STM JOURNALS

International Journal of
Orthopedic Nursing and Practices

Volume 1, Issue 1, 2023
January—June
DOI (Journal): 10.37591/IJORNP

https://journals.stmjournals.com/ijornp

Review IJORNP

Management of Rotator Cuff Injury with Physiotherapy in Pre- and Post-surgery: An Overview

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Abstract

The likelihood of rotator cuff tears increases with age, with total width tears occurring in roughly 25% of people in their 60s and an extra 50% of people in their 80s. Despite the fact that surgery is considered an active therapy, repeated rips at the inset place are common, particularly during progressive tears, which are common in the elderly population. Physical therapy and exercise therapy are currently receiving more attention as a way to treat partial and complete rotator cuff strains by treating weakness and effective arrears. Affected role selection for physical treatment and exercise has been advised by recent teachings to have best result, an enhancement in purpose, and achievement in avoiding surgery. Yet, once an elderly patient continues to be active and has very efficient needs, surgical activity becomes increasingly reciprocal. Studies in ageing populations had produced positive therapeutic and clinical outcomes after invasive restoration. Decompressing is a less harmful and intrusive opportunity that has remained useful to deliver temporary pain reprieve, although permanent interventions may become less effective with time. The goal of this clinical commentary is to describe the function of physical therapy in the pre- and post-surgical care of rotator cuff injury.

Keywords: Physiotherapy, rotator cuff tears, rotator cuff repairs, rehabilitation, surgical management

INTRODUCTION

Because of the small complexity of the glenoid cavity, the shoulder is the most movable and unstable joint since it is one of the main junctions in the body. Hence, the infraspinatus, teres minor, supraspinatus, in addition subscapularis muscles and tendons around the joint, including the rotator cuffs, demonstrate a vital role in joint constancy as well as joint activity [1]. Additionally, shoulder distress with a muscle linked origin remains one of the most common complaints among orthopaedic patients (between 30% and 70%), with rotator cuff ruptures as the mostly common cause (between 23% and 49%) [2]. The most common signs of a complete rotator cuff break, which may also affect the purpose and value of longevity, are pain, weakness, and an insufficient variety of signs [3].

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Received Date: June 17, 2023
Accepted Date: June 26, 2023
Published Date: June 30, 2023

Citation: Kudshiya Khan, Guisia Khan, Aafreen, Asad Jamal Ansari, Ebadurrahman, Abdur Raheem Khan. Management of Rotator Cuff Injury with Physiotherapy in Pre- and Post-surgery: An Overview. International Journal of Orthopedic Nursing and Practices. 2023; 1(1): 6–12p.

The frequency and magnitude of the breakage rise by stage, as well as clinical tendon repair success rates reduce breakage [4]. In this case, care is accomplished by invasive or conventional methods, such as arthroscopic and open surgery. Based on the patient's health, the magnitude of the rupture, and other factors, the category of therapy suggested is that not all individuals with rotator cuff ruptures require surgery [5]. Although numerous

studies have described the outcomes of comprehensive surgery of rotator cuff rupture, at present there is still a need for additional research to determine the best and most effective management for those patients because the findings from certain studies on the effectiveness of physiotherapy managements have been inconsistent.

As a result, to reduce the complications of the highest incidence as well as purposeful debility caused by rotator cuff tearing, a randomized clinical trial was necessary. There is significant difference around the best management technique and unsatisfactory sign concerning the importance of exercise and physiotherapy programmes in pain and debility of patients, and absence of an impartial sign of complete retrieval of patients subsequent surgery.

