(Chairperson, Physical Therapy)

PERMISSION

Title Use of Myofascial Release and Proprioceptive Neuromuscular Facilitation in Combination with a Rehabilitation Protocol For a Patient Following a Massive Rotator Cuff Tear and Repair: A Case Report

Department Physical Therapy

Degree Doctor of Physical Therapy

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Date 11-19-10

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I would like to thank my advisor, Schawnn Decker, for helping me put this case report together. I would also like to thank my group peers for reviewing this and giving me ideas and constructive feedback. I would most like to thank my patient for allowing me to work with him and letting me use him in my case report. Without him I wouldn't be writing this case report. He was a kind and generous person, and it was a pleasure getting a chance to meet him. I learned a lot from him.

ABSTRACT

Background and Purpose. This case report describes the use of postoperative treatments incorporating myofascial release and proprioceptive neuromuscular techniques, on a 59-year-old male who underwent a left open rotator cuff repair following a massive rotator cuff tear. This was after an 8 week passive motion phase. The goals of this case report were to evaluate the feasibility of these techniques and to examine improvements in shoulder range of motion, function of the involved extremity, and pain reduction.

Case Description. The patient suffered a massive rotator cuff tear at work after falling on his shoulder. The patient started with an 8 week passive motion treatment phase combined with stretching to protect the surgical sites and allow the rotator cuff tendons to heal. At 8 weeks the patient started an active assistive range of motion treatment phase to work on strengthening and flexibility. At 10 weeks he was able to do active range of motion and began strength exercises to help strengthen the deltoid and rotator cuff muscles.

Intervention. Myofascial release was used to stretch out tight restrictive tissues. The patient also performed a proprioceptive neuromuscular facilitation (PNF) hold-relax technique for external rotation.

Outcomes. Visual analog pain scores (0-10) at examination, 8 weeks, and 12 weeks were 6, 3, and 1, respectively. Passive shoulder flexion, abduction, and external rotation increased by 95°, 55° and 40°, respectively. At 12 weeks the patient was able to do some overhead activities at 90 degrees and was able to put on and take off his coat.

Discussion. The findings suggest that myofascial release and a PNF hold-relax technique may be incorporated into a rehabilitation program for a rotator cuff tear and repair.

CHAPTER I

BACKGROUND AND PURPOSE

The rotator cuff, a group of four tendons that blend together to help stabilize and move the shoulder, consists of the supraspinatus, infraspinatus, teres minor, and subscapularis muscles. The rotator cuff can become torn from either an acute trauma to the shoulder or from weakened tendons from disuse or wear and tear over time. Large (3-5cm) and massive (5+ cm) rotator cuff tears can be difficult to repair due to tendon retraction and poor tissue quality.[1,2] Poor tissue quality, common in massive tears, includes tendon inelasticity, bursal scarring, fatty degeneration, and muscle atrophy. This can lead to less than optimal physical outcomes, such as reduced shoulder elevation and functional ability. Massive tears also have a high incidence of failure and re-tear rate.[2]

Postoperative stiffness is another issue that can result following rotator cuff repairs. Many surgical and clinical factors (age, history of diabetes, time taken before repair) may be associated with the development of postoperative stiffness.[3] Diabetes has been shown to be a risk factor and pre-disposer to frozen shoulder and postoperative stiffness.[4] Research has been done with rats revealing slow tendon to bone healing with uncontrolled diabetes.[5] Rehabilitation following surgery needs to be more conservative to allow time for tendon healing, but if too conservative, the patient may develop soft tissue and capsular stiffness in the shoulder.[3]

Another factor resulting in poor outcomes following a rotator cuff repair is the presence of fatty infiltration in the rotator cuff muscles prior to surgery.[6,7] Fatty deposits

can develop in the muscles after an injury. The longer the patient delays surgery, the larger these deposits can become.[6] If there is a higher fat to muscle ratio at the injury site or if the muscle is entirely replaced by fat, the rotator cuff may become un-repairable and a total shoulder or a reverse total shoulder arthroplasty may be done. There is disagreement between surgeons as to how much fatty infiltration of the muscle is compatible with successful rotator cuff repair.[6]

There are numerous articles describing rotator cuff repair techniques and the outstanding results that can be achieved.[8,9] Studies have shown that early surgical intervention, within 3 weeks of injury, provides the best opportunity for maximal recovery of shoulder function.[10] Surgical intervention within 6 weeks may have some benefits in recovery of shoulder range of motion (ROM) and strength, but not as significant when compared to surgery within 3 weeks.[10] Good results can still be accomplished if surgery is performed within 6 weeks of injury, but any later than that can be detrimental to the integrity of the rotator cuff and functional outcomes.[10]

Generalized protocols, following rotator cuff repair, start with passive motion emphasized for the first 6 weeks to decrease the effects of immobilization and reduce the risk of postoperative stiffness. Even with the best surgeon and intervention techniques, postoperative stiffness may still occur. The protocol should be individualized to the patient depending on a multitude of factors (surgery, tear size, risk for stiffness). An open rotator cuff repair will have more ROM restrictions and a longer passive motion phase when compared to an arthroscopic rotator cuff repair, due to involvement of the deltoid muscle. The same is true for a larger rotator cuff tear and repair. More time is needed with a large or massive tear to allow for the tendons to heal.[11]

Regardless of the tear size or the cause of injury, physical therapy is believed to be effective for decreasing postoperative pain and regaining shoulder strength and ROM. Hold-relax and other proprioceptive neuromuscular facilitation (PNF) techniques have been shown to have immediate effects on increased shoulder ROM.[12,13,14] The hold-relax technique relies on a process known as autogenic inhibition, which occurs more readily in a muscle following an intense contraction. Autogenic inhibition of a muscle is controlled by the Golgi tendon organ, the role of which is to monitor tension within a muscle. The stimulation of the Golgi tendon organ by a muscle contraction causes the inhibition or relaxation of the muscle in which it is located.[15,16] This process allows the muscle that is limiting motion to relax and be stretched to increase ROM in a joint.

