

Comparison of Rehabilitation Protocols After Rotator Cuff Repair Surgery: Case Study

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Abstract

Background: Rotator cuff repair surgery is commonly performed to restore shoulder strength, reduce pain, and improve functional use of the upper limb after symptomatic tendon tear. Postoperative rehabilitation is essential because the repaired tendon must be protected while stiffness, muscle inhibition, scapular dyskinesis, and fear of movement are gradually addressed. Two widely used rehabilitation strategies are an early controlled motion protocol and a delayed protective motion protocol. Early controlled motion emphasizes protected passive range, scapular control, pain-free mobility, and timely progression to active assisted exercise. Delayed protective motion prioritizes tendon healing, sling compliance, inflammation control, and slower progression before active loading. Clinical comparison at the case level is useful because the balance between mobility and protection varies with tear size, tissue quality, pain irritability, patient confidence, and surgical precautions.

Presentation of Cases: This comparative case study presents two adults following arthroscopic rotator cuff repair for symptomatic full-thickness supraspinatus-dominant tears. Case A followed an early controlled motion protocol, whereas Case B followed a delayed protective motion protocol. Both patients were medically stable, had surgeon clearance for physiotherapy, and participated in a twelve-week supervised rehabilitation schedule with comparable therapist contact and home instruction. Baseline assessment included pain, active and passive shoulder range of motion, scapular posture, sling tolerance, sleep disturbance, fear of movement, hand-to-mouth ability, overhead activity readiness, and functional use during grooming, dressing, household work, and occupational tasks.

Intervention: The early controlled motion case received education, sling use outside exercise periods, pendulum activity, passive flexion and external rotation within repair limits, scapular setting, thoracic mobility, distal joint mobility, gradual active assisted elevation, low-load isometrics, closed-chain proprioceptive drills, and later progressive strengthening. The delayed protective motion case received prolonged sling protection, pain and swelling control, supported positioning, elbow-wrist-hand exercises, gentle scapular retraction, breathing and posture work, delayed passive mobility, cautious active assisted motion, and slower strengthening progression. Progression criteria were based on pain response, range tolerance, repair precautions, movement quality, and ability to complete home exercises safely.

Outcome Measures: Recovery was documented using the Numeric Pain Rating Scale, Shoulder Pain and Disability Index, American Shoulder and Elbow Surgeons score, Quick Disabilities of the Arm, Shoulder and Hand score, goniometric range of motion, manual muscle testing, handheld dynamometer screening, scapular observation, sleep tolerance, and a functional activity log developed for this case comparison.

Results: Both protocols improved shoulder pain, mobility, strength, and daily function. The early controlled motion case demonstrated faster gains in passive and active range, earlier confidence during grooming and table-level tasks, and quicker reduction in stiffness. The delayed protective motion case demonstrated better early comfort, fewer flare-ups, stronger adherence to tendon protection precautions, and gradual but steady gains after the immobilization phase. At twelve weeks, both patients improved on impairment and activity-level outcomes. Early controlled motion produced slightly greater improvement in range-dependent activities, while delayed protective rehabilitation produced a steadier pain profile and greater movement security during the early healing period.

Conclusion: The comparative findings suggest that early controlled motion may be useful when pain is controlled and stiffness risk is high, whereas delayed protective rehabilitation may be preferable when tissue protection, pain irritability, or apprehension are dominant concerns. Individualized progression is essential after rotator cuff repair. Keywords: Rotator cuff repair, shoulder rehabilitation, early controlled motion, delayed protective protocol, arthroscopic repair, physiotherapy, shoulder function, tendon healing.

Background

Rotator cuff tears are a major source of shoulder pain, weakness, sleep disturbance, and limitation in self-care, occupation, sports, and household activities. The rotator cuff provides dynamic stability to the glenohumeral joint by compressing the humeral head into the glenoid while allowing coordinated elevation, rotation, and load transfer. When the supraspinatus, infraspinatus, subscapularis, or teres minor tendons are torn, the shoulder may develop pain during overhead activity, painful arc, night pain, reduced external rotation strength, compensatory scapular elevation, and reduced confidence during lifting or reaching. Surgical repair is chosen when symptoms persist despite conservative care, when tear characteristics support repair, or when functional demands require restoration of shoulder capacity. Rehabilitation after rotator cuff repair is complex because the therapist must restore movement without overloading the healing tendon.