CLINICAL PRESENTATION

The clinical effectiveness of a particular rotator cuff tear that has been detected varies, as expressed by a total of movable quantities that include the tear's location and size. Some people still have significant discomfort, dysfunction, and symptoms, but others report losing strength and having severe agony. Yet, it is not quite clear why certain tears continue to be asymptomatic. When a patient has a symptomatic rotator cuff tear, these symptoms are classically existing with shoulder discomfort and cuff weakening. Supraspinatus tendon tears are indicated by pain during abduction between 70° and 120°. These patients have the same distinguishing features, including a lack of vigorous shoulder abduction and advancement, reproduction and weakening of pain with external rotation or resistant abduction [6], as well as positive impingement signs [7]. Although tears of the subscapularis might result in condensed strong range of motion, an aberrant “lift off” sign, and weakness in inner rotation, super subsequent tears also demonstrate a weakness in peripheral rotation with a positive lagging sign and a decrease of active range of motion [8]. A recent clinical study found that in individuals with severe rotator cuff tears, injuries that extend over half of the subscapularis tendon increase the chance of pseudoplegia [9, 10]. Active abduction and advancement may reveal scapulohumeral measure dysfunction as well as a compensatory shoulder motion. Last but not least, individuals with chronic rotator cuff injuries may have apparent atrophy, with muscle deterioration in the supraspinatus typically linked with a concurrent infraspinatus tear (Table 1) [11].

PHYSICAL EXAMINATION

A thorough clinical examination needs to be performed while wearing a shoulder gown that makes it possible to see the shoulder girdle. Prior to assuming that any radicular discomfort is coming from the cervical spine, the examination should rule it out. While often present, full active and passive shoulder range of motion (ROM) must be related with the contralateral side. There can be a painful arc of flexion and/or abduction from around 90° to 120°, In throwing athletes, increasing rotation at 90° abduction

Table 1. Clinical presentations of pain characteristically in primary shoulder.

Pain	Shoulder/rotator cuff
Attitude	Tooth pain associated with activity
Site	In upper arm
	Moving to the elbow (is common)
	Wrist (is less frequent)
Easing	In arm under the shoulder height
	In resting (but not in night)
	In definite (if it is temporary) retort to subacromial
	In local anaesthetic or in corticosteroid injection
Irritation	Lying on it
	Affecting to abduction > flexion
	In continued long arm actions
	Pain or discomfort at night
	While lifting something

and a subsequent decrease in interior rotation by means of a regular arc of motions are adaptations that are recurrently observed, but an injury of ROM >20° in comparison to the contralateral shoulder, identified as a glenohumeral internal rotation shortage, may be also present. The glenohumeral internal rotation deficiency is an adaptive mechanism which enhances the risk of partial thickness rotator cuff tears and micro-instability in throwers with posterior capsule constriction and anterior capsule enlarging. Due to the rarity of rotator cuff weakness, strength testing of the rotator cuff and scapular muscular may reveal that they are healthy. Infraspinatus illness is more likely to be the cause of pain while exterior rotation through arm at the side.

THERAPEUTIC MANAGEMENT

Physical Therapy

A systematic physical treatment regimen was suggested for those with a symptomatic rotator cuff injury and was based on previously published comprehensive reviews [12–17]. The physiotherapy protocol included exercises that were performed under supervision at home in an attempt at improving strength and ROM. Physical treatment was administered by one of 19 variety of physical therapists two to three times in a week for around 8 weeks. Patients were taught routine ROM exercises, rotator cuff rehabilitation drills, and scapulothoracic retraining drills. To ensure that research participants received consistent physiotherapy, the physical therapist study coordinators spoke once a week with the therapists overseeing their care. Each patient's electronic medical records had a record of the number of regulated visits they received from a physical therapist.

All the interventions were performed to reach a goal of increasing strength, improved ROM, and to lessening pain. Each session began with a 10- to 15-minute warm-up routine, followed by specific exercises, manual therapy, and concluded with a 10-minute cooldown period. Home-based exercise programme was also specified to recover function of the limb [18].