Trauma, inflammatory responses, and/or surgical procedures create myofascial restrictions that can produce tensile pressures of approximately 2,000 pounds per square inch on pain sensitive structures.[17] Myofascial release (MFR) is a type of manual therapy used to help reduce capsular stiffness and myofascial restrictions. The purpose of MFR is to apply a gentle sustained pressure to the fascia in the direction of the myofascial connective tissue restriction to restore motion and normal pain-free function. There is limited research on the possible effects of MFR on shoulder ROM following surgery, but it can still be an integral aspect of the rehabilitation process.

The purpose of this case report is to describe the treatment process, involving MFR and PNF techniques, of 59 year old male patient following a massive rotator cuff tear with repair and the ensuing outcomes.

CHAPTER II

CASE DESCRIPTION

This case study describes the physical therapy procedure and rehabilitation protocol following a massive rotator cuff tear and open surgical repair. It was conducted in an outpatient physical therapy department of a hospital. The patient was a 59-year-old left-hand-dominant male without any previous history of shoulder pathologies. The patient had a history of myocardial infarction, coronary artery bypass graft, and Type II diabetes mellitus, which was controlled with oral medications. He worked as a building maintenance personnel. His job required him to push, pull, and carry heavy equipment as well as reach overhead to change lights. He injured his left shoulder at work after falling on it while pushing a dumpster, and experienced sudden, severe pain. He was unable to lift his arm immediately after injury.

He was taken to the emergency room and received an X-ray revealing degenerative spurring at the acromio-clavicular joint, and the humeral head was offset medially below the coracoid process. He was diagnosed with acromial spurring and an anterior shoulder dislocation with possible rotator cuff tear. Initial treatment included analgesic medication and use of a sling combined with ice, elevation, and rest. The physician also recommended an arthroscopic examination and surgery.

Since he was injured at work he had to file for workers compensation insurance. He had to fill out paper work and wait to hear if workers compensation would accept his

claim. He was unable to have surgery until all of the paper work was approved and his claim accepted.

An arthroscopic shoulder repair with partial acromioplasty was performed 7 weeks after the initial injury date. Upon arthroscopic entry, massive tears of the supraspinatus, infraspinatus, teres minor, and biceps tendons were identified and an open rotator cuff repair was performed. The long head of the biceps tendon was anchored to the proximal humerus, or tenodesed, and the torn rotator cuff muscles were sutured and reattached to the greater tuberosity of the humerus.

Examination

The patient was seen 2 weeks following surgery for examination. He walked into the rehabilitation services department with his left arm in a sling. He displayed a slight increased thoracic kyphosis and a forward head. The patient guarded his left upper extremity at rest, but more so with any body movement. This guarding position was most evident after the patient removed his sling as he continued to keep his left elbow flexed and his left arm close to his body as if he was still wearing the sling.

He reported left shoulder pain mainly over the surgical incisions as well as anteriorly near the new biceps insertion, posteriorly over the rotator cuff muscles, and down the biceps muscle belly. Pain was reported on average as a 5/10 (a 0 being no pain and a 10 being worst pain possible). He stated that pain was a 0/10 with rest and at worst a 6/10 when he moved his arm or when it got bumped. Pain was described as dull and nagging with occasional pain spikes during any movement of his left arm. He also reported pain at night in his right shoulder. The pain was so intense at times that it would wake him up (2-3 times) during the course of the night.

He was unable to perform any overhead activities (reaching into his cupboard to grab dishes, wash his hair) with his left arm and had difficulties donning and doffing shirts and jackets. His wife helped him with these activities of daily living, as needed.

A complete systems review was not performed. The patient complained of some numbness over the posterior aspect of his left deltoid and triceps area. Numbness had been present since the injury. It slowly went away over the course of treatment.

Due to the extent of his injuries and surgery procedures, the patient was not allowed to perform any active movements with his left arm for 8 weeks to protect the rotator cuff muscles and biceps tendon repairs. The protocol called for only passive range of motion (PROM) of the left shoulder for the first 8 weeks following surgery.

Examination revealed palpably tender areas over the left biceps muscle belly and tendon, the posterior rotator cuff muscles (supraspinatus, infraspinatus, teres minor) and tendons near their insertion on the humerus, and deltoid muscles. Manual muscle tests of the left upper extremity were performed with the therapist objectively measuring strength by applying manual resistance to the tested muscles. Left hand, wrist, and forearm strength was measured at 5/5. The patient was able to flex his left shoulder against gravity through his available ROM., but no resistance was provided due to the biceps tendon repair.

The patient had no functional ROM of his left shoulder at the initial examination. Left shoulder and elbow ROM was measured with a goniometer. Left elbow flexion was WNL (130°) and was equal to the right elbow. Left elbow extension was limited and measured at -10°. The therapist passively moved the patient's left shoulder through

shoulder flexion, abduction, and external rotation. Measurements for PROM of the shoulders are shown in Table 1.

