Rotator Cuff Repair Management: 
Review of Evidence for Optimal Patient Recovery 

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Learning Objectives 
The clinician will be able to: 
● Summarize the current state of outcomes following RTC-R 
● Describe and explain the surgical considerations that impact outcomes after RTC-R 
● Identify and explain the patient specific factors that have insignificant and significant impact on outcomes after RTC-R 
● Discuss and apply updated evidence within phase specific protocol to optimize outcomes after RTC-R

A little about us 

Joe 
● B.S. Biology @ Stockton University (2011) 
● DPT @ Stockton University (2013) 
● Board Certified Specialist in Orthopedic PT (2018) 
● Enjoys golfing and woodworking 

Kyle 
● B.S. Exercise Science @ Elon University (2008) 
● DPT @ UNC-CH (2011) 
● Board Certified Specialist in Orthopedic Physical Therapy (2017) 
● Practicing ~ 8 years 
● Married to Darcy Cooper with two kids (Ava & Sadie)

What led us to perform an analysis of RCR management? 

Development of the UNC-HC RCR Protocols 

● UNC Therapy Services clinicians identified a need for updating protocols and selected the RCR protocol as the area of greatest need for improvement and clarification 
● Physical therapists had a strong desire to improve communication with physicians regarding postoperative RCR 
● Physical therapists had a strong desire to optimize patient outcomes 
● Approached our management and orthopedic surgeons about the need to update and clarify our postoperative RCR protocol

We received a variety of feedback!
Development of the UNC-HCS RCR Protocols

- A team of five therapists with experience treating patients after arthroscopic RCR reviewed the literature, alternative protocols, and clinical practice guidelines/statements
- Clinicians summarised their findings and created an updated protocol for UNC-HC
Development of the UNC-HCS RCR Protocols

- Provided to orthopedic surgeons for feedback
- Presented to clinicians
- Soft implementation across UNC Therapy Services
- Received feedback
- Multiple revisions based on feedback
- Protocol is currently in final phase of review prior to implementation across UNC Health Care

Prevalence

- Rotator cuff lesion are found in 13% of individuals at 50 years of age and >50% at 80 years of age.¹
- ~⅔ are asymptomatic²
- ~⅓ are painful and have associated functional disability²

RCR - Patient Reported Outcomes

- RCR seems to reliably deliver positive outcomes, including reduced pain, improved patient reported outcomes, and improved self perceived shoulder function.⁷
- A recent meta-analysis showed slightly superior outcomes for RCR v. SAD v. conservative management.⁸
  - Magnitude of difference is probably small and the “success rate” of conservative management may be high
  - Suggests a judicious use of surgery considering prognostic indicators of success is warranted
  - Previous literature refutes this result

RCR Outcomes - Retear Rate

- Historically retear rates have been reported to have varied between 11-94%.⁴,⁹
- More recent literature suggest rate of retears is likely between 11-57%.⁹
- 2383 articles on rotator cuff repairs published between 1980 and 2012 demonstrated a mean retear rate of 26.6% at mean of 23.7 months after surgery.⁹
- Clinical improvement averaged 72% of maximum improvement.⁹

Arthroscopic RCRs have increased 600%

Surgical rotator cuff repair followed by postoperative physical therapy is a common solution to this problem.
- 250,000-450,000 repairs are performed each year in the USA.⁴,⁹
- Direct medical costs in the USA exceed ~$7 billion per year⁴
- Arthroscopic RCRs have increased 600% over the past 10 years (1996-2006).⁵,⁶

临床改善平均为最大改善的72%
RTC-R Outcomes

- No clinically meaningful difference in patient reported outcomes or pain regardless of the structural integrity of the repair.\(^7\)
  
  maybe….

- Improvement seems to be related to whether or not the repair restored the integrity of the rotator cuff.\(^8\)

- Despite clinical benefits to patients with a retorn rotator cuff, both subjective and objective outcome data suggests having an intact rotator cuff after surgery results in superior outcomes.\(^10\)

Why are retear rates so high?

- Multifactorial problem
- No clear answers in the literature but some pre/postoperative factors may play a role in the rate of retears and functional outcomes
- Physical therapy may play a key role in reducing retear rate and functional outcomes by being mindful of these factors throughout the rehabilitation process.