- *First step – passive range of motion (ROM) (Weeks 1–3):* The primary objectives of the initial phase are to gradually enhance passive ROM, alleviate pain and inflammation, and improve strength. The patient engaged in specific exercises, such as tolerable flexion movements utilizing table sides. They performed external and internal rotations in the scapular plane using a stick, repeating the motion 20 times, four times a day. Pendulum exercises were also incorporated. Additionally, the patient was instructed to sit and retract and depress their scapula. Upper neck stretching exercises were recommended. Cryotherapy was administered for 15–20 minutes, two to three times a day, to address inflammation and pain. The patient received instructions to avoid activities such as heavy lifting, sudden stretching, sleeping on the affected side, and any movements involving backward or extension motions (Table 2).
- *Second step – range of motion (ROM) actively (3rd to 6th week):* In this phase, passive ROM is continued. In order to decrease passive stress on rotator cuff, a pillow was placed beneath the arm. This gradually progresses to the full functioning ROM. and active aided ROM was introduced. The patient also received self-assisted therapy with the use of an overhead pulley and a stick. Furthermore, the patient was introduced to open chain proprioceptive exercises, submaximal isometric activities for internal and external rotation, and movements targeting the scapula and thoracic region. No resistance or strength exercises were included in this phase. Under supervision and with a structured plan, active exercises were implemented to enhance ROM and alleviate discomfort [19].
- *Third step – initial strengthening (6th to 10th weeks):* During this phase, passive ROM and stretching exercises were continued, and the patient was provided with a self-directed home programme for ongoing management. Subsequently, progressive strengthening exercises, encompassing both eccentric and concentric movements, were introduced within a tolerable range. This was followed by the implementation of elastic resistance exercises, core muscle strengthening, and strengthening of the parascapular muscles. The patient received instructions to avoid engaging in overhead activities.

Table 2. Range of motion (ROM) on primary day of physiotherapy management.

Joint movements of shoulder	Left		Right	
	Passive	***Active***	***Passive***	***Active***
Extension	0–60	0–57	0–40	0–35
Flexion	0–175	0–180	0–130	0–120
Rotation, internal	0–77	0–80	0–49	0–45
Rotation, external	0–80	0–85	0–45	0–40
Adduction	0–50	0–45	0–35	0–27
Abduction	0–178	0–175	0–130	0–120

- *Fourth step – advanced strengthening (11th to 15th weeks and continue till relief):* In these phase, parascapular muscle strengthening was continued along with isometric strengthening and then advanced rotator cuff strengthening was initiated along with other exercises like finger ladder and increased resistance exercises were given along with mobilization modalities. Up until this point, the patient had seen a reduction in discomfort and inflammation as well as an enhancement in ROM and rotator cuff muscle strength.

Surgical Therapy

The surgical treatments for this joint damage include decompression to enlarge the subacromial area as well as reattaching the ruptured rotator cuff tendon to the humeral penetration region. According to Bhamra et al. [20], arthroscopic subacromial decompressing decreased the frequency of rotator cuff tears in patients with the impingement, and 82% of patients still had healthy tendons 15 years following surgical procedure, proving the mechanical theory and extrinsic pathogenic component to be true. Subacromial decompression occurs when there is considerable rotator cuff tendon impingement amongst both the and the humerus and the acromion. An open surgery or an arthroscopic treatment might be used to complete this operation [21]. The goal line of tendon restoration is to re-establish the sound tendon-bone edge. Both the open and the arthroscopic rotator cuff maintenances have established successful outcomes for pain and shoulder functioning, with a combined chances of success being 94% after 5 years and 83% at 10 years, measured by circumventing subsequent surgery. Recovery was markedly better after the operative clinical outcomes [22]. A rapid return to work, better post-operative patient outcomes, and fewer costs have all been predicted to result from prompt surgical repair around 3 months [23]. Repairs of full-thickness tears carried out even more than a year after the onset of symptoms have shown mediocre results, whereas patients who obtain repair within 4 months of the commencement of symptoms could frequently anticipate a favourable outcome [24–26]. Although patients who received early surgical repair and those who received delayed surgery had better mean purposeful outcome evaluations, the cuff integrity between the two groups did not significantly differ. The statistically significant difference of this discrepancy, however, was not stated.

Physical Therapy after Surgical Therapy

After a typical rotator cuff injury repair, patients received care through a rehabilitation programme that especially included scapula training exercises as well as more traditional therapeutic exercises and physical therapy.

Physical Therapy

- *Cold therapy:* For the first several weeks following surgery, the joint of shoulder was frozen and used for 5 to 20 minutes for 0 to 4 times in a week, using an ice and the water combination that was put in a water bag.
- *Ultrasonic therapy:* 4 to 12 weeks following surgery, OG Giken Corporation's ES-2 type ultrasonic treatment equipment was employed with frequencies of 1 MHz, a pulse frequency of 50%, a dose of 1.5 to 2.5 W/cm^2, and a stirring technique used for 5 to 10 minutes at each time.