Tendon-to-bone healing progresses slowly and is influenced by tear size, fixation strength, tissue quality, age, metabolic status, smoking, diabetes, and adherence to restrictions. Excessive early loading may increase stress at the repair site, while prolonged immobilization can contribute to capsular stiffness, pain sensitization, muscle atrophy, altered scapular mechanics, and delayed functional return. For this reason, postoperative rehabilitation protocols differ in the timing of passive motion, active assisted motion, active motion, resisted exercise, and return to work or sport. An early controlled motion protocol usually begins with protected passive range of motion soon after surgery.

The aim is to maintain capsular extensibility, reduce fear of movement, promote synovial fluid movement, preserve scapulothoracic mobility, and prepare the patient for later active elevation. The word controlled is clinically important because early rehabilitation is not unrestricted exercise. Passive elevation, external rotation, and abduction are performed within surgeonprescribed limits, with careful monitoring of pain, guarding, substitution, and post-exercise soreness. Sling use remains important between exercise sessions, and lifting, pushing, pulling, sudden reaching, and active shoulder elevation are avoided until permitted.

A delayed protective protocol places greater emphasis on repair protection during the first phase. It is commonly selected for larger tears, poorer tendon quality, revision repair, high pain irritability, or patients who require extra education to prevent premature active use. Early sessions focus on positioning, sleep strategies, sling adjustment, hand-wrist-elbow mobility, cervical and thoracic posture, scapular awareness, and prevention of complications without stressing the repaired tendon. Passive shoulder mobility is introduced cautiously after a longer protection period, and resisted loading is postponed until the tendon is considered ready for progressive stress.

Both strategies can be clinically valuable. The early protocol may reduce stiffness and speed return of pain-free range in suitable patients, while the delayed protocol may provide greater confidence regarding biological healing and protection. However, patient progress is rarely determined by timing alone. Pain behavior, sleep quality, movement fear, compliance, occupational demands, family support, and therapist supervision all influence outcome. A comparative case study therefore helps demonstrate how the same surgery can require different rehabilitation emphasis depending on the patient's presentation and response.

This case study examines two postoperative rotator cuff repair patients managed over twelve weeks. It focuses on pain, range of motion, muscle activation, scapular control, functional performance, and clinical decision-making during progression from protection to controlled mobility and strengthening. The purpose is to compare the practical effects of two rehabilitation pathways and to identify which patient characteristics appeared to benefit from each protocol.

Epidemiology and Clinical Relevance: Rotator cuff disease is highly relevant in adult and older working populations because shoulder pain can interfere with sleep, dressing, bathing, driving, lifting, computer work, household duties, and return to occupation. After surgical repair, rehabilitation quality strongly influences whether the patient regains usable movement without repeated irritation, compensatory movement, or avoidable stiffness. Poorly guided progression may delay recovery even after technically successful surgery.

Scope of the Study: This case study focuses on comparative rehabilitation after arthroscopic rotator cuff repair in two postoperative patients. It examines pain control, range restoration, scapular control, active movement quality, strength progression, adherence to precautions, and functional return during a twelve-week physiotherapy period.

Clinical Presentation

Patient Data

Case A (Early Controlled Motion Group) was a 49-year-old male electrician who underwent arthroscopic repair of a medium full-thickness supraspinatus tear with minor infraspinatus

involvement in the dominant right shoulder. He reported pain while reaching overhead, difficulty sleeping on the affected side, and inability to perform work tasks involving tools above shoulder level before surgery. Physiotherapy evaluation began two weeks after surgery after suture removal and postoperative review. His chief concerns were stiffness, fear of losing shoulder movement, difficulty wearing a shirt, disturbed sleep, and dependence on the opposite hand for grooming and bathing.