Surgical Considerations

Tear Size & Number of Tendons Involved

- Small tear: less than 1 cm
- Medium tear: 1–3 cm
- Large tear: 3–5 cm
- Massive tear: >5 cm

Tear Size & Number of Tendons Involved

- Larger tear had a negative effect on tendon healing, functional recovery time, and functional outcome.\(^2\)
- Larger tear size increases risk of retear but impact on outcomes is not clear\(^11\)
- Larger tear size & multiple tendon involvement is a moderate predictors of outcomes after RCR\(^12\)
- Retears are more frequent for larger tears\(^9\)
- Inconclusive evidence that tear size has an influence of functional outcomes but moderate evidence that a larger tear size negatively influences cuff integrity and retears\(^13\)
Failure to Heal

- 98% of failed RCR occur in the first 6 months after repair
- Larger tears may fail earlier, with as many as 78% of failures occurring in the first 3 months after repair

Tissue Quality

- Fatty infiltration the most significant factor in predicting cuff integrity after RCR
- Higher fatty infiltration has a negative effect on RCR healing

Acute/Traumatic v. Chronic/Nontraumatic Tear

- Functional outcomes for traumatic v. nontraumatic tears are similar
- Insufficient evidence that traumatic onset has an impact on functional outcome
- Waiting > 2 years s/p trauma was found to be associated with significantly higher retear rates

Bone Mineral Density (BMD)

- Low BMD may have a negative effect on tendon healing
- Osteoporosis 41.7% unsuccessful tendon healing
- Osteopenia 30.2% unsuccessful tendon healing
- Normal BMD 9% unsuccessful tendon healing

Double v. Single Row Repairs

- Cadaveric and animal studies comparing biomechanical properties indicates that DR repairs restore the anatomic footprint of the RC and is biomechanically superior with regard to tensile strength, construct failure, and gap formation
- No difference in patient reported outcomes except for tears greater >3 cm
- DR resulted in increased ROM for tears >3 cm

Preoperative Shoulder Stiffness

- Functional recovery time may be negatively impacted by preoperative shoulder stiffness
- Preoperative stiffness associated with increased postoperative stiffness but no difference in reported outcomes
- May result in a much longer rehabilitation with stiffness present in:
  - 40% with functional recovery at 3 months
  - 72% with functional recovery at 6 months
  - 75% with functional recovery >6 months
- Preoperative Diagnoses may include:
  - Adhesive capsulitis/synovitis
  - Arthritis
Concomitant Procedures: Tissue Healing

- Biceps or acromioclavicular joint procedures had a negative effect on tendon healing.
- Acromioclavicular procedures have a negative influence on cuff integrity.
- No difference in RCR healing following acromioplasty.

Concomitant Procedures: Tissue Healing

- Higher functional outcome scores with acromioplasty.
- Biceps tenodesis associated with higher postoperative functional outcomes.
- Biceps tenotomy worse outcomes scores and increased chance of popeye deformity.
- Better patient reported outcomes after shoulder dislocation if RCR performed v. nonoperative management.
- No difference in patient reported outcomes with subacromial decompression.

Additional Surgical Procedures

- No significant data on the influence of these procedures following RCR:
  - Superior Labrum Anterior-Posterior Lesion
  - Stabilization procedure
  - Shoulder Arthroplasty

Patient Factors

Age

- Increasing age negatively influences healing.
- Moderately negative effect on cuff integrity.
- No significant effect on function.
- No significant effect on speed of recovery or outcomes.

Obesity

- Comparable outcomes noted between obese and non-obese patients in retrospective study at 1 year.
- ER ROM plateau sooner.
- Higher retear rates for arthroscopic and open mini repairs in addition to poor outcomes in ROM and DASH.
Hypercholesterolemia
- Mechanism unknown
- Decreased normalized stiffness found in rat study
- No difference noted at 1 year in post-op outcomes

Pre-operative Muscle Strength
- Limited amount of studies
- Moderately significant risk factor in predicting poor function

Duration of Symptoms Prior to Surgery
- Limited amount of studies
- No ability to predict outcomes

Presence of Systemic Disease
- Rheumatoid Arthritis
  - No significant difference
  - CRP levels
  - Hx of oral steroids
- Lupus & Hypothyroidism
  - Increase in stiffness

Psychological Factors
- Negative pain beliefs and catastrophizing, kinesiophobia, and low pain self efficacy, are associated with a poor outcome or non-recovery following conservative management
- Patients that score poorly on psychological factors have worse self-reported outcomes at 3 and 12 months after surgery

Patient Expectations
- Expectations prior to surgery may be an independent predictor of self-assessed outcome following surgery
- Greater expectations correlated with better postoperative performance on the SST, DASH, VAS, and SF-36 and greater improvement in baseline scores on the DASH and SF-36
Fear Avoidance & Catastrophizing

- Systematic review & meta-analysis of the association with chronic postsurgical pain demonstrated that anxiety and catastrophizing had a significant association with chronic pain in 67% of studies.
- Pain catastrophizing might have a higher predictive utility.

