International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2025: 7.089

Evidence Based Rehabilitation Following Arthroscopic Bankart Repair with Remplissage for Recurrent Anterior Shoulder Instability: A Case Report

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Abstract: ***Background**: Bankart lesions are among the most common injuries associated with traumatic anterior shoulder instability and are frequently accompanied by other shoulder pathologies, including Hill-Sachs lesions, SLAP tears, synovitis, loose bodies, calcific tendinitis, and subacromial impingement. While arthroscopic Bankart repair combined with remplissage is widely used to restore shoulder stability, surgery alone is not sufficient to achieve optimal functional recovery. A carefully planned rehabilitation programme is essential to restore mobility, muscle strength, neuromuscular control, and confidence in everyday shoulder function. **Case Presentation**: A 57-year-old male presented to the physiotherapy outpatient department 12 days after arthroscopic Bankart repair with remplissage for a left shoulder SLAP tear with recurrent anterior shoulder instability. The patient reported pain during end-range shoulder movement, restricted range of motion, reduced rotator cuff strength, apprehension during shoulder movement, and difficulty in activities of daily living. **Intervention**: The patient participated in a structured, phase-based physiotherapy rehabilitation programme that was progressively advanced in accordance with tissue healing and functional recovery. During the early postoperative phase, rehabilitation focused on protecting the surgical repair while minimizing pain, maintaining joint mobility, and preventing muscle atrophy. Treatment included Pain Neuroscience Education, Blood Flow Restriction Training, pendulum exercises, passive-assisted shoulder range-of-motion exercises, scapular muscle activation, submaximal isometric strengthening, distal upper-limb mobility exercises, and a prescribed home exercise programme. As the patient's condition improved, the rehabilitation programme progressed to active range-of-motion exercises, graded exposure to previously apprehensive movements, rhythmic stabilization, proprioceptive and neuromuscular training, progressive strengthening, proprioceptive neuromuscular facilitation (PNF) patterns, closed kinetic chain exercises, and task-specific functional training to facilitate a safe return to daily activities. **Outcome**: Following two weeks of supervised rehabilitation, the patient demonstrated meaningful improvements across multiple clinical outcomes. Pain during end-range shoulder movement decreased from 6/10 to 1/10 on the Numerical Pain Rating Scale. Active shoulder flexion improved substantially from 45° to 145°, while manual muscle testing showed an increase in both internal and external rotator strength from Grade 3/5 to Grade 4/5. In addition to these objective gains, the patient exhibited improved scapulohumeral rhythm, greater confidence during shoulder movement with reduced apprehension, and enhanced independence in performing activities of daily living. **Conclusion**: This case report highlights the potential value of a structured, individualized physiotherapy rehabilitation programme following arthroscopic Bankart repair with remplissage. Combining conventional rehabilitation strategies with contemporary interventions such as Pain Neuroscience. Education, Blood Flow Restriction Training, scapular stabilization, neuromuscular re-education, proprioceptive exercises, and progressive strengthening was associated with early improvements in pain, shoulder mobility, muscle strength, and functional performance. These findings reinforce the importance of a carefully progressed rehabilitation programme in supporting safe and effective recovery after shoulder stabilization surgery.*

Keywords: Bankart lesion, arthroscopic Bankart repair, remplissage, physiotherapy, shoulder instability, Blood Flow Restriction Training, Pain Neuroscience Education, case report.

1. Introduction

The shoulder is the most mobile joint in the human body, enabling an extensive range of motion required for daily activities and complex upper-limb function. This remarkable mobility, however, comes with an inherent compromise in stability, making the glenohumeral joint particularly susceptible to injury. Joint stability is achieved through the coordinated interaction of static stabilizers, including the glenoid labrum, joint capsule, and glenohumeral ligaments, together with dynamic stabilizers such as the rotator cuff and scapular musculature.

Among the injuries associated with traumatic anterior shoulder instability, the Bankart lesion is one of the most frequently encountered. It involves detachment of the anteroinferior glenoid labrum and is often accompanied by additional shoulder pathologies, including SLAP tears, Hill-Sachs lesions, synovitis, loose intra-articular bodies, calcific tendinitis, and subacromial impingement. The coexistence of these lesions can further compromise shoulder function, resulting in pain, recurrent episodes of instability, reduced range of motion, muscle weakness, movement apprehension, and limitations in activities such as dressing, grooming, lifting objects, reaching overhead, and sleeping on the affected side.