Case B (Delayed Protective Protocol Group) was a 56-year-old female school administrator who underwent arthroscopic repair of a larger supraspinatus tear with degenerative tissue quality and subacromial decompression in the non-dominant left shoulder. Physiotherapy evaluation began two weeks after surgery, but the surgeon advised a more protective approach because of tear size and tissue quality. She reported moderate night pain, apprehension during accidental arm movement, difficulty maintaining sling position, and anxiety about damaging the repair. Her major limitations were dressing, hair care, kitchen activity, carrying a bag, and lying comfortably.

Inclusion Criteria Applied to Both Cases: arthroscopic rotator cuff repair; postoperative medical stability; surgeon clearance for outpatient physiotherapy; age between forty and sixty years; ability to understand precautions; pain controlled enough for supervised exercise; no postoperative infection; and willingness to follow a home programme.

Exclusion Criteria Considered: open fracture, adhesive capsulitis diagnosed before surgery, cervical radiculopathy causing major arm symptoms, uncontrolled diabetes with poor wound status, revision reconstruction requiring a different protection plan, neurological disorder affecting shoulder control, and non-compliance with sling or activity restrictions.

Clinical Examination and Findings

Both patients underwent structured postoperative physiotherapy assessment after review of operative notes and restriction guidelines. Observation included sling fit, shoulder resting position, swelling, bruising, wound condition, scapular posture, cervical guarding, thoracic kyphosis, protective shoulder elevation, and spontaneous use of the operated limb. Palpation assessed tenderness over the upper trapezius, pectoral region, biceps groove, deltoid, and periscapular muscles. Passive range was assessed gently within permitted limits and stopped before pain guarding. Distal mobility, grip, elbow extension, wrist movement, and hand swelling were also screened.

Case A showed low to moderate pain irritability with greater stiffness concern than tenderness. Passive forward flexion was limited by guarding but improved after relaxation and scapular support. External rotation was restricted but not severely painful when performed with the arm supported in the scapular plane. Scapular dyskinesis was observed as early elevation and reduced posterior tilt during assisted movement. The patient repeatedly wanted to test the shoulder, so education focused on controlled exercise and avoiding active lifting despite his desire for faster work return.

Case B showed higher pain irritability and marked apprehension. Passive flexion beyond the protected range produced guarding, and external rotation was approached cautiously. She had upper trapezius overactivity, difficulty relaxing the operated arm in the sling, and sleep

disturbance due to inability to find a comfortable position. Distal joint mobility was maintained, but shoulder movement confidence was low. Her clinical presentation supported a slower progression with repeated reassurance, positioning correction, and emphasis on repair protection.

Table 1: Baseline Demographic and Surgical Profile

Variable	Case A – Early Controlled Motion	Case B – Delayed Protective Protocol
Age / Sex	49 / Male	56 / Female
Occupation	Electrician	School administrator
Operated Shoulder	Right dominant shoulder	Left non-dominant shoulder
Surgery Type	Arthroscopic supraspinatus repair with minor infraspinatus involvement	Arthroscopic larger supraspinatus repair with subacromial decompression
Time Since Surgery at Evaluation	2 weeks	2 weeks
Main Early Complaint	Stiffness, work-related concern, difficulty dressing	Night pain, apprehension, sling discomfort
Rehabilitation Emphasis	Early controlled protected motion	Delayed and protective progression

Table 2: Baseline Shoulder Range of Motion (Operated Shoulder)

Movement	Normal Functional Range	Case A Pre	Case B Pre
Passive shoulder flexion	0-180°	0-82° within comfort	0-65° guarded
Passive shoulder abduction	0-180°	0-60° in scapular plane	0-48° in scapular plane
Passive external rotation at side	0-60°	0-18°	0-10° protected
Passive internal rotation	Functional to abdomen early	Hand to abdomen with support	Hand to abdomen with caution
Active shoulder elevation	Not permitted early	Not tested as per precaution	Not tested as per precaution
Elbow, wrist and hand motion	Full functional motion	Full, mild stiffness	Full, mild swelling