Fear Avoidance & Catastrophizing

- Poor scores on psychological measures before surgery have worse outcomes at 3 and 12 months after surgery.
- Screening for psychological factors before surgery may improve management by getting patients' behavior and psychological management prior to considering surgery.

Worker’s Compensation

- Receiving benefits is a predictor of poor function after RCR
- Require longer rehabilitation
- Worse reported outcomes
- 6x increase in retears

Poor Bone Quality

- Osteoporosis and osteopenia
- Variable proximal humerus bone mineral density
- Decreased bone quality at humeral tuberosities
- Rotator cuff tears contribute to poor bone quality
- Considered an independent risk factor affecting post-op rotator cuff healing

Diabetes Mellitus

- Increased surgical risk
- Increased retear rate in diabetics
  - Glycemic control plays vital role
- Worse outcomes and plateau sooner

Smoking & Rotator Cuff Repair

**Positive Outcome**
- No significant difference in functional outcomes vs non-smokers
- Strong evidence of no effect of cuff integrity
- No effect on tendon healing

**Negative Outcome**
- Plateau at ~ 6 months post-op vs non-smokers
- Lower functional outcome
- Higher failure rate vs non-smokers
Real World Application

- Major
  - Diabetes
  - Poor bone quality
  - Biopsychosocial factors
- Moderate
  - Increasing age
  - Pre-op muscle strength
- Minimal/No effect
  - Obesity
  - Hypercholesteremia
  - Duration of sx prior to surgery
- Mixed
  - Smoking

Physician Communication Regarding Factors

Rehabilitation Factors

Delayed Mobilization

- Improved healing / smaller retear rate
- Increased stiffness
- Slower recovery
**Early Mobilization**\(^4,32,33\)
- Increased ROM
- Quicker return to function
- Higher retear rate

**Early v. Delayed Mobilization**
- No significant difference in shoulder ROM, pain levels, and patient self-reported outcomes at follow-up periods of \(\geq 1\) year\(^4\)
- Early ROM enhances ROM slightly but not patient reported function during the first 3-6 months\(^34\)
- Stiffness due to prolonged immobilization tends to resolve at one year\(^35\)
- Early protected mobilization seems to mitigate stiffness in patients that are prone to stiffness following RCR\(^36\)
- Early ROM with tears > 2 cm resulted in 1.4-1.9 times greater risk of failure\(^34\)

**ASSET Recommendation**\(^4\)
- 2-week period of immobilization
- PROM<>AROM @ 6 weeks
- Strengthening progression @ 12 weeks

**Sling Weaning**
- Limited research available
- Earlier sling results in early improvement in quality of life indicators with no negative effect on returning to work with a health military population\(^37\)
- Earlier weaning and unprotected ROM may improve pain and short term ROM with no difference in outcomes at 1 year\(^38\)
- We have to keep in mind that despite early improvements in motion and quality of life there is a greater increase of retears, especially for those that have >2 cm tear size or poor healing.

**Sling Weaning Guidelines: Standard**

<table>
<thead>
<tr>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
<th>Week 6</th>
<th>Week 7</th>
<th>Week 8</th>
<th>Week 9</th>
<th>Week 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>No sling</td>
<td>No sling</td>
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<td>No sling</td>
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<td>No sling</td>
<td>No sling</td>
</tr>
</tbody>
</table>

