

# Orthopedic Rehabilitation Protocols



# Preface



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The main purpose of this booklet is to provide students, interns, and clinicians with a comprehensive reference for all common cases that might encounter during their clinical practice. This booklet is designed to help in the assessment and treatment of different conditions. No part of this file is allowed to be reproduced, transmitted, replicated in any form without permission from the publisher or sponsor. Legal actions will be considered against any form of violation.

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This is a quick source of most common orthopedic cases protocols based on updated guidelines, organizations, and sport medicine healthcare providers. Always adhere to the local rehabilitation program. Adjust the rehabilitation plan according to each patient ( age, history, race, etc.)




# Acknowledgement

Immeasurable appreciation and gratitude for the help and support are extended to **Dr.Ali Albarrati** for his approval, kind support, advices and suggestions. **PT.Ahmed Alqarni** for his time and effort in checking this booklet, sharing his knowledge and his valuable comments. **PT.Rasha Alghofaily** for her approval, collaboration, and help in the process of publishing this booklet.

# List of Abbreviation

<b>AAROM</b>	Active assisted range of motion
<b>AROM</b>	Active range of motion
<b>ABD</b>	Abduction
<b>ACL</b>	Anterior cruciate ligament
<b>ER</b>	External rotation
<b>FWB</b>	Full weight bearing
<b>GH</b>	Glenohumeral
<b>HVGS</b>	High voltage galvanic stimulation
<b>IR</b>	Internal rotation
<b>LAQ</b>	Long arch quad
<b>NMES</b>	Neuromuscular electrical stimulation
<b>NWB</b>	Non weight bearing
<b>PROM</b>	Passive range of motion
<b>PWB</b>	Partial weight bearing
<b>QS</b>	Quadriceps set
<b>RC</b>	Rotator cuff
<b>ROM</b>	Range of motion
<b>SAQ</b>	Short arch quad
<b>SHS</b>	Snapping hip syndrome
<b>SLR</b>	Straight leg raises
<b>UE</b>	Upper extremity
<b>VMS</b>	Vastus medialis oblique
<b>WB</b>	Weight bearing
<b>WBAT</b>	Weight bearing as tolerated

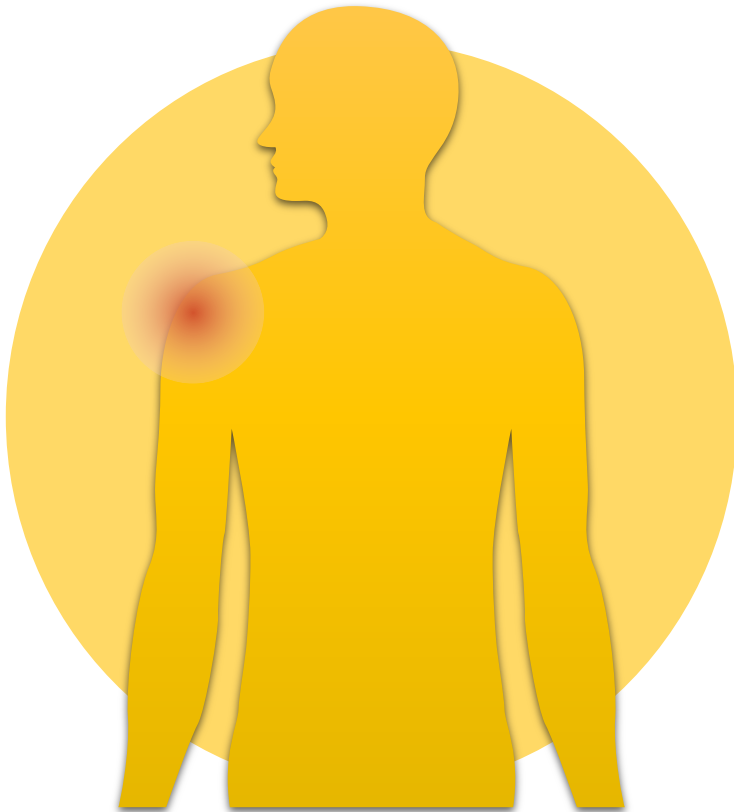


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# Shoulder



# Rotator Cuff Injuries

Muscles: Supraspinatus, Infraspinatus, Subscapularis, Teres Minor

## Common Injuries:

- 1- **Shoulder Impingement** (supraspinatus tendon become painfully entrapped in sub-acromial space)
- 2- **Shoulder Tendinopathy** (tendinosis- tiny tears in the tendon | tendonitis- inflammation of the tendon)
- 3- **Shoulder Bursitis** (inflammation of the bursa)
- 4- **Rotator Cuff Tear** (one or more of the tendons or muscles of the rotator cuff get torn)
- 5- **Bicipital Tendinopathy** ( biceps tendinitis | biceps tendinosis | biceps tenosynovitis (inflamed tendon sheath) | ruptured biceps tendon )

## Tests

### Hawkins Kennedy Test

90<sup>0</sup> of shoulder flexion + 90<sup>0</sup> of elbow flexion, then internally rotate the arm

+ = Pain with IR



Sub-acromial impingement



### Neer's Test

Stabilize the scapula, passively flex the shoulder with internal rotation

+ = Pain in the position



Sub-Acromial impingement





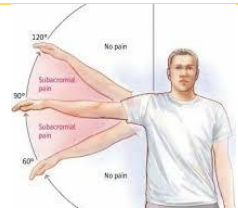
### **Painful Arc Test**

Ask the patient to actively abduct the shoulder then reverse the movement

+ = Pain between 60<sup>0</sup> and 120<sup>0</sup> of abduction and reduces once past 120<sup>0</sup> of abduction



Sub-acromial impingement



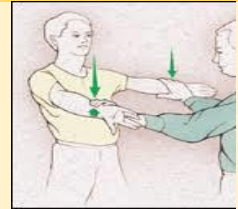
### **Empty Can Test**

Elevate the arm 90<sup>0</sup> + full IR of the arm ( thumbs down ) , then give resistance downward

+ = Weakness or pain during resistance



Impingement or supraspinatus tear



### **Drop-arm Test**

Abduct patient's arm to 90<sup>0</sup>, supporting the arm at the elbow. Release the elbow support and ask patient to slowly lower the arm.

+ = Pain while lowering the arm, sudden dropping of the arm



Rotator Cuff Tear, Particularly Supraspinatus



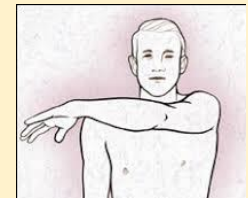
### **Cross-arm Test**

Elevate Patient's arm to 90<sup>0</sup> , Then passively adduct the arm fully in a horizontal direction

+ = Pain in the area of the acromioclavicular joint



Acromioclavicular joint dysfunction



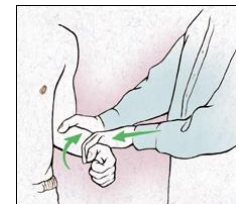
### **Yorgason Test**

Patient elbow is Flexed 90<sup>0</sup>, with arm pronation. Ask the patient to supinate the arm and resist the movement. Palpate the biceps tendon with the movement

+ = Pain with Resistance



Biceps Tendonitis





# Non-Surgical Rehabilitation

Phase : 0 – 4 Weeks

- **Goal:** Painless PROM and AROM of the shoulder

<b>Pain Control</b>	Ice, Ultrasound, HVGS - Moist Heat Before Therapy, Ice at end of session
<b>Restrictions</b>	<ul style="list-style-type: none"> <li>• Avoid exercises that cause discomfort (ROM and strengthening exercises)</li> <li>• ROM and muscle strengthening exercises should begin with the arm in less than 90<sup>0</sup> of abduction</li> <li>• Avoid abduction, rotation; recreates impingement maneuver</li> <li>• Avoid “Empty-Can” Exercises</li> <li>• Avoid repeated overhead activities</li> </ul>
<b>Immobilization</b>	<ul style="list-style-type: none"> <li>• May have brief sling immobilization for comfort only (3-6 days)</li> </ul>
<b>Exercises</b>	<ul style="list-style-type: none"> <li>• Passive ROM Exercises ( Forward Flexion, Extension, IR+ER Rotation, Capsular stretching for anterior, posterior, and inferior capsule by using the contralateral Arm)</li> <li>• Progress to active ROM exercises “Wall-Walking”</li> <li>• Resisted pain free isometric strengthening</li> </ul>
<b>Elbow Motion</b>	<ul style="list-style-type: none"> <li>• Passive to Active Motion, Progress as tolerated (0-130<sup>0</sup>, pronation to supination as tolerated)</li> </ul>
<b>Strengthening</b>	<ul style="list-style-type: none"> <li>• Grip strengthening (racquetball, etc.)</li> <li>• Use of the arm for daily living activities below shoulder level</li> </ul>