Arthroscopic Bankart repair has become the preferred surgical approach for restoring shoulder stability in patients with recurrent anterior instability. By repairing the detached capsulolabral complex, the procedure re-establishes the normal anatomy of the glenohumeral joint while preserving functional movement. In patients with an associated engaging Hill-Sachs lesion, the addition of a remplissage procedure further enhances stability by reducing the likelihood of engagement between the humeral head defect and the glenoid rim, thereby lowering the risk of recurrent dislocation.

Although surgical intervention addresses the underlying structural pathology, successful recovery depends heavily on a well-designed rehabilitation programme. Postoperative physiotherapy is essential not only to protect the healing repair but also to progressively restore shoulder mobility, rotator cuff strength, scapular stability, proprioception, and neuromuscular control. Rehabilitation must be carefully progressed according to tissue healing and the patient's functional status, as premature loading may jeopardize the surgical repair, whereas delayed or inadequate rehabilitation can contribute to persistent pain, stiffness, muscle weakness, altered scapulohumeral mechanics, and recurrent instability.

This case report describes the rehabilitation of a patient following arthroscopic Bankart repair with remplissage for recurrent anterior shoulder instability. The physiotherapy programme combined established rehabilitation principles with contemporary evidence-based strategies, including Pain Neuroscience Education, Blood Flow Restriction Training, and graded exposure, to promote early functional recovery while respecting postoperative healing and surgical precautions.

2. Case Presentation

A 57-year-old man presented to the Physiotherapy Outpatient Department at YMT College of Physiotherapy on **15 June 2026**, 12 days after undergoing arthroscopic surgery for recurrent left shoulder instability. His symptoms began following a slip-and-fall injury, after which he experienced persistent left shoulder pain, repeated episodes of instability, restricted shoulder movement, and increasing difficulty performing routine daily activities.

At the time of presentation, the patient reported difficulty with several functional tasks, including overhead reaching, dressing and grooming, lifting objects, sleeping on the affected side, and carrying out routine household activities. These limitations had a considerable impact on his independence and overall quality of life.

Orthopaedic evaluation, supported by arthroscopic findings, revealed a left shoulder SLAP tear associated with a Bankart lesion, a small Hill-Sachs lesion, synovitis, loose intra-articular bodies, calcific tendinitis, subacromial bursitis, and an anteroinferior acromial spur contributing to shoulder impingement. To address these pathologies, the patient underwent arthroscopic surgery on **3 June 2026**, which included multiple procedures aimed at restoring shoulder stability and relieving associated intra- articular pathology.

Surgical Procedure	Purpose
Arthroscopic Bankart repair	Restoration of capsulolabral stability
Remplissage	Management of the Hill-Sachs lesion and enhancement of shoulder stability
Loose body removal	Removal of intra-articular loose fragments
Debridement of calcific tendinitis	Reduction of tendon-related irritation
Subacromial decompression	Management of subacromial impingement
Synovial debridement	Reduction of intra-articular inflammation

Following surgery, the patient was instructed to wear a shoulder immobilizer and adhere to postoperative precautions, including avoiding excessive shoulder movement during the early healing period to protect the repaired tissues.

3. Clinical Examination

At the initial physiotherapy evaluation, the patient was wearing the prescribed shoulder immobilizer. Inspection revealed well-healed arthroscopic portal sites with no evidence of infection, wound discharge, or edema. Mild protective muscle guarding was observed around the left shoulder, consistent with the early postoperative stage.

Pain intensity was assessed using the **Numerical Pain Rating Scale (NPRS)**. The patient reported no pain at rest; however, moderate pain was elicited during end-range shoulder movements. Clinical assessment was performed within postoperative precautions, and provocative instability tests were intentionally avoided to protect the surgical repair.

Parameter	Initial Finding
Pain at rest	0/10
Pain during end-range movement	6/10
Posture	Protective guarding of the left shoulder
Wound condition	Arthroscopic portal sites well healed
Edema	Absent
Instability symptoms	Not assessed because of postoperative precautions
Functional limitations	Difficulty with dressing, grooming, overhead reaching, lifting objects, and sleeping on the affected side

Range of Motion

Active shoulder range of motion was restricted due to pain, postoperative precautions, and apprehension.