**Sling Weaning Guidelines: Accelerated**

<table>
<thead>
<tr>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
<th>Week 6</th>
<th>Week 7</th>
<th>Week 8</th>
<th>Week 9</th>
<th>Week 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wear sling with abduction pillow during the day and night. May come out of sling for hygiene purposes and to perform prescribed exercises. 1 hour/2 hours out of the sling if no increased pain with the above.</td>
<td>Wear sling with abduction pillow. May begin trials out of sling for 1-2 hours, 4x daily. Continue to wear while sleeping. Continue to wear while in public places and work.</td>
<td>Wear sling with abduction pillow. May begin trials out of sling for 1-2 hours, 2x daily. Continue to wear while sleeping. Continue to wear while in public spaces.</td>
<td>Wear sling with abduction pillow. May begin trials out of sling for 1-2 hours, 2x daily. Continue to wear while sleeping. Continue to wear while in public spaces.</td>
<td>Wear sling and discontinuous use of abduction pillow. May begin trials out of sling for 1-2 hours, 2x daily, 2x daily in controlled environments. Continue to wear sling in public spaces. Continue to wear sling at night for comfort.</td>
<td>Wear sling and discontinuous use of abduction pillow. May begin trials out of sling for 1-2 hours, continuous. Continue to wear sling in public spaces. Continue to wear sling at night for comfort.</td>
<td>Wear sling and discontinuous use of abduction pillow. May begin trials out of sling for 1-2 hours, continuous. Continue to wear sling in public spaces. Continue to wear sling at night for comfort.</td>
<td>Wear sling and discontinuous use of abduction pillow. May begin trials out of sling for 1-2 hours, 2x daily in controlled environments. Continue to wear sling in public spaces. Continue to wear sling at night for comfort.</td>
<td>Wear sling and discontinuous use of abduction pillow. May begin trials out of sling for 1-2 hours, 2x daily, 2x daily in controlled environments. Continue to wear sling in public spaces. Continue to wear sling at night for comfort.</td>
<td>Discharge sling</td>
</tr>
</tbody>
</table>

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\(\) references: [4], [32], [33], [34], [35], [36], [37], [38]
Sling Weaning Guidelines: Conservative

Progressive Loading 4,39

- Failure strength 6 weeks post RCR is approximately 200-400 N. 39
- Failure strength 12 week post RCR is approximately 700 N. 39
- Failure strength returns to near normal levels approximately 6 months after surgery (2400 N) 39
- No direct relationship between EMG activity level, tensile load, & exact stress in newtons has been established 39
- The exact failure strength of the individual surgical repairs is obviously unknown
- EMG data may help determine the level of difficulty and demands on the healing tissue

### Table X: Suggested shoulder exercises categorized by time of initiation and phase of postoperative rotator cuff rehabilitation

<table>
<thead>
<tr>
<th>Phase</th>
<th>Postoperative Weeks 1-2</th>
<th>Postoperative Weeks 3-12</th>
<th>Postoperative Weeks 13-24</th>
<th>Postoperative Week 25 and Later</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1 (POD 0 - POW 1)</td>
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<tr>
<td>Phase 2 (POD 2 - POW 6)</td>
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<tr>
<td>Phase 3 (POD 6 - POW 12)</td>
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<tr>
<td>Phase 4 (POD 12 and Beyond)</td>
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</tbody>
</table>

### Progressive Loading: Exercise Selection 4

**Phase 0 (POD 0 - POW 1)**

- If he dies...

**It’s because you didn’t follow appropriate EMG activity**

### Progressive Loading: PROM 4,39

<table>
<thead>
<tr>
<th>Staged ROM Goals and Approximate Targets (in degrees)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFE</td>
</tr>
<tr>
<td>POD 1</td>
</tr>
<tr>
<td>POW 2</td>
</tr>
<tr>
<td>POW 6</td>
</tr>
<tr>
<td>POW 9</td>
</tr>
<tr>
<td>POW 12</td>
</tr>
</tbody>
</table>

PFE = passive forward elevation; PER = passive shoulder external rotation; AFE = active forward elevation

*Approximate targets for ROM. Specific limits might be specified by the surgeon, especially if a subscapularis repair was performed.*
Phase 0

- Communication with patient and physician to determine surgical considerations, patient factors, and rehabilitation strategy
- Protection is key!
  - At high risk for retear with tissue failure between 200-400 N
- Education regarding pathology, procedure, time frames for recovery, and precautions
  - Poor compliance with postoperative restrictions and precautions may result in a dramatic increase in risk of retear and non-healing that is 152x higher than compliant patients\(^4\)

Goals of this Phase:
- Protect the integrity of the repair
- Reduce the irritability of the operative upper quarter
- Improve the patient's understanding of postoperative self-care, precautions and contraindications

Precautions:
- No lifting objects,
- Avoid bringing arm behind midline of body,
- No excessive motion behind back or body,
- No excessive stretching or sudden movements,
- No supporting of body weight by arms,
- Keep incision clean & dry

Interventions:
- Patient education
- Pendulum (short or long axis)
- Elbow, wrist, and hand AROM, no weights; gripping activities
  - *Only PROM of the elbow may be specified if concomitant biceps tenodesis performed
- Grade 1 glenohumeral joint mobilization
- Scapular Activation (lower trap activation, scapular clocks/PNF)
- For accelerated care patients, PROM of shoulder to staged goals