# Non-Surgical Rehabilitation

Phase II : 4-8 Weeks

**Goal:** Improve Shoulder Complex Strength, Power and Endurance

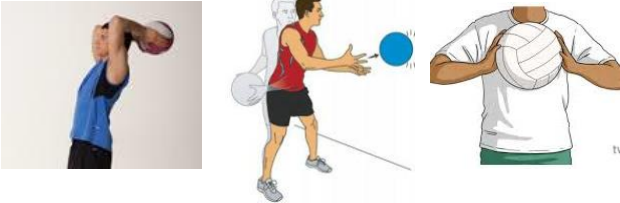
<b>Shoulder Motion</b>	<ul style="list-style-type: none"> <li>• Equal to contralateral shoulder in all planes of motion</li> </ul>
<b>Exercises</b>	<ul style="list-style-type: none"> <li>• Passive ROM</li> <li>• Capsular Stretching</li> <li>• Active-Assisted Motion Exercises</li> <li>• AROM Exercises</li> </ul>
<b>Muscle Strength</b>	<ul style="list-style-type: none"> <li>• <b>Freq : Three Times Per Week, 10-15 Repetitions, For Three Sets</b></li> <li>• Begin with closed-chain isometric strengthening ( internal rotation, external rotation, abduction)</li> <li>• Progress to open-chain strengthening with very low load( exercises performed with the elbow flexed to 90<sup>0</sup> , starting position is with the shoulder in neutral position)</li> <li>• Strengthening of Deltoid</li> <li>• Strengthening of Scapular Stabilizers <u>-Closed-Chain Strengthening Exercises-</u> <ul style="list-style-type: none"> <li>- Scapular Retraction (Rhomboids, Middle Trap)</li> <li>- Scapular Protraction (Serratus Anterior)</li> <li>- Scapular Depression (Latissimus Dorsi, Trapezius, Serratus Anterior)</li> <li>- Shoulder Shrugs (Upper Trap)</li> </ul> </li> </ul>

# Non-Surgical Rehabilitation

Phase III : 8-12 Weeks

**Goal:**

- Improve neuromuscular control and shoulder proprioception
- Prepare for return to functional activities gradually
- Establish a home based exercise program performed at least three times per week for stretching and strengthening

<p><b>Functional Strength</b></p>	<ul style="list-style-type: none"> <li>• Plyometric exercises</li> </ul> 
<p><b>Warning Signals</b></p>	<ul style="list-style-type: none"> <li>• Loss of ROM</li> <li>• Loss of strength progression; especially abduction and forward elevation.</li> <li>• Persistent pain especially at night</li> </ul>
<p><b>Treatment of Warning Signals</b></p>	<ul style="list-style-type: none"> <li>• These patients may need to move back to earlier routines</li> <li>• May require increased utilization of pain control modalities as outlined above</li> <li>• May require surgical intervention</li> </ul>



# Post-Surgical Rehabilitation

(small to medium size tears)

Phase I: 0 – 3 Weeks

**Goal:**

- Protect surgical repair
- Reduce swelling, minimize pain
- Maintain upper extremity ROM in elbow, hand and wrist
- Gradually increase shoulder PROM
- Minimize muscle inhibition
- Patient education

<b>Immobilization</b>	<ul style="list-style-type: none"> <li>• Neutral rotation</li> <li>• Use of abduction pillow in 30-45° abduction</li> <li>• Use at night while sleeping</li> </ul>
<b>Precaution</b>	<ul style="list-style-type: none"> <li>• No shoulder AROM/AAROM</li> <li>• No lifting of objects</li> <li>• No supporting of body weight with hands</li> <li>• Avoid scapular retraction with a teres minor repair</li> </ul>
<b>Intervention</b>	<ul style="list-style-type: none"> <li>• Swelling Management : Ice, Compression</li> <li>• Range of Motion/Mobility: PROM: ER &lt;20° Scapular Plane, Forward Elevation &lt; 90°, Seated GH Flexion Table Slide, Horizontal Table Slide</li> </ul> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <ul style="list-style-type: none"> <li>• AROM: Elbow, Hand, Wrist (PROM elbow flexion with concomitant biceps tenodesis/tenotomy)</li> <li>• Strengthening (week 2)</li> <li>• Periscapular: scapular retraction, prone scapular retraction, <a href="#">standing scapular setting</a>, <a href="#">supported scapular setting</a>, <a href="#">inferior glide</a>, <a href="#">low row</a> ( avoid with subscapularis repair and teres minor repair)</li> <li>• Ball squeeze in neutral position</li> </ul>



# Post-Surgical Rehabilitation

(small to medium size tears)

Phase II: 4-6 Weeks

**Goal:**

- Continue to protect surgical repair
- Reduce swelling, minimize pain
- Maintain shoulder PROM
- Minimize substitution patterns with AAROM
- Patient education

<b>Immobilization</b>	<ul style="list-style-type: none"> <li>• Neutral rotation</li> <li>• Use of abduction pillow in 30-45° abduction</li> <li>• Use at night while sleeping</li> </ul>
<b>Precaution</b>	<ul style="list-style-type: none"> <li>• No lifting of objects</li> <li>• No supporting of body weight with hands</li> </ul>
<b>Intervention</b>	<p><b>Range of Motion/Mobility</b></p> <ul style="list-style-type: none"> <li>• PROM ER&lt;20° Scapular Plane, Forward Elevation &lt;90°</li> <li>• AAROM: <a href="#">Active Assistive Shoulder Flexion</a>, <a href="#">Shoulder Flexion With Cane</a>, <a href="#">Cane External Rotation Stretch</a>, <a href="#">Washcloth Press</a>, <a href="#">Sidelying Elevation To 90 Degrees</a></li> </ul> <p><b>Strengthening</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Row on Physioball</a>, <a href="#">Shoulder Extension On Physioball</a></li> </ul>



# Post-Surgical Rehabilitation

(small to medium size tears)

Phase III: 7-8 Weeks

**Goal:**

- Do not overstress healing tissue
- Reduce swelling, pain
- Gradually increase shoulder PROM/AAROM
- Initiate shoulder AROM
- Improve scapular muscle activation
- Patient education

<b>Precaution</b>	<ul style="list-style-type: none"> <li>• No Lifting of Heavy Objects (&gt;10 Lb = 4.5 Kg)</li> </ul>
<b>Intervention</b>	<p><b>Range of Motion/Mobility</b></p> <ul style="list-style-type: none"> <li>• PROM: ER&lt;30<sup>0</sup> Scapular Plane, Forward Elevation &lt;120<sup>0</sup></li> <li>• AAROM: <a href="#">Seated Shoulder Elevation With Cane</a>, <a href="#">Seated Incline Table Slides</a>, <a href="#">Ball Roll On Wall</a></li> <li>• AROM: Elevation &lt; 120<sup>0</sup>, <a href="#">Supine Flexion</a>, <a href="#">Salutes</a>, <a href="#">Supine Punch</a>, Wall Climbs</li> </ul> <p><b>Strengthening</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Resistance Band Shoulder Extension</a>, <a href="#">Resistance Band Seated Rows</a>, <a href="#">Lawn Mowers</a>, <a href="#">Robbery</a>, <a href="#">Serratus Punches</a></li> <li>• Initiate scapular retraction/depression/protraction with subscapularis and teres minor repair</li> <li>• Elbow: resistance band bicep curls and triceps</li> </ul>

# Post-Surgical Rehabilitation

(small to medium size tears)

Phase IV: 9- 10 Weeks

**Goal:**

- Do not overstress healing tissue
- Gradually increase shoulder PROM/AAROM/AROM
- Improve dynamic shoulder stability
- Progress periscapular strength
- Gradually return to full functional activities