Table 1. Shoulder ROM at Evaluation

Range (°)	R shoulder	L shoulder	Normal Values
Flexion	165	45	160-180
Abduction	160	45	170-180
External rotation	80	0	80-90

Evaluation, Diagnosis, Prognosis

The patient underwent a traumatic injury and surgery to his left shoulder. To allow proper tendon healing time, rehabilitation for this patient followed a conservative protocol of only PROM of the left shoulder for the first 8 weeks of therapy. PROM was implemented early to counteract any effects of immobilization and to prevent excessive postoperative stiffness from developing. The patient was unable to perform any overhead activities such as washing his hair or grabbing dishes out of the cupboards. He also had difficulties putting on and taking off shirts and jackets. Shoulder ROM was limited to ensure that the repair was not compromised from any unnecessary stresses to the repair sites. Pain was also a limiting factor for shoulder ROM.

The patient's diagnosis fits into Practice Pattern 4I: Impaired joint mobility, motor function, muscle performance, and range of motion associated with bony or soft tissue surgery.[18] Goals of therapy were to decrease the patient's pain in his left shoulder to 0/10 so that he could sleep through the night without waking up due to the pain and to increase left shoulder ROM, as the protocol allowed. By the end of therapy the patient wanted to increase ROM in his left shoulder to equal that of the right one. Other goals were to improve the patient's posture and to limit guarding of his left upper extremity.

Prognosis for this patient was fair, due to having Type II diabetes, which could be a predictor for the development of postoperative stiffness, however his diabetes was controlled. Postoperative stiffness could inhibit the effects of therapy and make functional outcomes difficult to obtain. Rehabilitation for such a massive injury such as this could last from 4-6 months. Therapy focused on increasing shoulder ROM and regaining the patient's functional use of his left arm.

CHAPTER III

INTERVENTION

A home exercise program (HEP) was provided at the preoperative examination. Exercises included active wrist movement (flexion, extension, ulnar deviation, radial deviation, supination, and pronation), pendulum exercises (See Appendix A, page 21) and supine self-assisted passive shoulder flexion. Each exercise was to be repeated 20 times, three times a day.

The patient arrived for physical therapy 2 weeks after surgery. Therapist-assisted passive stretching of the shoulder and elbow was performed twice a week for 8 weeks. Stretching was performed for shoulder flexion, abduction, external rotation, and internal rotation. Light stretching was also done for elbow flexion and extension.

Table slides, scapular pinches (squeezing the shoulder blades together), and shoulder shrugs were added to the patient's HEP 2 weeks after surgery. Table slides were a variation of the pendulum exercises and were done as another form of PROM. The patient performed this by putting his left hand on a towel on a low table and moving his trunk back and forth, side-to-side, and in a circular motion.

Three weeks after surgery, the patient was instructed to perform passive shoulder external rotation, internal rotation, and flexion with a cane independently at home (See Appendix A, page 22). These were done with the patient lying supine. Keeping his left arm at his side and his elbow at a 90 degree angle, he was to use the cane to push his left

arm into external rotation. The therapist provided verbal cuing to the patient to not straighten his elbow during this exercise. This stretching was to be repeated 10-20 times, 2-3 times a day, holding the stretch for 5-10 seconds as tolerated. When more range became available, the patient started performing cane exercises in standing for shoulder flexion and abduction (Appendix A, page 22). He saw the surgeon 1 month after surgery. Continued use of the sling was recommended until 6 weeks post-surgery. He had been slowly weaning off the sling and was feeling better without it but followed his doctor's recommendation. The surgeon encouraged the patient to keep up with his therapy.

Five weeks after surgery, his HEP was increased to include passive horizontal shoulder adduction stretching and standing hand-behind-back stretching with a cane or towel (See Appendix A, page 23) to work on internal rotation, holding for 10 seconds, 5 times each. The patient was also given self-stretches for shoulder flexion, external rotation, and for his neck and trapezius muscles (Appendix A, page 23). These stretches were to be incorporated into the patient's everyday life and performed multiple times throughout the day while the patient was sitting at a desk or standing at a doorway.

Therapist performed myofascial release was also initiated to stretch the pectoralis muscles, shoulder, and neck tissues. With the patient sitting, the therapist stood behind him and applied a gentle sustained pressure to the pectoralis muscles and shoulders in a posterior direction. This pressure was held for 2-3 minutes or until the myofascial restrictions were felt to release. MFR to the neck and upper trapezius muscles was applied using a cross-hands technique. Manual therapy of gentle distraction was initiated along with the passive stretching. He saw the surgeon 8 weeks after surgery and was instructed

to push harder and begin shoulder active-assistive range of motion exercises and active elbow range of motion exercises. He also was allowed to return to work.

Phase II active assisted exercises began 8 weeks after surgery. An overhead pulley and a finger ladder were used to assist shoulder elevation. Use of an upper body ergometer was initiated at the beginning of therapy for 6 minutes as a warm-up, alternating directions every minute. Grade 2-3 glenohumeral joint mobilization began with inferior, posterior, and anterior glides to the shoulder to increase all shoulder motions.[19]

Joint mobilization techniques were performed with the patient lying supine. Posterior glides were performed with the therapist holding the patient's arm in 30° of scaption and applying a posterior-medial force to the humeral head. Anterior glides were performed with the patient's arm in the same position and the therapist grabbing the humeral head and pulling it up anteriorly and slightly laterally. Inferior glides were done with the therapist taking the patient's arm to the end range of shoulder abduction and applying an inferior force to the humeral head. Force was applied with short thrusts at the end range of tissue restrictions, also known as a Grade 4 joint mobilization.