Movement	Initial Assessment
Shoulder flexion	0-45°
Shoulder abduction	0-50°
Internal rotation	Limited, only a few degrees
External rotation	Limited, only a few degrees

Manual Muscle Testing

Muscle Group	Initial Grade
Shoulder flexors	4/5
Shoulder extensors	4/5
Shoulder abductors	4/5
Shoulder adductors	4/5
Internal rotators	3/5
External rotators	3/5

Physiotherapy Diagnosis

The patient presented with postoperative pain during end-range shoulder movement, restricted shoulder range of motion, reduced rotator cuff activation, impaired scapulohumeral rhythm, apprehension during movement, and functional limitation following arthroscopic Bankart repair with remplissage.

Treatment Goals

The rehabilitation programme was planned according to tissue-healing principles and postoperative surgical

precautions.

The main goals were:

- To protect the repaired capsulolabral structures.
- To reduce postoperative pain and fear of movement.
- To prevent shoulder stiffness.
- To preserve upper-limb muscle activation.
- To improve scapular control and rotator cuff function.
- To restore shoulder mobility progressively.
- To improve proprioception and dynamic stability.
- To regain independence in activities of daily living.
- To prepare the patient for return to occupational and recreational activities.

Physiotherapy Intervention

The patient received supervised physiotherapy from **15 June 2026 to 28 June 2026**. A phase-wise rehabilitation protocol was planned, with progression based on pain, range of motion, tissue healing, scapular control, strength, and absence of instability symptoms.

Phase I: Protection and Early Mobility Phase

Duration: Postoperative weeks 2-6

Goals

The primary goals of this phase were protection of the surgical repair, pain reduction, prevention of postoperative stiffness, maintenance of distal joint mobility, preservation of muscle activation, and restoration of scapular control.

Pain Neuroscience Education

Pain Neuroscience Education was provided to improve the patient's understanding of postoperative pain and healing. The patient was educated about normal tissue healing, expected postoperative discomfort, safe movement strategies, immobilizer use, sleeping precautions, and warning signs requiring medical attention.

The aim was to reduce fear of movement, improve confidence, and increase adherence to the home exercise programme.

Blood Flow Restriction Training

Low-load Blood Flow Restriction Training was used as an adjunct to minimize muscle atrophy while avoiding excessive mechanical stress on the repaired tissues. A pneumatic cuff was applied proximally over the arm and inflated to approximately 50-60% limb occlusion pressure.

Low-load upper-limb exercises were performed using the **30-15-15-15 repetition protocol**, with 30- second rest intervals between sets. The patient was monitored for pain, numbness, skin colour changes, dizziness, and vascular discomfort. The cuff was deflated after completion of each exercise.

Pendulum Exercises

Codman's pendulum exercises were performed with the trunk flexed forward and the operated arm hanging freely. Gentle forward-backward, side-to-side, clockwise, and counter-clockwise movements were performed without active shoulder contraction.

Exercise	Dosage
Pendulum exercises	3 sets of 20 repetitions
Frequency	2-3 times/day

Passive-Assisted Shoulder Range of Motion

Passive-assisted shoulder flexion was performed in the supine position within surgical limits. Flexion was gradually progressed up to approximately 70° as tolerated. Abduction and external rotation were introduced cautiously, avoiding excessive anterior humeral translation.

Exercise	Dosage
Passive-assisted shoulder flexion	3 sets of 10 repetitions
Abduction and external rotation	Within pain-free protected range

Distal Joint Mobility

Active movements of the elbow, wrist, forearm, and hand were performed to maintain mobility and circulation.

Exercise	Dosage
Elbow flexion-extension	3 sets of 15 repetitions
Forearm pronation-supination	3 sets of 15 repetitions
Wrist flexion-extension	3 sets of 15 repetitions
Finger flexion-extension	3 sets of 15 repetitions
Soft ball gripping	3 sets of 15 repetitions

Scapular Muscle Activation

Scapular stabilization exercises were initiated in a protected shoulder position. These included scapular setting, retraction, depression, and gentle serratus anterior activation.