<b>Precaution</b>	<ul style="list-style-type: none"> <li>• No Lifting Of Heavy Objects (&gt;10 Lbs. , 4.5 Kg)</li> </ul>
<b>Intervention</b>	<p><b>Range of Motion/Mobility</b></p> <ul style="list-style-type: none"> <li>• PROM: ER&lt; 60<sup>0</sup> Scapular Plane , Forward Elevation &lt;155<sup>0</sup> , ABD &lt;60<sup>0</sup></li> <li>• AROM: <a href="#">Supine Forward Elevation With Elastic Resistance To 90 Deg</a>, <a href="#">Scaption</a> And <a href="#">Shoulder Flexion To 90 Degrees Elevation</a></li> </ul> <p><b>Strengthening</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Push-Up Plus On Knees</a>, <a href="#">Prone Shoulder Extension Is</a>, <a href="#">Resistance Band Forward Punch</a>, <a href="#">Tripod</a>, <a href="#">Pointer</a></li> </ul>

Phase V: 11 – 12 Weeks

**Goal:**

- Restore full PROM and AROM
- Enhance functional use of upper extremity

<b>Intervention</b>	<p><b>Range of Motion/Mobility</b></p> <ul style="list-style-type: none"> <li>• PROM: Full</li> <li>• AROM: Full</li> </ul> <p><b>Stretching</b></p> <ul style="list-style-type: none"> <li>• <a href="#">External Rotation (90 Degrees Abduction)</a>, <a href="#">Hands Behind Head</a>, <a href="#">IR Behind Back With Towel</a>, <a href="#">Sidelying Horizontal ADD</a>, <a href="#">Sleeper Stretch</a>, <a href="#">Triceps</a> , <a href="#">Doorjam Series</a></li> </ul>
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# Post-Surgical Rehabilitation

(small to medium size tears)

Phase VI: 13 - 16 Weeks

## Goal:

- Maintain pain-free ROM
- Initiate RC strengthening (with clearance from md)
- Initiate motor control exercise
- Enhance functional use of upper extremity

<b>Intervention</b>	<b>Strengthening</b> <ul style="list-style-type: none"><li>• Rotator Cuff: <a href="#">Internal External Rotation Isometrics</a>, <a href="#">Side-Lying External Rotation</a>, <a href="#">Standing External Rotation W/ Resistance Band</a>, <a href="#">Standing Internal Rotation W/ Resistance Band</a>, <a href="#">Side Lying Abd→Standing Abd</a></li><li>• Periscapular: <a href="#">T And Y</a>, <a href="#">“T” Exercise With Band</a>, <a href="#">Push-Up Plus Knees Extended</a>, <a href="#">Wall Push Up</a>, <a href="#">Band Dynamic Hug</a>.</li><li>• <a href="#">Biceps Curl</a> (Begin with Concomitant Biceps Tenodesis/Tenotomy)</li></ul> <b>Motor Control</b> <ul style="list-style-type: none"><li>• Internal and External Rotation in Scaption And Flex 90-125<sup>0</sup> (Rhythmic Stabilization)</li><li>• IR/ER And Flex 90-125<sup>0</sup> (Rhythmic Stabilization)</li><li>• Quadruped Alternating Isometrics and Ball Stabilization on Wall</li><li>• <a href="#">PNF – D1 Diagonal Lifts</a>, <a href="#">Pnf – D2 Diagonal Lifts</a></li><li>• <a href="#">Field Goals</a> (Scaption)</li></ul>
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# Post-Surgical Rehabilitation

(small to medium size tears)

Phase VII: 4 – 6 Months (Early Return to Sport)

**Goal:**

- Maintain pain-free ROM
- Continue strengthening and motor control exercises
- Enhance functional use of upper extremity
- Gradual return to strenuous work/sport activity

<b>Intervention</b>	<b>Strengthening</b> <ul style="list-style-type: none"><li>• Rotator Cuff: <a href="#">External Rotation At 90 Degrees</a>, <a href="#">Internal Rotation At 90 Degrees</a></li></ul> <b>Motor Control</b> <ul style="list-style-type: none"><li>• <a href="#">Resistance Band PNF Pattern</a>, <a href="#">PNF – D1 Diagonal Lifts W/ Resistance</a>, <a href="#">Wall Slides W/ Resistance Band</a></li></ul>
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# Post-Surgical Rehabilitation

(large size tears)

This Protocol is Divided into 4 Phases:

- Phase I: Passive Range of Motion
  - Phase II: Active Assisted→Active Range of Motion
  - Phase III: Resisted Exercises/Strengthening
  - Phase IV: Advanced Strengthening/Dynamic Stability.
- 

# Post-Surgical Rehabilitation

(large size tears)

Phase I: Passive Range of Motion (0 to 8 – 10)

## Goal:

- Patient education: posture, joint protection, positioning, hygiene
- Minimize postoperative pain and inflammation, prevent stiffness
- Controlled passive shoulder motion (within pain limits)

<b>Immobilization</b>	<ul style="list-style-type: none"><li>• Sling +/- abduction pillow for a minimum of 2-6 weeks post-surgery for comfort and to protect the integrity of repair. Remove for showering and ROM exercises.</li></ul>
<b>Precaution</b>	<ul style="list-style-type: none"><li>• Avoid active shoulder flexion/abduction or active muscle contraction in the first 6 weeks.</li><li>• Avoid lifting, carrying, pushing. The repair can only withstand minimal loads.</li></ul>

Intervention	<p style="text-align: center;"><b><u>Muscle Activation</u></b></p> <p><b>General:</b></p> <ul style="list-style-type: none"> <li>• Ball/Theraputty squeezes (Avoid if biceps repair or tenodesis done)</li> <li>• Posture awareness /exercises</li> </ul> <p><b>Scapula: *With Sling On*</b></p> <ul style="list-style-type: none"> <li>• Elevation/depression, retraction/protraction</li> <li>• Scapular orientation: Ensure patient can achieve proper scapular positioning (Emphasize posterior tilt with some elevation /upward rotation, external rotation/retraction)</li> </ul> <p style="text-align: center;"><b><u>ROM</u></b></p> <ul style="list-style-type: none"> <li>• <b>Elbow &amp; Wrist:</b> Active &amp; Passive Flexion/Extension/Pronation/Supination (Avoid elbow flexion if biceps repair or tenodesis)</li> <li>• <b>Shoulder:</b> <u>Passive</u> motion in supine position through a Comfortable Range <ul style="list-style-type: none"> <li>- 0-2 Weeks: No range of motion except home exercises supervised by therapist</li> <li>- 2-6 Weeks: Therapist guided supine range in therapy sessions/assistant at home</li> <li>- 6-8 Weeks: Patient PROM with cane/stick</li> </ul> </li> <li>• Passive abduction &amp; scaption: Slowly progress ROM to AAROM painfree</li> <li>• Bent-arm self-assisted scaption and forward flexion to 90<sup>0</sup> +</li> <li>• Passive ER/IR At 30° abduction/scapular plane: 0-60<sup>0</sup> (Unless subscapularis repaired)</li> </ul> <p style="text-align: center;"><b><u>Pain/ Inflammation Control</u></b></p> <ul style="list-style-type: none"> <li>• Ice 15 minutes every few hours</li> <li>• Interferential current therapy (Pain Relief)</li> </ul>
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# Post Surgical Rehabilitation

(large size tears)

Phase II: active assisted→active range of motion (10 to 14-18 weeks )

### Goals:

- Ensure adequate mobility specific to glenohumeral joint (~90-12 GH flexion & abduction)
- Active-assisted ROM with progression to active ROM exercises
- Establish baseline humeral head control
- Initiation of functional activities/adls and proprioception exercises below shoulder height
- Patients should be able to actively raise the arm against gravity in standing