Phase III resisted exercises began 10 weeks after surgery. Shoulder isometric strengthening exercises were given to the patient to add to his HEP. Isometric exercises were performed for shoulder flexion, extension, abduction, adduction, external rotation, and internal rotation (See Appendix A, page 24). These exercises were to be performed against a wall or doorway with the patient standing, his arm at his side, and his elbow flexed to 90 degrees. The patient was instructed to apply minimal force when doing his isometric exercises just getting the shoulder muscles to fire. These exercises were performed 15 times, 1-2 times a day, as tolerated.

Phase III also included rhythmic stabilization and eccentric strengthening. Rhythmic stabilization exercises were delivered with the patient lying supine and his left arm elevated to 90 degrees of should flexion. The therapist provided a sustained force against isometric contractions into shoulder flexion, extension, and horizontal abduction. Resistance was applied in varying directions for proprioceptive training of the shoulder muscles. Rhythmic stabilization for shoulder internal rotation and external rotation was done with the patient supine with his shoulder in 45° and 80° of abduction and 0°, 45°, and at the end range of shoulder external rotation. Eccentric strengthening was accomplished by instructing the patient to lower his arm slowly from an elevated position. The patient also performed an assisted military press with his left arm. Lying supine, he punched his left arm into the air using his right arm to assist as needed.

A hold-relax technique was also performed in conjunction with passive stretching to increase shoulder motion. This was performed with the patient lying supine with his elbow flexed to 90° and his shoulder in 45° of abduction. The therapist would bring the arm to the end range of external rotation. The patient was then instructed to perform an isometric contraction into internal rotation against resistance provided by the therapist. The contraction was held for 5 seconds. The patient was then instructed to relax, after which the therapist would bring the arm into more available external rotation. This process was repeated until no further gains in external rotation were achieved.

Active shoulder ROM and resistive elastic band exercises began 11 weeks after surgery. The patient performed active range of motion for shoulder flexion, extension, abduction, and scaption in standing (See Appendix A, page 25). The patient performed these motions as high as he could while still keeping good posture without any substitu-

tions, such as any shoulder elevation from the trapezius or leaning backward of the trunk. He also was given active range of motion exercises for shoulder horizontal abduction (See Appendix A, page 25). These were performed with the patient prone. All active motions were done through available pain-free motion, for 10-15 repetitions or until fatigue. Resisted shoulder internal rotation, external rotation, flexion, extension, abduction, and adduction exercises were performed with light yellow and tan Thera-tubes (See Appendix, page 26). Resistance from an elastic band was well tolerated. Thera-band exercises were performed every day until fatigue.

At 12 weeks the patient started performing prone rows with 3 pounds and supine military presses with 2 pounds for further strengthening. Exercises were done 10-15 times per day or until fatigue, 3 times a week. A overview of the protocol used can be seen in Table 2.

Table 2. Protocol

Phase I (0 – 8 wks)	Phase II (8 – 10 wks)	Phase III (10+ wks)

• PROM
  • Pendulum
  • Cane
• Prolonged stretching
  • PT
  • self
• Jt Mobilization
• Posture Education
• Sling d/c (5-6 wks)
• MFR (5 wks)
• RICE
	• AAROM
	  • pulleys
	• Return to work
		• AROM
		• Isometrics (10 wks)
		  • Hold-relax
		• Light Resistance (12 wks)
		  • Theraband
		  • Light dumbbells

CHAPTER IV

OUTCOMES

Short term and long term outcomes were assessed and recorded over the course of physical therapy. Reduction in left shoulder pain was used to assess short term outcomes. Long-term outcomes were assessed with PROM measurements of the left shoulder, strength gains, and functional performance with his left shoulder.

Pain scores at examination, 8 weeks, and 12 weeks were 6, 3, and 1, respectively. At 12 weeks, the patient's major complaint was the feeling of stiffness in his left shoulder. He was feeling stiffness at the end range of all shoulder motions. He was no longer having pain that awakened him at night.

Overall shoulder PROM showed an increase from the initial evaluation. Shoulder range of motion measurements for the first 12 weeks of treatment are shown in Table 3.

Table 3. Passive range of motion of the shoulder

	R shoulder	L shoulder		
		Evaluation	8 weeks post-op	12 weeks post-op
Range (°)				
Flexion	165	45	120	140
Abduction	160	45	95	100
External rotation	80	0	23	40

Passive shoulder flexion, abduction, and external rotation increased by 95°, 55° and 40°, respectively.

Strength was measured by the patient's ability to elevate his arm. At 12 weeks post-operation he was able to actively elevate his arm to shoulder height and showed in-

creased strength in supine being able to hold his arm up in the air at 90° of shoulder flexion without assistance. Functionally he was able to don and doff a coat if he put his left arm in first. The patient returned to work 8 weeks after his surgery. He was able to change overhead light fixtures with his right arm, but he was unable to perform any overhead duties with his left arm.

The patient was still being seen for therapy after the 12 weeks of this case report. He received 22 more treatments. Additional outcomes were unable to be obtained.