Table 3: Pain, Protection, and Movement Irritability Assessment

Clinical Variable	Case A	Case B	Description
Pain NPRS at rest	3/10	4/10	Early postoperative discomfort
Pain NPRS during permitted movement	6/10	7/10	Guarding and end-range irritability
Night pain	Moderate	Marked	Sleep quality affected in both
Fear of movement	Mild to moderate	Marked	Case B required slower progression
Sling compliance	Good but impatient	Good with adjustment needs	Education needed in both cases

Table 4: Baseline Functional Shoulder Measures

Outcome Measure	Case A Pre	Case B Pre	Clinical Meaning
SPADI total score /100	72	78	Higher score indicates more pain and disability
ASES score /100	32	28	Lower score indicates poorer shoulder function
QuickDASH score /100	68	74	Higher disability in daily upper limb activity
Sleep tolerance	3-4 hours uninterrupted	2-3 hours interrupted	Night pain and positioning difficulty
Functional activity log /20	5	4	Limited self-care participation

UNIQUE FEATURES OF THE STUDY

This case study is distinctive because it compares two common postoperative physiotherapy pathways after rotator cuff repair while maintaining the same assessment sequence, similar therapist contact, and parallel outcome monitoring. It highlights not only the amount of improvement but also the clinical pattern of improvement. Early controlled motion appeared to influence stiffness, passive range, and confidence during low-load functional movement more quickly, whereas delayed protective rehabilitation appeared to support pain control, repair confidence, and avoidance of early flare-ups. The comparison is clinically useful because rotator cuff rehabilitation cannot be decided only by time after surgery; it must consider tissue quality, tear size, pain irritability, movement fear, occupational demand, and response to each exercise stage.

Investigations and Findings

Operative notes confirmed arthroscopic repair in both cases. Case A had a medium full-thickness supraspinatus tear repaired using suture anchors, with no major postoperative complication. Case B had a larger degenerative supraspinatus tear with greater concern for

tissue protection. Postoperative wounds were clean in both patients. There was no fever, infection, neurovascular compromise, deep vein thrombosis sign, or complex regional pain presentation. Both patients demonstrated intact distal circulation and sensation. Shoulder imaging after surgery was not repeated during the twelve-week physiotherapy period because no red flag indicated repair failure.

The clinical findings supported different rehabilitation decisions. Case A presented with manageable pain and a tendency toward stiffness, making controlled passive mobility appropriate. Case B presented with higher irritability, apprehension, and a more protective surgical profile, making delayed shoulder mobility more suitable during the first phase. Both patients received clear education about avoiding lifting, sudden reaching, weight bearing through the operated arm, pushing from a chair, and unsupported active elevation until allowed.

Table 5: Summary of Relevant Medical and Functional Findings

Investigation / Finding	Case A	Case B
Operative finding	Medium full-thickness supraspinatus tear	Larger degenerative supraspinatus tear
Repair type	Arthroscopic suture anchor repair	Arthroscopic suture anchor repair with decompression
Wound status	Clean and healed after suture removal	Clean and healed after suture removal
Neurovascular status	Intact distal sensation and circulation	Intact distal sensation and circulation
Pain irritability	Moderate and movement related	High early irritability
Main risk to progress	Stiffness and overuse tendency	Flare-up and excessive fear of motion
Tolerance for therapy	Good with education	Adequate with reassurance and pacing

Physiotherapy Management

Treatment lasted twelve weeks, with supervised physiotherapy three sessions per week during the initial six weeks and two sessions per week during weeks seven to twelve. Home exercise was reviewed at every visit. Both patients received education regarding repair protection, sling use, posture, sleep position, ice application, safe dressing methods, skin care, distal mobility, and avoidance of load. However, the content and speed of shoulder progression differed according to the assigned protocol, surgical profile, pain response, and movement behavior.