<b>Precaution</b>	<ul style="list-style-type: none"> <li>• Do Not Load, Lift, Push Or Pull With Affected Arm</li> <li>• No Rapid Movements/Gestures (Excessive Muscle Contraction)</li> </ul>
<b>Intervention</b>	<p style="text-align: right;"><b><u>ROM</u></b></p> <p><b>PROM &amp; AAROM:</b></p> <ul style="list-style-type: none"> <li>• Use Cane/Stick (PROM) Progressions: Supine→ 45<sup>0</sup> Semi-Reclined→ Sitting/Standing→ Pulleys (=AAROM):             <ul style="list-style-type: none"> <li>- Scaption &amp; Abduction And Flexion Above Shoulder Level (As Tolerated).</li> <li>- Continue With ER Range In Abduction/Scapular Plane &gt;30<sup>0</sup> Elevation (As Tolerated).</li> </ul> </li> <li>• Hydrotherapy/Pool = AAROM (Ensure Good Glenohumeral Movement To Avoid Scapular Hitching)</li> </ul> <p><b>AROM:</b></p> <ul style="list-style-type: none"> <li>• Supine Cane/Stick Progress To Wall/Towel Slides And Then To No Assistance (AROM)             <ul style="list-style-type: none"> <li>- Scaption/Abduction &amp; Flexion 0-140<sup>0</sup> (Or as Tolerated) Progression of Position (Supine → 45<sup>0</sup> Semi-Reclined → Standing) [ Table 1]</li> </ul> </li> </ul> <p>Note: Flexion Above 90<sup>0</sup> Becomes Gravity Assisted. At the Beginning with The Elbow Flexed and Then Extending the Elbow.</p>

**Intervention****Muscle Strength & Endurance****General:**

- Pendulums Forward/Back, Side/Side For Pain Control And Joint Stiffness
- Posture Awareness / Exercises

**Rotator Cuff:**

- Initiate Isometrics/Isotonics When 80% A Achieved to Activate The Cuff Not Strengthen. The Amount of Force Should Be Like Pressing into A Balloon. [Table 2]
- **Sub-Maximal Isometrics:**
  - ER/IR And Adduction With Arm Supported In 30<sup>0</sup> Abduction
  - \*Caution With IR If Subscapularis is Repaired
  - Shoulder Flexion & Extension (Push/Pull With Elbow At 90<sup>0</sup>)
  - Elbow Flexion (Avoid if Biceps Tenodesis/Tenotomy), Extension
- **Light Isotonics:**
  - AROM against gravity
  - Sidelying ER With Pillow/Towel (~30<sup>0</sup> Abduction) No Weight +/-Muscle Stimulation

**Scapula:**

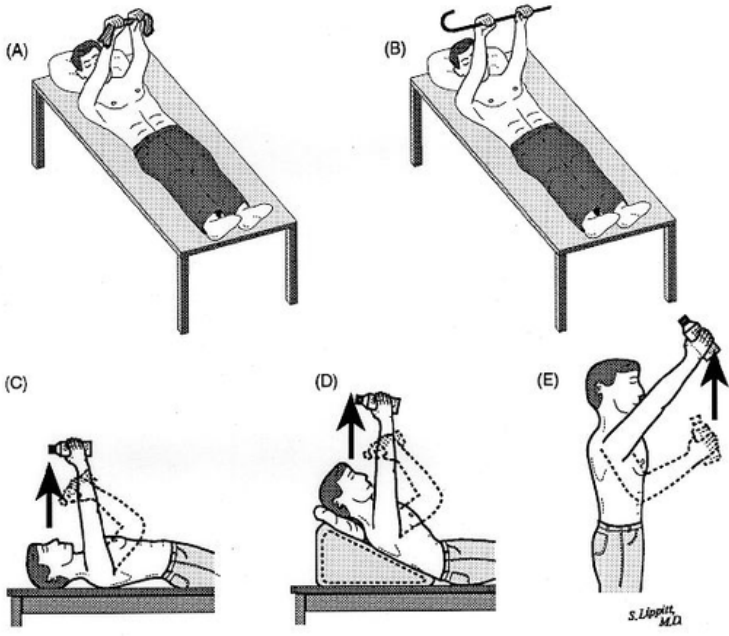
- Continue with protraction, retraction, elevation, depression. Posterior tilt for scapula
- Manual resistance for scapular motions
- Closed chain scapulothoracic stability & proprioception at ranges below 60<sup>0</sup> of elevation (Large theraball on floor: Circles clockwise and Counterclockwise +/- Pushing into ball)
- Prone arms Raises At 0<sup>0</sup>
- Swiss ball slides up wall in Flexion And Scaption

**Mobilizations**

- GH Mobilizations (Grade II-III)
- Scar Massage If Incisions Completely Healed

**Cardiovascular (As Tolerated)**

- Stationary Bicycle, Treadmill, Stairmaster, Elliptical Trainer (No Arms), Walking



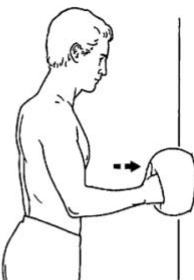
Matsen Fig. 4-31.

Table [1]. Supine press with progressive incline

SHOULDER - 29 Strengthening: Isometric Flexion

Using wall for resistance, press fist into ball using light pressure. Hold 10 seconds.

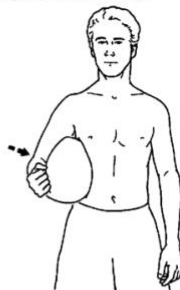
Repeat \_\_\_\_\_ times per set.  
 Do \_\_\_\_\_ sets per session.  
 Do \_\_\_\_\_ sessions per day.



SHOULDER - 34 Strengthening: Isometric Adduction

Using body for resistance, gently press arm into ball using light pressure. Hold 10 seconds.

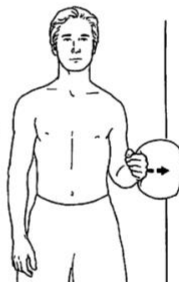
Repeat \_\_\_\_\_ times per set.  
 Do \_\_\_\_\_ sets per session.  
 Do \_\_\_\_\_ sessions per day.



SHOULDER - 36 Strengthening: Isometric External Rotation

Using wall to provide resistance, and keeping arm at side, press back of hand into ball using light pressure. Hold 10 seconds.

Repeat \_\_\_\_\_ times per set.  
 Do \_\_\_\_\_ sets per session.  
 Do \_\_\_\_\_ sessions per day.



SHOULDER - 37 Strengthening: Isometric Internal Rotation

Using door frame for resistance, press palm of hand into ball using light pressure. Keep elbow in at side. Hold 10 seconds.

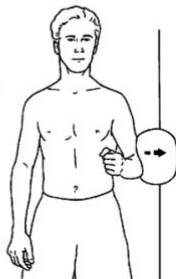
Repeat \_\_\_\_\_ times per set.  
 Do \_\_\_\_\_ sets per session.  
 Do \_\_\_\_\_ sessions per day.



SHOULDER - 32 Strengthening: Isometric Abduction

Using wall for resistance, press arm into ball using light pressure. Hold 10 seconds.

Repeat \_\_\_\_\_ times per set.  
 Do \_\_\_\_\_ sets per session.  
 Do \_\_\_\_\_ sessions per day.



SHOULDER - 31 Strengthening: Isometric Extension

Using wall for resistance, press back of arm into ball using light pressure. Hold 10 seconds.

Repeat \_\_\_\_\_ times per set.  
 Do \_\_\_\_\_ sets per session.  
 Do \_\_\_\_\_ sessions per day.



Table [2]. Isometric shoulder exercises



# Post-Surgical Rehabilitation

(large size tears)

Phase III : resisted exercises/strengthening (18 to 24 weeks, 6 months)

## Goals:

- Satisfactory range of movement, especially flexion and external rotation
- Progress AROM as tolerated – should be nearly full
- ER at side, at 45<sup>0</sup> and 90<sup>0</sup> abduction
- Restore dynamic humeral head control
- Increase external rotation strength/endurance
- Progression of functional activities/heavier ADL's below shoulder height
- Non-painful normal range of motion