Exercise	Dosage
Scapular setting	3 sets of 10 repetitions with 5-second hold
Scapular retraction	3 sets of 10 repetitions
Scapular depression	3 sets of 10 repetitions
Serratus anterior activation	3 sets of 10 repetitions

Isometric Strengthening

Submaximal, pain-free isometric contractions were performed with the arm close to the body.

Isometrics included shoulder flexion, extension, abduction, adduction, internal rotation, and external rotation.

Parameter	Dosage
Hold time	5 seconds
Repetitions	10 repetitions
Sets	3 sets
Intensity	Submaximal and pain-free

Home Exercise Programme

The patient was advised to perform pendulum exercises, elbow-wrist-hand mobility exercises, scapular setting, and isometric contractions twice daily. He was instructed to continue using the shoulder immobilizer as prescribed and avoid heavy lifting, sudden shoulder movements, excessive abduction, and combined abduction with external rotation.

Criteria for Progression to Phase II

Progression was based on:

- Minimal pain.
- Shoulder flexion of at least 70°.
- No instability symptoms.

- Satisfactory scapular control.
- Healed surgical wounds.
- Good compliance with home exercises.

Phase II: Controlled Mobility and Dynamic Stability Phase

Duration: Weeks 6-12

Goals
This phase focused on improving active range of motion, reducing movement apprehension, restoring dynamic shoulder stability, and progressing functional use of the upper limb.

Target outcomes included:

Outcome	Target
Shoulder flexion	0-150°
External rotation	0-55°
Pain	Minimal
Functional stability	Present during daily activities

Interventions
Active-assisted to active range-of-motion exercises were initiated using wand exercises, pulley- assisted movements, and progressive active shoulder elevation.

Graded exposure was used to reduce apprehension during previously feared movements. The patient was gradually exposed to controlled shoulder positions while maintaining proper scapulohumeral rhythm.

Rhythmic stabilization exercises were added to improve dynamic stability. These included multidirectional perturbation training, closed-chain stabilization drills, and reactive neuromuscular control exercises.

Progressive strengthening was performed using resistance bands for the rotator cuff and scapular stabilizers.

Sensorimotor training included proprioceptive exercises and joint-position awareness activities to improve shoulder coordination and stability.

Criteria for Progression to Phase III
The patient would progress after achieving:
- Minimal pain.
- Shoulder flexion of at least 150°.
- External rotation of at least 55°.
- Functional shoulder stability.
- Ability to perform daily activities without apprehension.

Phase III: Advanced Strengthening and Full Range of Motion Phase

Duration: Weeks 12-20

Goals
The goals of this phase were to restore full pain-free shoulder mobility, improve muscular strength and endurance, enhance neuromuscular coordination, and prepare the patient for higher-level functional activities.

Interventions
Proprioceptive Neuromuscular Facilitation was incorporated using D1 and D2 flexion-extension patterns, rhythmic initiation, and dynamic reversals.

Closed kinetic chain exercises were introduced, including wall push-ups, weight-shifting activities, and quadruped stabilization exercises.

Isokinetic strengthening was planned for progressive rotator cuff and scapular muscle strengthening through the available range of motion.

Advanced neuromuscular control exercises included perturbation training, functional reaching activities, and multiplanar movement control.

Criteria for Progression to Phase IV
Progression was based on:
- Full pain-free range of motion.
- Symmetrical shoulder strength.
- Functional shoulder stability.
- Successful completion of advanced strengthening tasks.

Phase IV: Return-to-Function Phase

Duration: Weeks 20-24+

Goals
The final phase focused on return to occupational, recreational, and functional activities.

Interventions
Progressive overhead loading, work-specific tasks, functional movement patterns, and plyometric exercises were introduced when appropriate.

Kinesiophobia management continued through graded exposure, confidence-building activities, and psychological readiness assessment.

Return-to-activity drills included agility-based upper-limb tasks, dynamic stabilization under fatigue, and activity-specific movement simulation.

Discharge Criteria
The patient would be considered ready for discharge after achieving:
- Full functional shoulder range of motion.
- Symmetrical shoulder strength.
- Absence of instability symptoms.
- Successful completion of functional testing.
- Independence with a home exercise programme.

Outcome Measures and Results
The patient was reassessed after two weeks of supervised rehabilitation. Outcomes were measured using the Numerical Pain Rating Scale, shoulder range of motion, Manual Muscle Testing, and functional observation.