Early Controlled Motion Protocol for Case A

Phase I: Protection, Pain Control, and Controlled Passive Mobility (Week 2-4). The early focus was on maintaining the repair precautions while preventing excessive stiffness. The patient wore the sling except during hygiene and exercises. Sessions included breathing and relaxation, cervical and thoracic mobility, scapular setting in sitting, supported pendulum exercise, elbow-wrist-hand mobility, and therapist-assisted passive shoulder flexion within comfort. External

rotation was performed at the side within the prescribed limit. Pain after exercise was monitored, and activity was reduced if soreness lasted beyond the same evening. Education repeatedly emphasized that early movement was passive and protected, not an invitation to lift or actively reach.

Phase II: Active Assisted Control and Scapular Coordination (Week 4-8). After pain reduced and passive range improved, the programme progressed to active assisted elevation with a cane, table slides, pulley within safe range, supine assisted flexion, and supported external rotation. Scapular control was trained through low-load retraction, depression awareness, thoracic extension, and mirror feedback to reduce shoulder hiking. Submaximal pain-free isometrics for external rotation, internal rotation, extension, and abduction were introduced only after movement quality was acceptable. Functional practice included supported hand-to-mouth simulation, tabletop reaching without load, and controlled use of the hand near the body.

Phase III: Active Motion, Strength Initiation, and Functional Integration (Week 8-12). The patient progressed to active elevation in supine and then sitting, wall slides, closed-chain weight shift on a table, light elastic resistance below shoulder height, serratus anterior activation, rotator cuff endurance drills, and graded functional tasks. Emphasis remained on smooth movement, no painful arc, controlled lowering, and avoidance of sudden occupational loading. Home exercises included cane-assisted flexion, scapular setting, side-lying external rotation without resistance initially, supported wall climb, and light functional practice such as grooming, keyboard work, and handling small objects close to the body.

Delayed Protective Protocol for Case B

Phase I: Immobilization Support and Distal Conditioning (Week 2-6). The first phase prioritized tendon protection and symptom control. The sling was adjusted to support the forearm and prevent traction on the shoulder. Treatment included pain education, ice use, supported sleep positioning, hand gripping, wrist and elbow range, gentle scapular retraction without humeral movement, breathing exercises, cervical mobility, and relaxation to reduce upper trapezius guarding. Shoulder passive movement was minimal and performed only within the surgeon's protected allowance. The patient was encouraged to maintain general walking activity and postural awareness without using the operated arm for support.

Phase II: Gradual Passive and Active Assisted Mobility (Week 6-9). Once the protection period was completed, passive flexion, scaption, and external rotation were introduced gradually. The therapist used support under the arm to reduce guarding and taught the patient to distinguish stretching discomfort from sharp pain. Table slides, supine cane-assisted flexion, and gentle pulley exercises were started with low repetitions. Scapular setting was linked to breathing and trunk posture. Functional tasks were limited to light supported self-care, such as using the hand at waist level, stabilizing light objects, and assisted grooming without lifting.

Phase III: Active Control and Delayed Strengthening (Week 9-12). Active shoulder motion was introduced in gravity-reduced positions and progressed to sitting as tolerated. Low-load isometrics were started later than in Case A, followed by short-arc elastic resistance when pain remained low. The patient practiced controlled reaching to shelf level below ninety degrees, gentle external rotation activation, scapular endurance, and movement confidence drills. Home

practice remained conservative, with special emphasis on no lifting, no sudden reaching, no pushing from bed or chair, and no prolonged unsupported arm positions until strength and control improved.