CHAPTER V

DISCUSSION

This case report described how myofascial release in conjunction with a PNF hold-relax technique was used in a rehabilitation protocol following an open rotator cuff repair for a 59-year-old male after sustaining a massive rotator cuff tear. Hold-relax has been shown to have immediate effects on increasing shoulder ROM,[11,12,13] but it's effectiveness over the long-term is unclear. Myofascial restrictions that cause pain and may inhibit motion are known to occur throughout the body following an injury. The effectiveness of myofascial release on shoulder pain and ROM is relatively unknown.

Large and massive rotator cuff tears have less than optimal outcomes than small or medium tears following surgery.[1,2] This patient also had a massive rotator cuff tear which could have led to poorer outcomes. Research has shown that early intervention for a rotator cuff repair has the greatest chance for optimal outcomes and benefits.[10] Within 3 weeks is the most opportune time to receive surgical intervention, however, 6 weeks has shown to have some benefits as well. This patient was unable to receive surgery until 7 weeks after his initial injury. He still showed gains in left shoulder range of motion, but he may have had better outcomes if he had received surgery sooner. Rehabilitation following a massive rotator cuff can take up to 4-6 months. This patient received treatment for 12 weeks and was still receiving treatment by the end of this case report. At 12

weeks left shoulder ROM was not equal to the right shoulder. Long-term goals were not achieved, but he had returned to work.

Reflective Practice

Massive rotator cuff tear and repairs were not seen frequently in this clinic and they can take months of rehabilitation to regain function and accomplish desired outcomes. This was my first, and only, encounter with a massive rotator cuff tear over my 18 weeks of clinical work. I have had numerous encounters with patients who had rotator cuff tears only involving the supraspinatus.

This patient showed significant stiffness throughout treatment, especially at the beginning of each treatment session. He did, however, loosen up by the end of treatment, especially after performing the PNF hold-relax technique. I do not think that this patient's diabetes played a significant role in him developing stiffness. He had his diabetes controlled with oral medication. I believe that bigger factors for the development of stiffness were the delay of surgery and the extent of his injury. Seven weeks is a long time to have to wait for surgery. With that much time after injury, there is an increased risk of fatty infiltration into the muscles which can make the rotator cuff un-repairable. I also think that just the shear extent of his injury was the greatest factor for stiffness. He tore multiple muscles and tendons, including his biceps tendon. There was more time needed for healing and recovery with the amount of surgery that had taken place.

Another factor is that some people tend to be tighter around their joints and are more prone to developing stiffness. I discovered this working with patients who had undergone total knee replacements. I worked with an 80-year-old female who had full ROM in her knee and was walking within 4-6 weeks of her surgery. I also had the pleas-

ure of working with a 50-year-old male who had received a total knee replacement by the same surgeon. He had significant stiffness in his knee and was only at -5° of knee extension and 100° of knee flexion at 12 weeks post-surgery. He ambulated with a very visible antalgic gait due to not being able to reach full knee extension. His knee would loosen up at the end of treatment following exercising and stretching, but it would be right back to the same way the next treatment session. He finally underwent a manipulation under general anesthesia at 12 weeks but was still unable to regain full ROM, still lacking 5° of knee extension and accomplishing 110° of knee flexion. Some people have tighter fascial restrictions than others and are more prone to developing stiffness.

A PNF hold-relax technique seemed to help for this patient. I also used this technique for total knee replacements to help stretch the quadriceps muscles and accomplish more knee flexion. I had used hold-relax regularly throughout my clinical work and feel comfortable using it on my patients with shoulder pathologies. The next time I use this technique I would like to incorporate more of a D2 flexion pattern to get more motions involved in the treatment and work on more functional movements.

Another technique used in this case report was myofascial release. There is limited research to support this intervention, especially for patients after shoulder surgeries. We used this technique specifically to stretch out tight tissues and muscles around the neck and anterior chest. I have also seen it used in the back, knee, and shoulder. This technique would not be on the top of my list for interventions to perform, but it does have some merit and use in the clinic. It can be used as a complimentary treatment, but I would not use it as the primary treatment for my patients.

After 12 weeks, this patient's main accomplishment was being able to lift his left arm slightly above 90° without any compensation. A new therapist can be very passive when first working with patients like this because of not wanting to hurt them. From personal experience and observation, it is beneficial to be more aggressive when working with patients with shoulder pathologies.

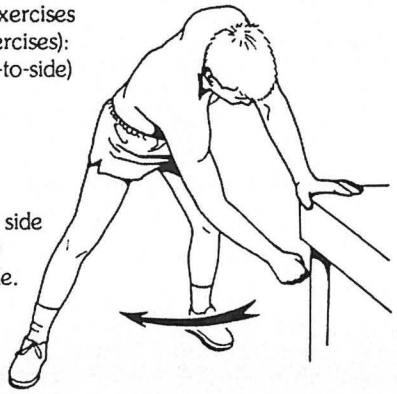
Generalized protocols are given to assist in the rehabilitation process for a rotator cuff repair, but treatment must be individualized to the patient. This demands cooperation, communication, and teamwork by all healthcare providers involved in the treatment. Therapists need to have patience and not get frustrated when working with patients following shoulder surgeries because it does take time. This message also needs to be relayed to the patient so that they understand that as well.