<b>Precaution</b>	<ul style="list-style-type: none"> <li>• Avoid overhead loads with affected arm and painful activities</li> <li>• Avoid full and empty can exercises – the long lever places too much stress on the rotator cuff</li> </ul>
<b>Intervention</b>	<p style="text-align: center;"><b><u>AROM</u></b></p> <ul style="list-style-type: none"> <li>• Overhead wall slide/walking: forward, scaption</li> <li>• Ball slides/roll up wall (90<sup>0</sup>-160<sup>0</sup> + flexion/scaption/abduction)</li> </ul> <p style="text-align: center;"><b><u>Muscle Strength &amp; Endurance</u></b></p> <p style="text-align: center;">Note: progression is endurance then strength. High repetitions (4x15 or 3x30)</p> <p><b>Rotator Cuff:</b></p> <ul style="list-style-type: none"> <li>• Light Isotonics             <ul style="list-style-type: none"> <li>- Sidelying ER with towel (30<sup>0</sup> Abduction) +/- Muscle stimulation progress to 1 lb</li> <li>- Light resistance tubing ER/IR (30<sup>0</sup> Abduction) with towel</li> <li>- Progress 45<sup>0</sup>→90<sup>0</sup> as tolerated +/- support and then arm at side (0<sup>0</sup>)</li> </ul> </li> <li>• Low force rhythmic stabilization spine 90<sup>0</sup> flexion and ER/IR at 45<sup>0</sup> Abduction (For Humeral Head Control)</li> </ul>

<b>Intervention</b>	<p style="text-align: center;"><b><u>Muscle Strength &amp; Endurance</u></b></p> <p><b>Scapula:</b></p> <ul style="list-style-type: none"> <li>• Supine/Standing Protraction/Retraction + Weights/Tubing</li> <li>• Prone/Seated Rowing. Progress To Pulleys, Tubing Etc.</li> <li>• Forward Punches With Pulleys, Tubing.</li> <li>• Dynamic Hug → With Tubing</li> <li>• Light Resistance Shoulder Extension, Adduction, Flexion. (Good Patterning Required!!)</li> <li>• PNF Patterning – None To Light Resistance Only</li> <li>• Closed Chain Proprioception Progression At And Above Shoulder Height (Weight-Bearing Protraction/Retraction: Supine At 90, Wall, Plinth, Hands &amp; Knees....)</li> <li>• Ball Stabilization On Wall</li> <li>• Wall Washes</li> <li>• Push-Up With Plus, Progress From On Wall →Plinth → Floor</li> </ul> <p style="text-align: center;"><b><u>Mobilizations And Stretching</u></b></p> <ul style="list-style-type: none"> <li>• GH Mobilizations (Grade III – IV) For Mobility</li> <li>• Gentle stretches if needed for anterior or posterior Shoulder, Internal Rotation</li> </ul> <p style="text-align: center;"><b><u>Cardiovascular (As Tolerated)</u></b></p> <ul style="list-style-type: none"> <li>• Continue with stationary bicycle, treadmill, stairmaster, elliptical trainer (no arms), walking</li> </ul>
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# Post-Surgical Rehabilitation

(large size tears)

Phase IV: Advanced Strengthening & Dynamic Stability (6 months+ up to 1 year)

**Goals:**

- Full pain free AROM
- Continue to improve muscular strength, stability and endurance with emphasis on external rotation strength
- Functional activities/ADLs above shoulder height (progress with weight +/- repetition)
- Advance strengthening program +/- plyometric training \*\* only if required
- Return to desired activities i.e. heavier labour, overhead sports

<b>Precaution</b>	Pain with activities/exercise. This indicates the load/stresses are too much.
<b>Intervention</b>	<p style="text-align: center;"><b><u>Muscle Strength &amp; Endurance</u></b></p> <p><b>General:</b></p> <ul style="list-style-type: none"> <li>• Biceps/Triceps</li> <li>• Chest Press</li> <li>• Shoulder Press</li> <li>• Flys / Reverse Flys</li> <li>• Lat Pull Downs</li> <li>• Full Push Up</li> </ul> <p><b>Rotator Cuff:</b></p> <ul style="list-style-type: none"> <li>• ER/IR At Side, 45<sup>0</sup> , 90<sup>0</sup> – Vary Speed, Resistance &amp; Position (Sidelying, Standing, Prone)</li> <li>• Hands And Knees Closed Chain Perturbations, Progress to Hands And Feet</li> </ul>

Intervention	<p style="text-align: center;"><b><u>Muscle Strength &amp; Endurance</u></b></p> <p><b>Scapula:</b></p> <ul style="list-style-type: none"> <li>• Continue with shoulder strengthening program as Initiated in Phase III With faster speed, multiplanar activities.</li> <li>• PNF Diagonal Patterns [Table 3] With Bands/Pulleys/Manual Resistance: <ul style="list-style-type: none"> <li>- D1 Extension (High Back Hand To Down To Hitch Hike Position)</li> <li>- D1 Flexion (Hitch Hike To High Back Hand Position)</li> <li>- D2 Extension (Carry Tray To Hand In Opposite Front Pocket Position)</li> <li>- D2 Flexion (Hand In Opposite Front Pocket To Carry Tray Position)</li> </ul> </li> </ul> <p style="text-align: center;"><b><u>Cardiovascular Fitness</u></b></p> <ul style="list-style-type: none"> <li>• Train specific to demand of Sport (Aerobic, Anaerobic)</li> </ul>
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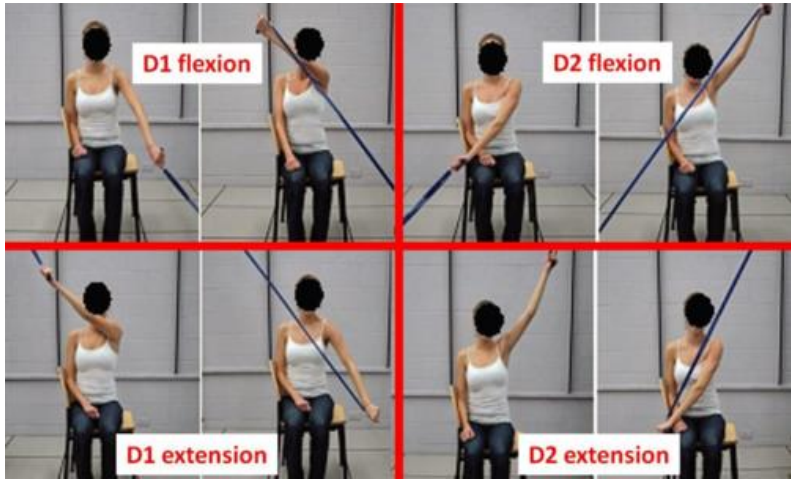


Table [ 3] PNF patterns

# Shoulder Dislocation

Anterior dislocation is the most common dislocation and is caused by the arm being positioned in an excessive amount of abduction and external rotation

- Arm held in an abducted and externally rotated position
  - Loss of normal contour of the deltoid and acromion prominent posteriorly and laterally
  - Humeral head palpable anteriorly
  - All movements limited and painful
  - Palpable fullness below the coracoid process and towards the axilla
- 

## Tests

### Apprehension test

Supine,  $90^{\circ}$  of shoulder flexion +  $90^{\circ}$  of elbow flexion, then apply ER force slowly

+ = pain



Glenohumeral instability in an anterior direction.



### Shoulder release/surprise test

After the apprehension test, apply a posteriorly directed force to the shoulder

+ = relief of the pain



Glenohumeral instability, subluxation, dislocation



# Non-Surgical Rehabilitation

- **First time dislocation:** may be immobilized for 4-6 weeks before starting physical therapy.
  - **Recurrent dislocation:** physical therapy can begin immediately
- 

Phase I: 0 – 4 Weeks

**Goal:**

- Re-establish full motion, retard muscular atrophy, decrease pain and inflammation, allow capsular healing

<b>Immobilization</b>	<ul style="list-style-type: none"><li>• Ultra-sling ER: position arm in 10<sup>0</sup> of ER. Use at all times except showering / bathing</li></ul>
<b>Intervention</b>	<ul style="list-style-type: none"><li>• AAROM with wand to tolerance</li><li>• Begin IR/ER at side, progress to 30<sup>0</sup>, 60<sup>0</sup> then 90<sup>0</sup></li><li>• Submax isometrics for all shoulder musculature</li><li>• Gentle joint mobilization</li><li>• Ice to decrease inflammation and pain</li></ul>

Phase II: 4-8 weeks

**Goals:**

- Increase dynamic stability, increase strength, maintain full motion

<b>Immobilization</b>	<ul style="list-style-type: none"><li>• Ultra-sling ER: only as needed for comfort / symptom control</li></ul>
<b>Intervention</b>	<ul style="list-style-type: none"><li>• Isotonic strengthening: rotator cuff , scapular stabilizers, deltoid, biceps, triceps</li><li>• Rhythmic stabilization (basic intermediate advanced)</li></ul>