Pain

Outcome Measure	Initial Assessment	Final Assessment
Pain at Rest	0/10	0/10
Pain on end-range movement	6/10	1/10

Shoulder Range of Motion

Movement	Initial Assessment	Final Assessment
Flexion	0-45°	0-145°
Abduction	0-50°	Near-functional range within precautions
Internal rotation	Limited, only a few degrees	Improved within protected range
External rotation	Limited, only a few degrees	Improved within protected range

Manual Muscle Testing

Muscle Group	Initial Assessment	Final Assessment
Shoulder flexors	4/5	4/5
Shoulder extensors	4/5	4/5
Shoulder abductors	4/5	4/5
Shoulder adductors	4/5	4/5
Internal rotators	3/5	4/5
External rotators	3/5	4/5

Functional Outcomes

After two weeks of rehabilitation, the patient showed improvement in:

- Grooming.
- Dressing.
- Feeding.
- Basic overhead reaching within precautions.
- Confidence during shoulder movement.
- Scapulohumeral rhythm.
- Ability to perform home exercises independently.

No postoperative complications, recurrent instability, wound problems, or adverse events related to physiotherapy were observed during the intervention period.

4. Discussion

This case report describes the early clinical outcomes of a structured postoperative physiotherapy programme in a 57-year-old patient who underwent arthroscopic Bankart repair with remplissage for recurrent anterior shoulder instability. Following two weeks of supervised rehabilitation, the patient experienced clinically meaningful improvements in pain, shoulder mobility, rotator cuff strength, scapular control, and functional independence. These findings highlight the important role of individualized physiotherapy in supporting recovery during the early postoperative period while protecting the integrity of the surgical repair.

Bankart lesions typically result from traumatic anterior shoulder dislocation and involve disruption of the anteroinferior glenoid labrum and the surrounding capsuloligamentous structures. In the present case, the injury was accompanied by several additional pathologies, including a SLAP tear, a small

Hill-Sachs lesion, synovitis, loose intra-articular bodies, calcific tendinitis, subacromial bursitis, and shoulder impingement. The coexistence of these conditions increased the complexity of both the surgical intervention and the rehabilitation process, emphasizing the need for a carefully planned and progressive physiotherapy programme.

The initial phase of rehabilitation prioritized protection of the repaired tissues while minimizing the adverse effects of postoperative immobilization. Gentle passive-assisted range-of-motion exercises and pendulum exercises were introduced to maintain joint mobility without placing excessive stress on the repaired capsulolabral complex. At the same time, early scapular activation and submaximal isometric exercises helped preserve muscle function and promote neuromuscular recruitment, both of which are essential for restoring dynamic shoulder stability.

A notable aspect of this rehabilitation programme was the incorporation of Pain Neuroscience Education. Following shoulder stabilization surgery, patients often develop apprehension toward movement because of pain, uncertainty about tissue healing, and fear of reinjury. Providing clear explanations about the healing process, pain mechanisms, and safe movement strategies appeared to improve the patient's confidence and willingness to participate in rehabilitation. Better understanding of the recovery process may also have contributed to improved adherence to the prescribed home exercise programme.

Blood Flow Restriction Training was introduced as an adjunct during the early protection phase, when conventional high-load strengthening was not yet appropriate. By allowing low-load exercise to stimulate muscle activation, this approach may help reduce postoperative muscle atrophy while respecting surgical precautions. In the present case, the improvement in internal and external rotator strength from Grade 3/5 to Grade 4/5 may, in part, reflect the combined effects of early muscle activation, progressive rehabilitation, and the addition of Blood Flow Restriction Training.

Rehabilitation also focused on restoring dynamic shoulder stability through scapular stabilization, rhythmic stabilization, proprioceptive training, and graded exposure to previously apprehensive movements. These interventions address the neuromuscular deficits that frequently persist after shoulder instability, helping to improve movement quality, scapulohumeral coordination, and functional confidence. Given that recurrent instability is influenced by both structural and neuromuscular factors, restoring motor control is an important component of successful postoperative rehabilitation.

Within only two weeks of supervised physiotherapy, the patient reported a substantial reduction in pain during end-range shoulder movement, with Numerical Pain Rating Scale scores improving from 6/10 to 1/10. Active shoulder flexion also increased from 45° to 145°, accompanied by improvements in muscle strength, scapulohumeral rhythm, and performance of activities of daily living. Although recovery was still in its early stages, these outcomes suggest that rehabilitation progressed according to tissue-healing principles can promote meaningful functional gains without compromising shoulder stability.