Table 6: Comparative Summary of Intervention Content

Rehabilitation Element	Early Controlled Motion – Case A	Delayed Protective Protocol – Case B
Main therapeutic emphasis	Protected mobility, stiffness prevention, graded activation	Tendon protection, pain control, cautious mobility
Sling use	Used between exercises and outside hygiene	Strict and prolonged during early phase
Passive shoulder motion	Started early within prescribed limits	Delayed and introduced gradually
Active assisted exercise	Introduced after early pain and passive control improved	Introduced after protection period
Strengthening	Low-load isometrics earlier, resistance later	Delayed isometrics and resistance
Feedback style	Movement quality, range tolerance, scapular control	Pain response, safety, relaxation, confidence
Home programme	Frequent controlled mobility practice	Protection-focused practice with limited shoulder movement
Goals	Prevent stiffness and restore functional range	Protect repair and progress without flare-up

Goals

Short-Term Goals

1. To reduce postoperative pain, swelling, guarding, and sleep disturbance.
2. To educate both patients regarding sling use, repair precautions, and safe home practice.
3. To maintain elbow, wrist, hand, cervical, thoracic, and scapular mobility without stressing the repair.
4. To improve passive shoulder mobility within permitted limits according to the selected protocol.
5. To minimize fear of movement while preventing premature active lifting or unsupported elevation.
6. To improve posture, scapular awareness, and confidence during basic self-care activities.

Long-Term Goals

7. To restore pain-free functional shoulder range required for grooming, dressing, eating, and household activity.
8. To improve rotator cuff and scapular muscle activation without compensatory shoulder hiking.
9. To progress from passive mobility to active assisted, active, and resisted exercise safely.

10. To improve SPADI, ASES, QuickDASH, sleep tolerance, and functional activity log scores.
11. To support return to occupation and daily routine according to tissue healing and clinical tolerance.
12. To prevent secondary complications such as stiffness, persistent pain, weakness, fear avoidance, and repeated irritation.

Results

Both patients completed the twelve-week rehabilitation period without adverse event. Attendance was satisfactory, and home programme adherence improved after written instructions and repeated demonstration. Case A showed faster improvement in passive flexion, external rotation, active assisted control, and table-level functional use. He required repeated reminders not to use the operated shoulder for work-related tasks too early. Case B showed slower early movement recovery, but her pain profile became more stable after sling adjustment, sleep education, and delayed progression. Once the protection phase ended, she gained range gradually and reported greater confidence because she felt the repair had been protected. At twelve weeks, both patients had meaningful improvement in pain, disability, shoulder range, and daily activity. Case A remained slightly ahead in range-dependent tasks such as reaching to a shelf and grooming. Case B showed less reactive soreness and better adherence to restrictions. Both patients required continued strengthening beyond twelve weeks before heavier lifting or overhead work could be allowed.

Table 7: Mid-Programme and Post-Programme Shoulder Flexion Range

Time Point	Case A – Early Controlled Motion	Case B – Delayed Protective Protocol
Baseline	Passive flexion 82°	Passive flexion 65°
Week 6	Passive flexion 138°, active assisted 112°	Passive flexion 96°, active assisted not yet emphasized
Week 12	Active flexion 154°, passive flexion 165°	Active flexion 138°, passive flexion 150°
Total Functional Gain	Earlier mobility and smoother active elevation	Slower but steady range restoration

Table 8: Disability and Functional Task Performance

Measure	Case A Pre	Case A Post	Case B Pre	Case B Post
SPADI total score /100	72	26	78	34
ASES score /100	32	78	28	70
QuickDASH score /100	68	30	74	38
Functional activity log /20	5	16	4	14
Independent grooming score /10	2	8	1	7
Light shelf reach below shoulder /10	1	8	1	6

Table 9: Strength, Pain, and Sleep Changes

Variable	Case A Pre	Case A Post	Case B Pre	Case B Post
Pain NPRS at rest	3/10	1/10	4/10	1/10
Pain NPRS during movement	6/10	2/10	7/10	3/10
External rotation strength	Not tested early	4-/5 pain-free	Not tested early	3+/5 cautious
Abduction strength	Not tested early	4-/5 below shoulder level	Not tested early	3+/5 below shoulder level
Sleep tolerance	3-4 hours uninterrupted	6-7 hours	2-3 hours interrupted	6 hours
Post-exercise soreness	Occasional with overactivity	Minimal with pacing	Frequent initially	Minimal after graded progression