- *Steam therapy with herb:* The Changzhou Zhengrong–invented XZQ-V gassing apparatus type was used to treat patients 6 to 12 weeks after surgery. The subsequent Chinese herbal medicines were chosen and supplementary to 1000 cm^3 of boiling water: 20 g of long pepper, 20 g each of *Gentiana macrophylla, Lycopodium clavatum, Clematis chinensis,* and *Artemisia anomala*. 20 gof ground beetle, 20 g garden balsam stem, 20 g of *Rhizoma chuanxiong*, and 20 g of *Flos carthami*. Every day for 30 minutes, the affected body part was exposed to steam [27].

Conventional Therapeutic Exercise

In order to protect the injured shoulder, patients finished the immobilization rehabilitation exercise in weeks 0 to 4 after surgery. Forceful workouts carried out 1 or 2 times a day for 10 to 15 minutes of forearm, elbow, wrist, and finger joints, each in order to prevent issues of such muscle synarthrophysis and atrophy. Patients with pain-free ROM developed the Codman pendulum exercises, and the first week after surgery, longitudinal tightening trainings of the muscles everywhere round the shoulder joint were commenced. We stated that the workouts should be inert and that the shoulder joint can only transfer in a few different ways in all directions. Two to three 15-to-20-minute training sessions each day were performed for routine activities. The rehabilitation regimen was performed to improve function and muscle strength six to twelve weeks later the treatment. The chief objectives at this phase were for regain complete ROM within the shoulder, to progressively increase joint strength training, in addition to continue performing low-intensity daily activities with the shoulder joint's anteflexion degree inside of 90° [28–30].

Scapula Training Exercise

During 2 weeks of surgery, patients regained full ROM in their shoulders. The initial submissive activity training for the scapula concentrated on the surface of the scapula. If the patient's shoulder joint's range of motion was obviously limited, they were used a cushion to support their arms in a neutral adjacent situation. In order to support the exercise of elevating, protracting, subsiding, and rear-protracting the scapula in the chest within the pain-free range, then the physiotherapist first put a hand on the shoulder joint and the another in the aberrant angle of scapula. A slight scapula parting and drawing exercise were administered at the same time to recover scapula flexibility. Once their activity level had increased, the patients underwent scapula adduction also outreach action training through the scapula plane within the supine location, in addition to resistance training by massages. The instruction should have been carried out with the patients gradually seated, as was the ideal scenario. Four weeks after the operation, the patients begin strengthening their scapula-regional muscles. With the aid of medical specialists, strength training in the anterior drawer and rear protraction, in addition to ROM training, were carried out as a first step to promote the strength exercises of the serratus anterior muscle. By rotating both internally and externally while standing and using an elastic strap, the patients' rotator cuff muscles would ideally get stronger. After the surgery, the complete range of motion and muscular strength workouts were combined with scapula stability training, and dynamically closed chain training was optional. As an illustration, the treatment table may tilt at a 45° angle while the yoga ball consistency exercise was being performed. After that, treatment table angle would gradually shift until both shoulders' anteflexion reached 90°, at which point the yoga ball would be secured to the support weight at a 60° of both shoulders anteflexion. The patients may perhaps now bear their mass using only by one arm [31]. The scapula training workout indicated above may be done sometimes daily or once every other day, depending on the patient's condition. Three months were spent under the aforementioned administration.

CONCLUSION

In the elderly populace, rotator cuff tears are more prevalent and can be repaired surgically or nonoperatively. For people who have irreparable tears, are in little functional request, or have an attention in pursuing nonsurgical treatments, physical therapy or physiotherapy is a crucial first-line treatment. As everyone is aware, physiotherapy is the most effective low-risk management for people

with shoulder discomfort who have not experienced any trauma and for elderly patients who have only little passive limitation but painful and constrained active mobility. For such a group of patients, physiotherapists are in a good position to offer comprehensive examination and care. There must be precise time frames for assessment and therapy response, as well as communication with surgical and medical colleagues when additional treatments are needed. Exercise or rehabilitation programmes that support and develop the shoulder have shown significant effects, and the majority of patients are happy with the outcomes.

Acknowledgements

The authors offer their sincere thanks to Dean, R&D, Integral University for providing technical support and assigning communication reference number IU/R&D/2023-MCN0001895 for further communication. We also extend our sincere thanks to the Department of Physiotherapy and Faculty of Pharmacy for their kind support.

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