This patient may have achieved similar outcomes with a generalized program and without the use of myofascial release and a hold-relax technique. More research needs to be done with myofascial release as a treatment. Still, these techniques may provide a clinician with additional treatment options for stretching and releasing restrictive tissues and fascia.

APPENDIX A

SHOULDER - 25

Range of Motion Exercises
(Codman's Exercises):
Pendulum (side-to-side)



Gently move arm from side to side by rocking body weight from side to side. Let arm swing freely.

Repeat_____times.
Do_____sessions per day.

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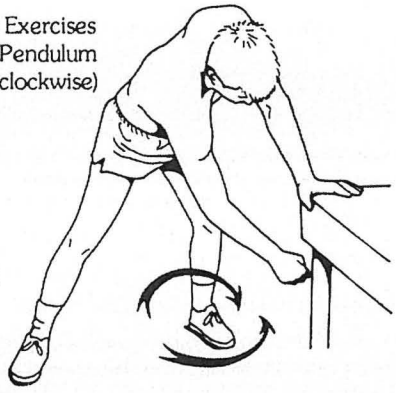
SHOULDER - 26

Range of Motion Exercises
(Codman's Exercises): Pendulum
(Clockwise/counterclockwise)



Let arm move in a circle clockwise, then counterclockwise by rocking body weight in a circular pattern.

Repeat_____times.
Do_____sessions per day.

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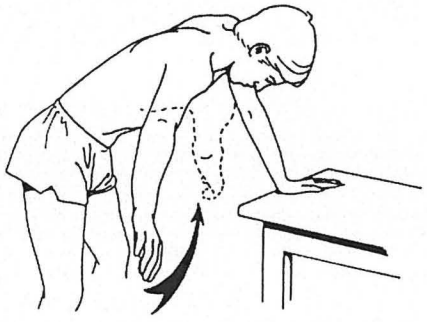
SHOULDER - 28 Range of Motion Exercises
(Codman's Exercises): Crosses
(horizontal abduction/adduction)



Supporting body weight with other hand, reach across body as far as you can, then pull back.
Repeat____times. Do____sessions per day.

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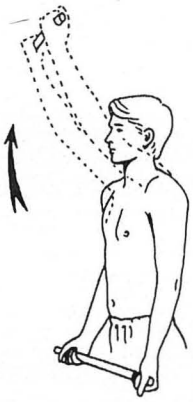
SHOULDER - 1
Range of Motion Exercises
(Wand activities): Flexion



Bring wand directly overhead, leading with uninvolved side. Reach back until you feel a stretch.

Hold_____seconds.

Repeat_____times.

Do_____sessions per day.

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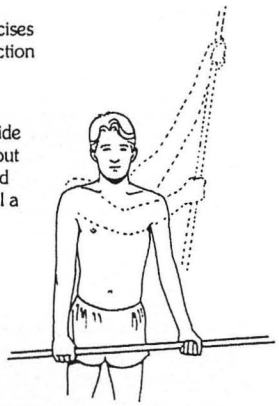
SHOULDER - 2
Range of Motion Exercises
(Wand activities): Abduction



Holding wand with involved side palm up, push wand directly out from your side with uninvolved side (palm down) until you feel a stretch.

Hold_____seconds.

Repeat_____times.

Do_____sessions per day.

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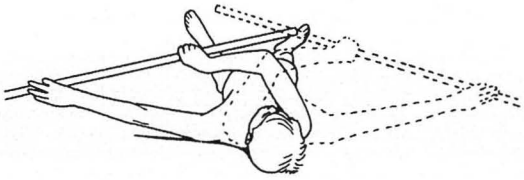
SHOULDER - 5 Range of Motion Exercises
(Wand activities): Horizontal abduction/adduction



Keeping both palms down, push wand across body with uninvolved side. Then pull back across body, keeping arms parallel to floor. Do not allow your trunk to twist.

Hold_____seconds. Repeat_____times.

Do_____sessions per day.

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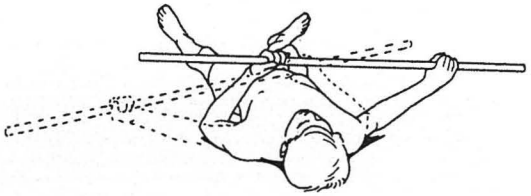
SHOULDER - 3 Range of Motion Exercises
(Wand activities): External/Internal Rotation



Hold wand with involved side palm up, push with uninvolved side (palm down) out from body while keeping elbow at side until you feel a stretch. Then pull back across body leading with uninvolved side. Be sure to keep elbows bent.

Hold _____seconds. Repeat_____times.

Do_____sessions per day.

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SHOULDER - 73 Towel Stretch for Internal Rotation

Pull involved arm up behind back by pulling towel upward with uninvolved arm.

Hold_____seconds.
Repeat_____repetitions/set.
Do_____sets/session.
Do_____sessions/day.

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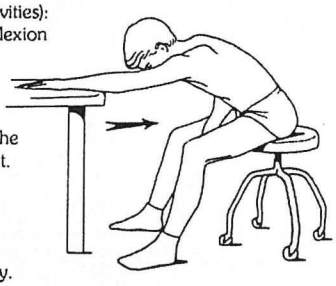
SHOULDER - 7
Range of Motion Exercises
(Self-stretching activities):
Flexion



Sitting upright, slide forearm forward along table as you bend from the waist until a stretch is felt.

Hold_____seconds.
Repeat_____times.
Do_____sessions per day.