Table 10: Final Active Voluntary Movement Comparison

Movement	Case A Post	Case B Post	Clinical Interpretation
Shoulder flexion	0-154° active	0-138° active	Case A gained range faster
Shoulder abduction / scaption	0-142° active	0-126° active	Both improved with scapular training
External rotation at side	0-52° active	0-44° active	Protected progression restored rotation in both
Internal rotation reach	Thumb to L3 level	Thumb to sacrum/L5 level	Functional dressing improved
Scapular control	Mild hiking only near end range	Moderate hiking with fatigue	Both need continued strengthening
Functional use	Independent light ADL and desk tasks	Independent light ADL with cautious reach	Heavier tasks still restricted

Outcome Measures

Pain was recorded using the Numeric Pain Rating Scale during rest and permitted shoulder movement. Shoulder pain and disability were measured using the Shoulder Pain and Disability Index.

Global shoulder function was documented using the American Shoulder and Elbow Surgeons score. Upper limb disability was monitored using the Quick Disabilities of the Arm, Shoulder and Hand score.

Shoulder range of motion was measured with a universal goniometer within postoperative precautions. Muscle performance was screened through manual muscle testing and later low-load handheld dynamometer assessment when permitted.

Scapular control, compensatory shoulder hiking, guarding, and movement confidence were documented through clinical observation.

Functional shoulder use was recorded with a therapist-maintained activity log including grooming, dressing, feeding, desk work, light household activity, sleep tolerance, and protected reach.

Discussion

The findings of this comparative case study show that both early controlled motion and delayed protective rehabilitation improved recovery after rotator cuff repair, but the pattern of improvement differed. Case A benefited from early protected mobility because pain was manageable and stiffness was the main concern. Earlier passive and active assisted exercise improved flexion, external rotation, grooming ability, and confidence in light daily activity. However, this patient required careful education to avoid premature occupational loading. Case B benefited from delayed protection because tear size, tissue quality, pain irritability, and movement fear were greater. A slower first phase reduced flare-ups, improved sleep, and strengthened adherence to precautions, though range recovery was slower. By twelve weeks, Case A showed better range-dependent function, while Case B showed steadier pain control and safer movement behavior. The comparison indicates that postoperative rehabilitation should be guided by surgical findings, pain response, stiffness risk, patient behavior, and functional demands rather than by a fixed timetable alone. A blended plan may be most practical, beginning with protection and education, then adding controlled mobility and progressive strengthening according to clinical tolerance.

Limitations of the Study

- Only two patients were included, so broad generalization is limited.
- The two repairs differed in tear size, tissue quality, dominance, and occupational demand.
- Follow-up was limited to twelve weeks and did not include return to heavy work or sport.
- Advanced imaging was not repeated to confirm tendon integrity during rehabilitation.
- Strength testing was limited in the early phase because of postoperative precautions.
- Home exercise adherence depended on patient reporting and therapist review.

Conclusion

Both rehabilitation protocols improved pain, mobility, sleep, and shoulder function after rotator cuff repair. Early controlled motion produced faster range recovery, while delayed protective

rehabilitation supported pain stability and repair confidence. Selection should depend on tear characteristics, irritability, stiffness risk, precautions, and patient behavior.

Future Scope of the Study

Future research should compare early controlled motion and delayed protective rehabilitation in larger postoperative samples with stratification by tear size, repair type, tissue quality, diabetes status, smoking, occupational load, and baseline stiffness. Longer follow-up is required to determine whether early range gains translate into better function at six months and one year without compromising tendon integrity. Additional outcome measures such as ultrasound assessment of tendon healing, dynamometer-based strength testing, return-to-work scale, patient confidence scale, sleep quality index, and activity monitoring may provide a more complete picture of recovery. Future protocols should also examine whether hybrid progression, where protection is emphasized early but mobility is individualized according to irritability and stiffness risk, gives better functional results than rigid protocol selection.

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