# Non-Surgical Rehabilitation

Phase III : 8 – 12 Weeks

## Goal:

- Increase neuromuscular control (especially in apprehension position)
- Progress dynamic stability, increase overall strength

## Intervention

- Continue to progress previous isotonic exercises
- Begin dynamic stabilization
- Introduce basic plyometrics
- \*in athletes begin to work ER/IR in 90<sup>0</sup> ABD



Phase IV: 13 + week (return to activity)

## Goals:

- Progressively increase activities to patient for full functional return

## Intervention

- Continue previous isotonic strengthening program
- Advance plyometrics
- Instruct in maintenance program prior to discharge





# Bankart Lesion

- Are injuries at the anteroinferior aspect of the glenoid labrum and represent a common complication of anterior shoulder dislocation
- Patients with a Bankart lesion are recognized by shoulder pain which is not localized in a specific point and the pain gets worse when the arm is held behind the back. They also feel weakness and instability of the shoulder.
- MRI is used after making sure that the patient is suffering from anterior subluxation. It is the most useful tool to confirm the lesion

## Post-Surgical Bankart Repair

Note: Always adhere to the local protocol

Phase I: 0 - 3 weeks

### Goals:

- Protect surgical repair
- Reduce swelling, minimize pain
- Maintain UE ROM in elbow, hand and wrist
- Gradually increase shoulder PROM
- Minimize muscle inhibition
- Patient education

<b>Immobilization</b>	<ul style="list-style-type: none"><li>• Neutral rotation</li><li>• Use of abduction pillow in 30-45<sup>0</sup> abduction</li><li>• Use at night while sleeping</li></ul>
<b>Precaution</b>	<ul style="list-style-type: none"><li>• No shoulder AROM</li><li>• No lifting of objects</li><li>• No supporting of body weight with hands</li></ul>
<b>Intervention</b>	<p><b>Swelling Management</b></p> <ul style="list-style-type: none"><li>• Ice, compression</li></ul> <p><b>Range of motion/Mobility</b></p> <ul style="list-style-type: none"><li>• PROM: ER&lt;20<sup>0</sup> scapular plane, forward elevation &lt;90<sup>0</sup>, <a href="#">seated GH flexion table slide</a></li><li>• AROM: elbow, hand, and wrist.</li></ul>



# Post-Surgical Bankart Repair

Phase II: 4-6 weeks

**Goals:**

- Continue to protect surgical repair
- Reduce swelling, minimize pain
- Gradually increase shoulder PROM
- Minimize substitution patterns with AAROM/AROM
- Patient education

<b>Immobilization</b>	Start to wean out of sling
<b>Precaution</b>	<ul style="list-style-type: none"> <li>• No lifting of objects</li> <li>• No supporting of body weight with hands</li> </ul>
<b>Intervention</b>	<p><b>Range of motion/Mobility</b></p> <ul style="list-style-type: none"> <li>• PROM: ER&lt;50<sup>0</sup> scapular plane, ER at 90<sup>0</sup> ABD&lt;45<sup>0</sup>, forward elevation &lt;135<sup>0</sup></li> <li>• AROM: elbow, hand, wrist</li> <li>• AAROM: <a href="#">washcloth press up</a>, <a href="#">seated table slides</a>, <a href="#">seated shoulder elevation with cane</a>, <a href="#">Active assistive shoulder flexion</a>, <a href="#">shoulder flexion with cane</a>, <a href="#">cane external rotation stretch</a></li> <li>• AROM: elevation &lt; 115<sup>0</sup>, supine flexion, salutes, supine punch, seated shoulder elevation with cane and active lowering</li> </ul> <p><b>Strengthening</b></p> <ul style="list-style-type: none"> <li>• Rotator cuff: internal external rotation isometrics</li> <li>• Periscapular: <a href="#">scap retraction</a>, <a href="#">prone scapular retraction</a>, <a href="#">standing scapular setting</a>, <a href="#">supported scapular setting</a>, <a href="#">inferior glide</a>, <a href="#">low row</a></li> </ul>



# Post-Surgical Bankart Repair

Phase III: 7 – 8 weeks

**Goals:**

- Do not overstress healing tissue
- Reduce swelling, minimize pain
- Gradually increase shoulder PROM/AROM
- Initiate rotator cuff strengthening
- Progress periscapular strength
- Improve dynamic shoulder stability
- Gradually return to full functional activities
- Patient education

<b>Immobilization</b>	Discontinue
<b>Precaution</b>	No lifting of heavy objects (>10 lbs, = 4.5 kg )
<b>Intervention</b>	<p><b>Range of motion/Mobility</b></p> <ul style="list-style-type: none"> <li>• PROM: ER&lt;65<sup>0</sup> scapular plane, ER at 90<sup>0</sup> , ABD &lt; 75<sup>0</sup>, forward elevation &lt;155<sup>0</sup></li> <li>• AAROM: Pulleys</li> <li>• AROM: Elevation &lt; 145<sup>0</sup> , supine forward elevation with elastic resistance to 90<sup>0</sup> .</li> </ul> <p><b>Strengthening</b></p> <ul style="list-style-type: none"> <li>• Rotator cuff: side-lying external rotation, standing external rotation w/ resistance band, standing internal rotation w/ resistance band.</li> <li>• Periscapular: resistance band shoulder extension, resistance band seated rows, tripod, pointer, resistance band forward punch, prone shoulder extension Is</li> </ul> <p><b>Motor Control</b></p> <ul style="list-style-type: none"> <li>• Internal and external rotation in scaption and Flex 90-125<sup>0</sup> (rhythmic stabilization)</li> <li>• IR/ER and Flex 90-125<sup>0</sup> (rhythmic stabilization)</li> </ul>



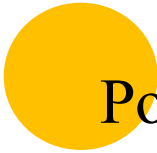
# Post-Surgical Bankart Repair

Phase IV: 9 - 11 weeks

**Goals:**

- Do not overstress healing tissue
- Gradually increase shoulder PROM/AROM
- Progress rotator cuff strengthening
- Progress periscapular strength
- Improve dynamic shoulder stability

<b>Precaution</b>	No lifting of heavy objects (> 10 lbs , = 4.5 kg)
<b>Intervention</b>	<p><b>Range of motion/mobility</b></p> <ul style="list-style-type: none"> <li>• PROM: Full</li> <li>• AROM: Full</li> </ul> <p><b>Strengthening</b></p> <ul style="list-style-type: none"> <li>• Rotator cuff: sidelying ABD→standing ABD, <a href="#">scaption</a> and <a href="#">shoulder flexion to 90 degrees elevation</a></li> <li>• Periscapular: <a href="#">T and Y</a>, <a href="#">push-up plus on knees</a>, prone external rotation at 90 degrees, <a href="#">wall push up</a>, <a href="#">resistance band dynamic hug</a></li> </ul> <p><b>Stretching</b></p> <ul style="list-style-type: none"> <li>• <a href="#">IR behind back with towel</a>, <a href="#">sidelying horizontal ADD</a>, <a href="#">sleeper stretch</a>, <a href="#">triceps</a> and lats, <a href="#">doorjam series</a></li> </ul> <p><b>Motor Control</b></p> <ul style="list-style-type: none"> <li>• <a href="#">PNF – D1 diagonal lifts</a>, <a href="#">PNF – D2 diagonal lifts</a></li> <li>• <a href="#">Field goals</a></li> </ul>



# Post-Surgical Bankart Repair

Phase V: 12 – 16 weeks

**Goals:**

- Maintain pain-free ROM
- Enhance functional use of upper extremity

<b>Intervention</b>	<p><b>Strengthening</b></p> <ul style="list-style-type: none"> <li>• Rotator cuff: <a href="#">resistance band standing external rotation at 90 degrees</a>, <a href="#">resistance band standing internal rotation at 90 degrees</a>, <a href="#">push-up plus knees extended</a>, <a href="#">Resistance band Ws</a></li> </ul> <p><b>Motor control</b></p> <ul style="list-style-type: none"> <li>• Resistance band PNF pattern, PNF – D1 diagonal lifts w/ resistance</li> <li>• <a href="#">Wall slides w/ resistance band</a></li> </ul> <p><b>Stretching</b></p> <ul style="list-style-type: none"> <li>• <a href="#">External rotation (90 degrees abduction), hands behind head</a></li> </ul>
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Phase VI: 4 – 6 months

**Goals:**

- Maintain pain-free ROM
- Continue strengthening and motor control exercises
- Enhance functional use of upper extremity
- Gradual return to strenuous work/sport activity

<b>Intervention</b>	See sport specific rehabilitation program coordinate with sports physio
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# Frozen Shoulder

- Freezing stage: pain with any movement of the shoulder, and shoulder range of motion starts to become limited.
  - Frozen stage: Pain may begin to diminish during this stage. However, shoulder becomes stiffer, and using it becomes more difficult.
  - Thawing stage: range of motion of the shoulder begins to improve.
- 

## Tests

### ROM testing

External rotation: fixate the scapula with your body and the coracoid process with the arm from the anterior side then perform shoulder ER

+ = 1- Loss of ROM at least 50% or less than 30° of ER

2- ROM reduction in 2 another planes by at least 25% like flexion and abduction



### Apley's scratch test

1- abduction and external rotation: patient reach behind the head and touch the superior aspect of the opposite scapula.