Phase 1 (1-6 Weeks)

- Education:
  - Compliance starts to drop during this phase as patient feels more comfortable and willing to try things with their surgical arm
  - TENS & cryotherapy may help reduce pain and decrease opioid use in the first 72 hours\(^4,39\)
  - Not clear if this impacts long term outcomes\(^4,39\)

Phase 1 - Therapeutic Exercise (PROM)\(^4\)

- Used to minimize postoperative motion loss
- Can be done in a way that protects the repair
- Staged ROM may limit potential for adverse loading
- EMG \(<= 15\%\) during all activities
- Not clear if this impacts long term outcomes

Phase 1
Phase 1

Goals of this Phase:
● Protect the integrity of the repair
● Reduce the irritability of the operative upper quarter
● Prevent postoperative stiffness by achieving ROM goals
● Establish basic control and neutral positioning of the scapula
● Improve the patient’s understanding of postoperative self-care, precautions, and contraindications

Precautions:
● Provocative PROM that significantly increases the irritability of the shoulder
● Active range of motion of the shoulder
● Weighted exercise
● No supporting body weight through surgical arm

Criteria to Progress to the Next Phase:
● Adherence to post-operative precautions, exercise and immobilization guidelines
● Staged ROM goals achieved
● Tolerating ROM with < 3/10 pain
● Able to position the scapula in neutral with minimal verbal and tactile cues

Interventions:
● Modified or standard pendulum
● PFE in the plane of scapula
● Table step backs into PFE, passive scaption
● Patient self-assisted supine, reclined or seated PFE using opposite hand
● Passive shoulder ER- walk around or partner, PT assisted ER with arm supported on towel roll in ~20 deg abduction, and/or supine ER with a stick with arm supported on towel roll in ~20 deg abduction
● Grade 1-2 glenohumeral joint mobilization and grade 1-4 scapular, thoracic, and cervical mobilization staying within the parameters of the staged ROM goals
● AROM of the scapula in all positions, including prone scapular retraction/depression (no arm movement- arm supported or hanging off table), scapular clock, shoulder rolls, advance to multi-directional scapular stabilization with manual resistance
● Continue- elbow, wrist, and hand AROM, no weights; gripping activities

Phase 2 (6-12 Weeks)

4

Sharpey fibers not present
Repair strength likely 19-30% of normal at 6 weeks
Repair strength increases to 29-50% of normal at 12 weeks
Early phase 2 interventions <=15% EMG
Late phase 2 interventions 16-29% EMG
Phase 2

Goals of this Phase:
● Protect the integrity of the repair
● Continue to reduce the irritability of the operative upper quarter
● Normalized PROM as directed in staged ROM chart
● Gradually progress to AAROM->AROM as tolerated
● Improve tolerance for light, non-repetitive arm dominant ADLs and self-care at mid-sternum level or below

Precautions:
● ROM & terminal stretching significantly beyond staged ROM goals
● Any high velocity movements, including sudden jerking, pushing, and pulling
● Initiating strengthening if irritability remains high or PROM is substantially below staged ROM
● Heavy lifting with elbows away from the torso
● Repetitive activities with the elbow at or above the mid-sternum level
● Strengthening into straight-plane abduction
● No lifting greater than 5 lbs over shoulder height, No jerking motions, No sudden lifting or pushing activities

Criteria to Progress to the Next Phase:
● Staged ROM goals achieved
● Tolerating Phase 2 ROM, strength and control activities with < 3/10 pain.
● Consistently demonstrates appropriate positioning of the scapula at rest and when performing ROM, strength and scapular control activities.

Interventions:
● AAROM -> AROM
  ○ Ensure appropriate scapulohumeral rhythm and avoidance of upper trap shrugging, especially when progressing to AAROM and/or AROM in upright positions where gravity is a strong influence.
● Grade 1-3 glenohumeral joint mobilization and grade 1-4 scapular, thoracic, and cervical mobilization staying within the parameters of the staged ROM goals
● Towel slide or horizontal dusting flexion, scaption progress to abduction as tolerated; hand position at therapist discretion
● AAROM supine press-up -> press-up with FE -> FE (elbows extended) with dowel gradual increase from supine to seated
● AAROM ER with increasing degrees of abduction with dowel in supine with arm supported on towel (shoulder in scapular plane)
● Aquatic FE slow speed