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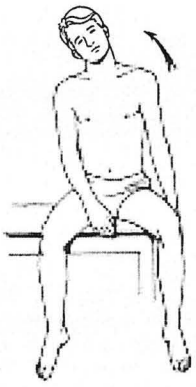
SHOULDER - 13
Range of Motion Exercises
(Self-stretching activities):
Caudal Glide



Grasp edge of table firmly and lean trunk away from stabilized arm.

Hold_____seconds.
Repeat_____times.
Do_____sessions per day.

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SHOULDER - 11
Range of Motion Exercises
(Self-stretching activities):
External Rotation(alternate)

Keep palm of hand against door frame and elbow bent at 90 degrees. Turn body from fixed hand until a stretch is felt.

Hold_____seconds.
Repeat_____times.
Do_____sessions per day.

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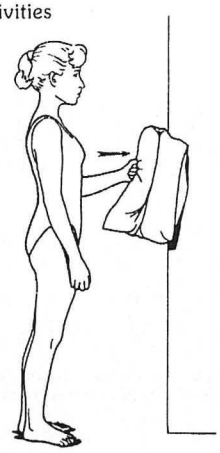
SHOULDER - 29 Strengthening Activities
Isometric Flexion

Using wall
to provide resistance,
press fist into pillow
as shown, using
light moderate maximal
pressure.

Hold ____ seconds.

Repeat ____ times.

Do ____ sessions per day.



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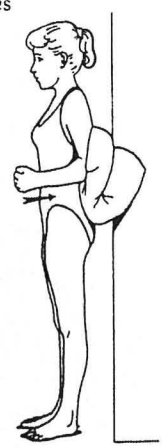
SHOULDER - 31 Strengthening Activities
Isometric Extension

Using wall to provide resistance,
press back of arm into pillow using
light moderate maximal
pressure.

Hold ____ seconds.

Repeat ____ times.

Do ____ sessions per day.



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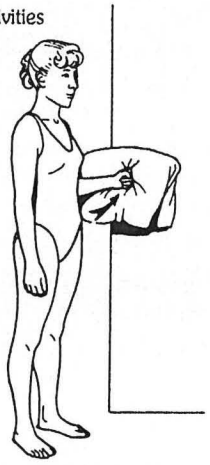
SHOULDER - 36 Strengthening Activities
Isometric External Rotation

Keeping arm tucked in at side,
press back of hand into wall.

Hold_____seconds.

Repeat_____times

Do_____sessions per day.



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SHOULDER - 37 Strengthening Activities
Isometric Internal Rotation

Using door frame to provide
resistance, press palm of hand
into door frame as shown using
light moderate maximal
resistance. Be sure to keep
elbow in at your side.

Hold_____seconds.

Repeat_____times.

Do_____sessions per day.

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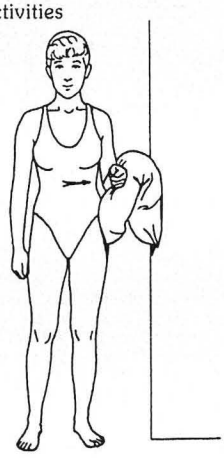
SHOULDER - 32 Strengthening Activities
Isometric Abduction

Using wall
to provide resistance,
press into pillow with arm
as shown, using
light moderate maximal
pressure.

Hold ____ seconds.

Repeat ____ times.

Do ____ sessions per day.



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SHOULDER - 34 Strengthening Activities
Isometric Adduction

Gently squeeze pillow using
light moderate maximal
resistance.

Hold_____seconds.

Repeat_____times.

Do_____sessions per day.

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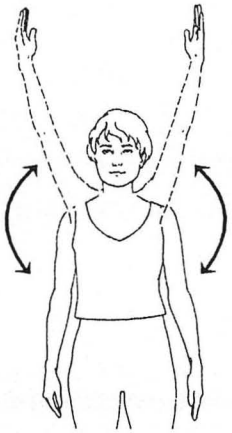
SHOULDER - 83
Standing Shoulder Flexion



Bring arms
straight out in front
and raise as high
as possible
without pain.
Keep palm
oriented _____.

Repeat _____ times per set.
Do _____ sets per session.
Do _____ sessions per day.

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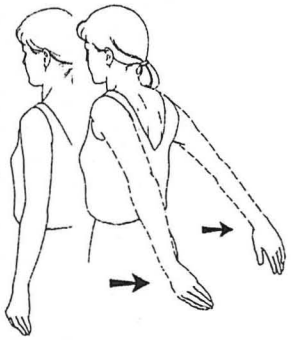
SHOULDER - 87
Standing Shoulder Extension



Bring arms
straight behind you
as far as possible
without pain.

Repeat _____ times per set.
Do _____ sets per session.
Do _____ sessions per day.

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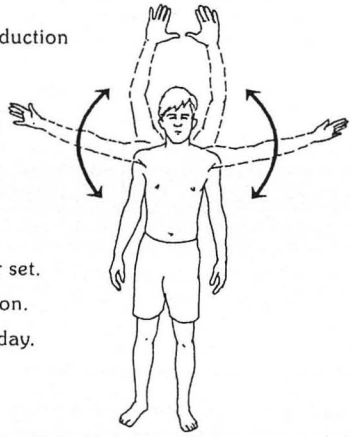
SHOULDER - 84
Standing Shoulder Abduction

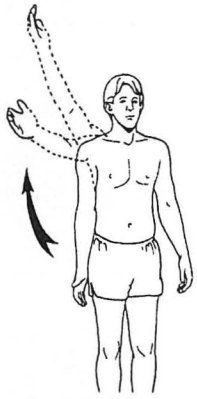


Bring arms
straight out from sides
and raise as high
as possible
without pain.