2- Internal rotation and adduction: patient reach behind the back and touch the inferior aspect of the opposite scapula

+ = Patient is unable to perform the movement





# Frozen shoulder rehabilitation

Note: Always adhere to the local protocol

Phase I: 0 – 2 weeks

**Goals:**

- Reduce the pain and restore the motion

<b>Immobilization</b>	Sling allowed as needed for comfort only, first 5 - 7 days, taking arm out often 5 - 7 times a day for elbow ROM
<b>Intervention</b>	<p><b>Pain control</b></p> <ul style="list-style-type: none"> <li>• Icing every two hours for 12 – 15 minutes first 5 - 7 days, 3 times a day thereafter</li> </ul> <p><b>Range of motion/mobility</b></p> <ul style="list-style-type: none"> <li>• AAROM: <a href="#">Active assistive shoulder flexion, shoulder flexion with cane</a></li> <li>• Soft tissue mobilization focused on periscapular musculature, cervical spine, and rotator cuff</li> <li>• Scapular mobilization</li> <li>• Passive and active assisted ROM manually and using pulley at home going for full motion as soon as able without increased irritability</li> </ul> <p><b>Suggested treatment</b></p> <ul style="list-style-type: none"> <li>• Cardiovascular training program can include bike, treadmill, versa climber, UBE</li> <li>• Core stabilization program</li> <li>• Ball or putty squeezing throughout the day</li> </ul>



# Frozen shoulder rehabilitation

Phase II: 2 - 4 weeks

**Goals:**

- Full passive range of motion should be achieved by 2 - 4 weeks

<b>Intervention</b>	<p><b>Pain control</b></p> <ul style="list-style-type: none"><li>• Continued icing 3 times per day</li></ul> <p><b>Range of motion/mobility</b></p> <ul style="list-style-type: none"><li>• Scapular and glenohumeral joint mobilization as indicated</li><li>• Begin rotator cuff retraining and strengthening, focus on restoring proper biomechanics</li><li>• Integration of involved shoulder through bilateral UE activity and total motion training (full body movements using both upper and lower extremities)</li></ul> <p><b>Suggested treatment</b></p> <ul style="list-style-type: none"><li>• Continued cardiovascular and core strength training</li></ul>
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Phase III: 4 – 8 weeks

**Goals:**

- Controlled, emphasized ROM exercises
- ROM may be more aggressive when pain not a limiting factor
- Focus on stretching at ROM limits

<b>Intervention</b>	<ul style="list-style-type: none"><li>• Progressive strength training contingent upon perfect biomechanics</li><li>• Development of independent home and gym program</li><li>• Return to swimming with good mechanics after 6 weeks</li></ul>
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# Frozen Shoulder Rehabilitation

Phase IV: 8 - 10 weeks

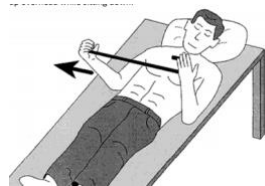
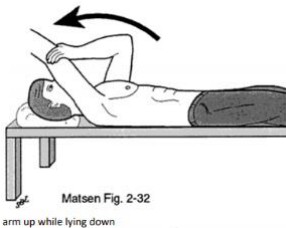
## Goals:

- Home maintenance exercise program
- Progression into normal activity and exercise program

## Intervention

- Patient discharged with life-long home maintenance program to include daily ROM exercises, rotator cuff program, and cardiovascular program
- ROM exercises two times a day, Rotator cuff strengthening 3x per week, Scapular stabilizer strengthening 3x per week

Home program: Stretching Exercises for the Frozen shoulder



**Appendices for Shoulder Injuries**  
**[Appendix 1] Quick Dash**  
**[Appendix 2] The Penn Shoulder Score**

Please rate your ability to do the following activities in the last week by circling the number below the appropriate response.

	NO DIFFICULTY	MILD DIFFICULTY	MODERATE DIFFICULTY	SEVERE DIFFICULTY	UNABLE
1. Open a tight or new jar	1	2	3	4	5
2. Do heavy household jobs (e.g. wash windows, clean floors)	1	2	3	4	5
3. Carry a shopping bag or briefcase	1	2	3	4	5
4. Wash your back	1	2	3	4	5
5. Use a knife to cut food	1	2	3	4	5
6. Recreational activities which require you to take some force or impact through your arm, shoulder or hand (e.g. golf, hammering, tennis etc)	1	2	3	4	5

	NOT AT ALL	SLIGHTLY	MODERATELY	QUITE A BIT	EXTREMELY
7. During the past week, to what extent has your arm, shoulder or hand problem interfered with your normal social activities with family, friends, neighbours or groups? (circle number)	1	2	3	4	5

	NOT LIMITED AT ALL	SLIGHTLY LIMITED	MODERATELY LIMITED	VERY LIMITED	UNABLE
8. During the past week, were you limited in your work or other regular daily activities as a result of your arm, shoulder or hand problem? (circle number)	1	2	3	4	5

Please rate the severity of the following symptoms in the last week (circle number)

	NONE	MILD	MODERATE	SEVERE	EXTREME
9. Arm, shoulder or hand pain	1	2	3	4	5
10. Tingling (pins and needles) in your arm, shoulder or hand	1	2	3	4	5

	NO DIFFICULTY	MILD DIFFICULTY	MODERATE DIFFICULTY	SEVERE DIFFICULTY	SO MUCH DIFFICULTY THAT I CAN'T SLEEP
11. During the past week, how much difficulty have you had sleeping because of the pain in your arm, shoulder or hand? (circle number)	1	2	3	4	5

QuickDASH DISABILITY/SYMPTOM SCORE =  $\frac{(\text{sum of } n \text{ responses}) - 1}{n} \times 25$  (where n is the number of completed responses)

## [Appendix 1] Quick Dash

**WORK MODULE (OPTIONAL)**

The following questions ask about the impact of your arm, shoulder or hand problem on your ability to work (including home-making if that is your main work role).

Please indicate what your job / work is: \_\_\_\_\_

I do not work (you may skip this section).

Please circle the number that best describes your physical ability in the past week.

Did you have any difficulty:	NO	MILD	MODERATE	SEVERE	UNABLE
	DIFFICULTY	DIFFICULTY	DIFFICULTY	DIFFICULTY	
1. Doing your work in your usual way?	1	2	3	4	5
2. Doing your usual work because of arm, shoulder or hand pain?	1	2	3	4	5
3. Doing your work as well as you would like?	1	2	3	4	5
4. Spending your usual amount of time doing your work?	1	2	3	4	5

**SPORTS/PERFORMING ARTS MODULE (OPTIONAL)**

The following questions relate to the impact of your arm, shoulder or hand problem on playing *your musical instrument or sport or both*. If you play more than one sport or instrument (or play both), please answer with respect to that activity which is most important to you.

Please indicate the sport or instrument which is most important to you: \_\_\_\_\_

I do not play a sport or an instrument. (You may skip this section).

Please circle the number that best describes your physical ability in the past week.