Interventions: Progress to this list of interventions after patient can perform exercises listed above with minimal pain and appropriate scapulohumeral rhythm.
● Pulley FE
● Incline dusting
● Ball roll on wall
● Upright wall slide
● FE with dowel
● AAROM elevation
● Submaximal isometrics of the rotator cuff
● Aquatic FE fast speed
● Quadruped positioning

Phase 3 (12-20 weeks)
Phase 3

Goals of this Phase:
- Obtain and maintain full shoulder A/PROM
- Improve dynamic shoulder stability
- Gradual restoration of shoulder strength
- Gradual return to functional activities

Precautions:
- Soreness - Post-rehab soreness should be alleviated within 24 hours of the activities
- Pain Management - Ice PRN. May use heat prior to session or HEP
- Avoid quick, uncontrolled movements

Criteria to Progress to the Next Phase:
- Pain-free with basic upper extremity dominant ADLs and self-care
- Pain-free AROM against gravity
- MMT 4+/5 or 80% of the nonsurgical limb as tested with handheld dynamometer
- Consistently demonstrates appropriate scapula positioning during Phase III ROM, strength and control activities
- Progression to Phase 4 if patient activity level and work/recreation/sport demands require higher level strength and skill

Interventions:
- Supine elastic band FE
- Upright dowel rod AAROM FE, active lowering
- Upright active FE with no weight, progress to 1 lb as tolerated
- Side-lying dumbbell ER with elbow bent to 90 deg, rolled towel between arm and side
- Elastic resistance ER, IR and forward punch
- High, middle and low scapular rows
- Standing dumbbell ER at 0 deg abd, 10-rep max
- Standing dumbbell ER in scapular plane, 10-rep max
- Elastic resistance shoulder flexion
- Elastic resistance throwing acceleration phase
- Elastic IR at 90 deg
- Grade 1-4 glenohumeral joint mobilization and grade 1-4 scapular, thoracic, and cervical mobilization staying within the parameters of the staged ROM goals

Phase 4 (20-26+ Weeks)

- Advanced strengthening phase
- EMG activity > 50%
- Caution remains
Phase 4

Goals of this Phase:
● Enhance functional use of surgical arm
● Improve muscular strength and power
● Continue gradual return to functional activities
● Gradual return to strenuous work activities
● Gradual return to recreational/sport activities

Precautions:
● Soreness - Post-rehab soreness should be alleviated within 24 hours of the activities
● Pain Management - Ice PRN. May use heat prior to session or HEP
● Avoid activities that result in substitution patterns. Avoid exercises that generate a large increase in load compared to previous exercises.
● Return to modified manual labor, recreation, and sport pending physician approval

Interventions:
Return to sport, high level work activity phase

Strengthening
● Upright FE 3-4 lbs, 10-rep max
● Side-lying dumbbell ER at 0 deg, 10-rep max
● Prone horizontal abduction, 10-rep max
● Prone ER at 90 deg abduction, 10-rep max
● Seated military press
● Elastic resistance ER at 90 deg
● Elastic resistance throwing deceleration phase
● Standing dumbbell ER at 90 deg abd, 10-rep max

Individualized program to meet the demands of sport/recreation-specific requirements.

Manual Therapy
● Grade 1-4 glenohumeral joint mobilization and grade 1-4 scapular, thoracic, and cervical mobilization

Criteria for Return to Throw / Sport / Work

● No gold standard
● Criteria for return is variable
○ Average unrestricted return to play is 23.2 weeks
○ Reported criteria is strength comparable to uninvolved side or 75-80% strength
○ At least 6 weeks of strengthening with other considerations
○ Full ROM and “adequate” strength

Return to Throw

● Fatigue → Injuries
● Plyometrics
● Interval throwing program

Ultimate success depends on the ability to dynamically stabilize
Special Considerations: Massive

- Much larger rate of retear following massive rotator cuff repairs
- Requires significantly more protection of the healing tissues during the first 12 weeks of rehabilitation
- Slower & gentler approach to minimize cumulative load to more vulnerable tissues
- Delayed PROM for up to 6 weeks is common for this group to maximize healing and reduce possible detrimental effects of cyclic loading on tendon

Bibliography


Bibliography


Bibliography


Abbreviations Reference

● RCR - Rotator Cuff Repair
● UNC-HCS - University of North Carolina Health Care System
● ASSET: American Society of Shoulder & Elbow Therapists
● POD - Postoperative Day
● POW - Postoperative Week