Repeat _____ times per set.
Do _____ sets per session.
Do _____ sessions per day.

Copyright VHI 1994R

SHOULDER - 75 Scaption With External Rotation



Place hanging arm halfway
between hip and navel.
Raise arm above head.
Elbow straight,
thumb pointing up.

Repeat _____ repetitions per set.
Do _____ sets per session.
Do _____ sessions per day.

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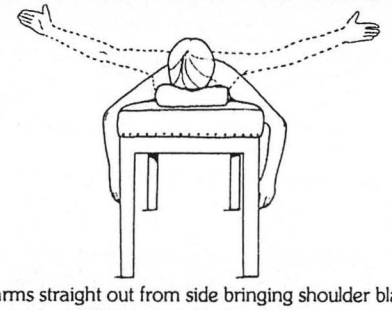
SHOULDER - 76
Prone Horizontal Abduction with External Rotation



Raise arms straight out from side bringing shoulder blades closer together. Elbows straight, thumbs up.

Repeat_____repetitions/set. Do_____sets/session.
Do_____sessions/day.

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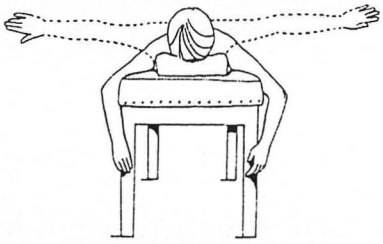
SHOULDER - 77
Prone Horizontal Abduction with Internal Rotation



Raise arms straight out from side bringing shoulder blades closer together. Elbows straight, thumbs down.

Repeat_____repetitions/set. Do_____sets/session.
Do_____sessions/day.

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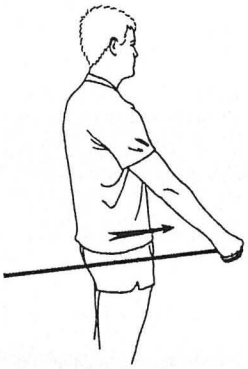
SHOULDER - 41 Strengthening Activities
Active Resistive Flexion



Using tubing, start with arm at side and pull arm outward and upward. Move shoulder through pain free range of motion.

Repeat_____times.
Do_____sessions per day.

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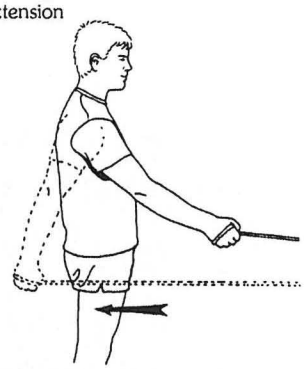
SHOULDER - 45 Strengthening Activities
Active Resistive Extension



Using tubing, pull arm back. Be sure to keep elbow straight.

Repeat_____times.
Do_____sessions per day.

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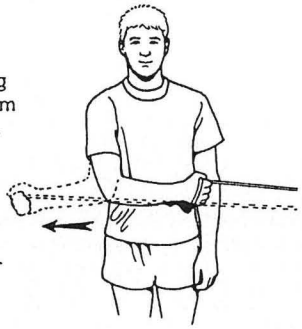
SHOULDER - 43 Strengthening Activities
Active Resistive External Rotation



Using tubing, and keeping elbow in at side, rotate arm outward away from body. Be sure to keep forearm parallel to floor.

Repeat_____times.
Do_____sessions per day.

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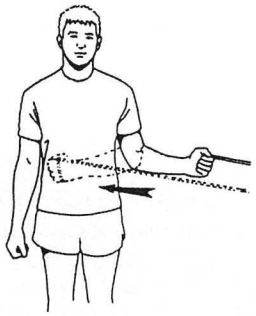
SHOULDER - 44 Strengthening Activities
Active Resistive Internal Rotation



Using tubing, and keeping elbow in at side, rotate arm inward across body. Be sure to keep forearm parallel to floor.

Repeat_____times.
Do_____sessions per day.

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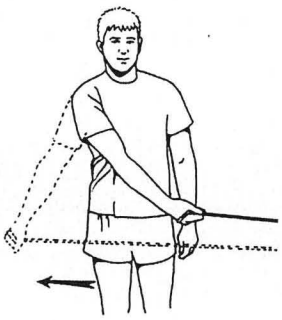
SHOULDER - 42 Strengthening Activities
Active Resistive Abduction



Using tubing, start with arm across body and pull away from side. Move through pain free range of motion.

Repeat_____times.
Do_____sessions per day.

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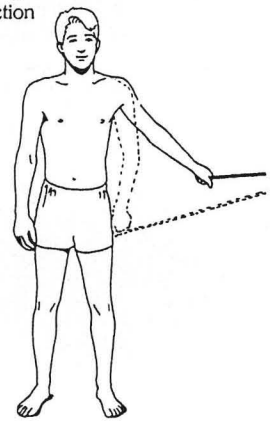
SHOULDER - 46 Strengthening Activities
Active Resistive Adduction



Using tubing, pull arm in toward buttock. Do not twist or rotate trunk.

Repeat_____times.
Do_____sessions per day.

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