Another important observation from this case is the value of an individualized rehabilitation approach. Rather than relying solely on predetermined timelines, progression was guided by the patient's symptoms, range of motion, muscle performance, scapular mechanics, and overall functional status. This patient-centered strategy allowed rehabilitation to advance safely while accounting for individual variability in healing and recovery.

5. Limitations

The findings of this case report should be interpreted within the context of its limitations. As this report describes the outcome of a single patient, the results cannot be generalized to the broader population undergoing arthroscopic Bankart repair with remplissage. Furthermore, follow-up was limited to the early postoperative period, preventing evaluation of long-term outcomes such as recurrent instability, return to work, return to sport, and sustained functional recovery.

Another limitation is the absence of standardized patient-reported outcome measures, including the Shoulder Pain and Disability Index (SPADI), Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire, Western Ontario Shoulder Instability Index (WOSI), and Constant-Murley Score.

Incorporating these validated outcome measures in future studies would provide a more comprehensive assessment of functional recovery. Larger prospective studies with longer follow-up periods are warranted to further evaluate the effectiveness of structured physiotherapy rehabilitation following arthroscopic Bankart repair with remplissage.

6. Conclusion

This case highlights the potential benefits of a structured, evidence-informed physiotherapy rehabilitation programme in facilitating early recovery following arthroscopic Bankart repair with remplissage. The rehabilitation strategy combined conventional postoperative management with contemporary interventions, including Pain Neuroscience Education, Blood Flow Restriction Training, controlled range-of-motion exercises, scapular stabilization, isometric strengthening, proprioceptive training, neuromuscular re-education, graded exposure, and progressive strengthening to support functional recovery while respecting tissue-healing principles.

Over the two-week rehabilitation period, the patient experienced meaningful improvements in pain, shoulder mobility, rotator cuff strength, scapulohumeral rhythm, and confidence during movement, resulting in greater independence in activities of daily living. Although the findings are limited to a single case, they reinforce the value of individualized, progressively advanced physiotherapy in optimizing early postoperative outcomes after shoulder stabilization surgery. Further research involving larger patient populations and longer follow-up is needed to establish the long-term effectiveness of this rehabilitation approach.

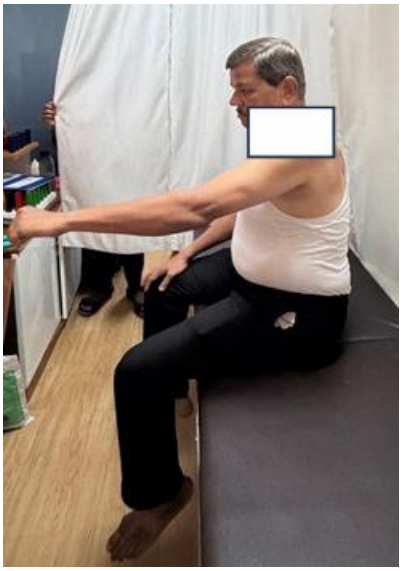

Figure 1: Pre-operative AP shoulder radiograph.

Figure 2: Clinical assessment of active shoulder flexion

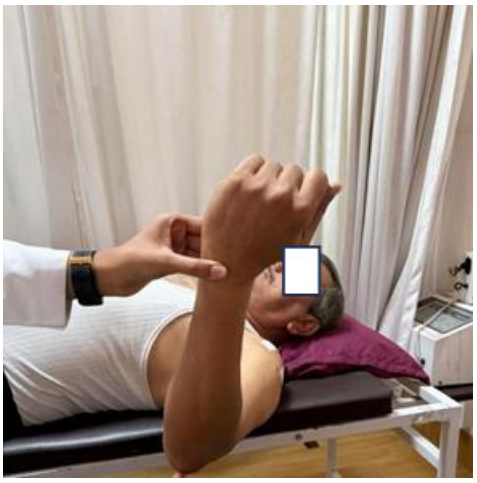

Figure 3: Range of motion assessment

Figure 4: Manual muscle testing.

Figure 5: MRI coronal images showing Bankart pathology.