Did you have an difficulty:	NO	MILD	MODERATE	SEVERE	UNABLE
	DIFFICULTY	DIFFICULTY	DIFFICULTY	DIFFICULTY	
1. Playing your instrument or sport in your usual way?	1	2	3	4	5
2. Playing your musical instrument or sport because of arm, shoulder or hand pain?	1	2	3	4	5
3. Playing your instrument or sport as well as you would like?	1	2	3	4	5
4. Spending your usual amount of time practising or playing your instrument or sport?	1	2	3	4	5

**Scoring the optional modules:** add up the assigned values for each response; divide by 4 (number of items); subtract 1; multiple by 25.

## [Appendix 1] Quick Dash

## The Penn Shoulder Score, Part 1: Pain and Satisfaction Subscales

Please circle the number closest to your level of pain or satisfaction	Office Use Only
Pain at rest with your arm by your side:  0   1   2   3   4   5   6   7   8   9   10 No pain <span style="float: right;">Worst pain possible</span>	_____ (10 - # circled)
Pain with normal activities (eating, dressing, bathing):  0   1   2   3   4   5   6   7   8   9   10 No pain <span style="float: right;">Worst pain possible</span>	_____ (10 - # circled) (Score 0 if not applicable)
Pain with strenuous activities (reaching, lifting, pushing, pulling, throwing):  0   1   2   3   4   5   6   7   8   9   10 No pain <span style="float: right;">Worst pain possible</span>	_____ (10 - # circled) (Score 0 if not applicable)
Pain score: = ____/30	
How satisfied are you with the current level of function of your shoulder?  0   1   2   3   4   5   6   7   8   9   10 Not satisfied <span style="float: right;">Very satisfied</span>	_____/10 (# circled)

[Appendix 2] The Penn Shoulder Score

### The Penn Shoulder Score: Function Subscale

Please circle the number that best describes the level of difficulty you might have performing each activity	No difficulty	Some difficulty	Much difficulty	Can't do at all	Did not do <u>before</u> injury
1. Reach the small of your back to tuck in your shirt with your hand	3	2	1	0	X
2. Wash the middle of your back/hook bra	3	2	1	0	X
3. Perform necessary toileting activities	3	2	1	0	X
4. Wash the back of opposite shoulder	3	2	1	0	X
5. Comb hair	3	2	1	0	X
6. Place hand behind head with elbow held straight out to the side	3	2	1	0	X
7. Dress self (including put on coat and pull shirt off overhead	3	2	1	0	X
8. Sleep on affected side	3	2	1	0	X
9. Open a door with affected arm	3	2	1	0	X
10. Carry a bag of groceries with affected arm	3	2	1	0	X
11. Carry a briefcase/small suitcase with affected arm	3	2	1	0	X
12. Place a soup can (1-2 lb) on a shelf at shoulder level without bending elbow	3	2	1	0	X
13. Place a one gallon container (8-10 lb) on a shelf at shoulder level without bending elbow	3	2	1	0	X
14. Reach a shelf above your head without bending your elbow	3	2	1	0	X
15. Place a soup can (1-2 lb) on a shelf overhead without bending your elbow	3	2	1	0	X
16. Place a one gallon container (8-10 lb) on a shelf overhead without bending your elbow	3	2	1	0	X
17. Perform usual sport/hobby	3	2	1	0	X
18. Perform household chores (cleaning, laundry, cooking)	3	2	1	0	X
19. Throw overhand/swim/overhead racquet sports (circle all that apply to you)	3	2	1	0	X
20. Work full-time at your regular job	3	2	1	0	X

**SCORING**

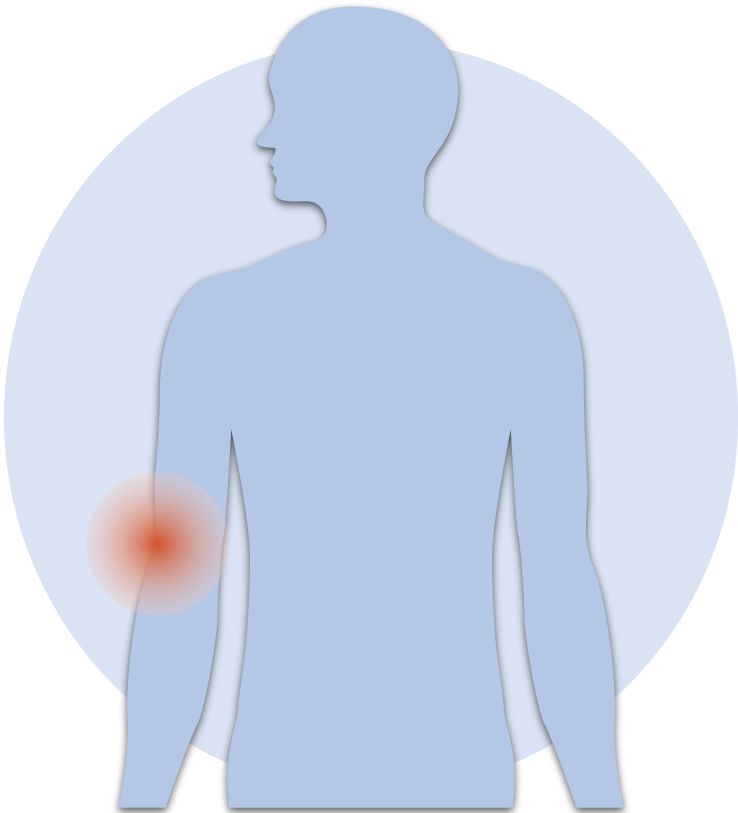
Total of columns = \_\_\_\_ (a)

Number of Xs  $\times$  3 = \_\_\_\_ (b),  $60 - \text{____}(b) = \text{____}(c)$  (if no Xs are circled, function score = total of columns)

Function Score =  $\text{____}(a) \div \text{____}(c) = \text{____} \times 60 \text{ ____}/60$

### [Appendix 2] The Penn Shoulder Score

# Elbow



# Tennis elbow

Condition that causes pain in the lateral side of elbow, clinically known as lateral epicondylitis. Tight supinator and wrist extensor.

---

## Tests

### Mill's test

Palpate the lateral epicondyle, flex the elbow 90<sup>0</sup>, pronate the forearm then flex the wrist, extend the elbow fully

+ = Pain at the lateral epicondyle



Lateral epicondylitis



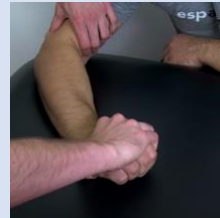
### Cozen's test

Stabilize the arm in a table. Ask the patient to make a fist+ pronate the forearm+ extend the wrist, give resistance

+ = Pain at the lateral epicondyle



Lateral epicondylitis



### Maudsley's Test

Stabilize the arm in a table. Ask the patient to pronate the arm. Palpate the lateral epicondyle while resisting the 3<sup>rd</sup> digit of the hand

+ = Pain at the lateral epicondyle



Lateral epicondylitis






# Tennis Elbow Rehabilitation

Phase I: 0 - 3 weeks

**Goal:**


- Minimizing the recurrence of the patient's lateral epicondylitis
- Reduce pain and inflammation

<b>Immobilization</b>	<ul style="list-style-type: none"> <li>• A wrist immobilization splint, along with a counterforce tennis elbow band, is fitted for continual basis</li> </ul> 
<b>Intervention</b>	<ul style="list-style-type: none"> <li>• Manual massage is recommended for 5 mins sessions 2 times a day</li> <li>• Ice for 15 minutes three to four times a day.</li> <li>• Patient education and activity modification: is critical. It is important to review the list of activities &amp; movements that aggravate the pain. Patients should be instructed in lifting objects with the palm up as opposed to grasping objects with the palm down.</li> </ul>

Phase II: 3 weeks

**Goal:**

- Restore flexibility through active stretching exercises.

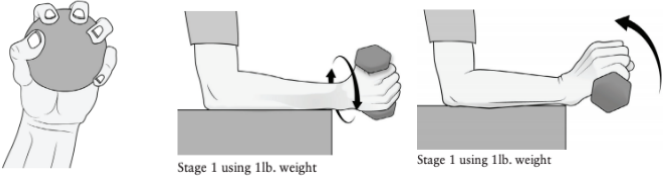
<b>Intervention</b>	<p><u>Stretching</u></p> <ul style="list-style-type: none"> <li>• Freq: Once per day for 3-5 repetitions, 30 sec hold</li> </ul> 
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# Tennis Elbow Rehabilitation

Phase III: 4- 6 weeks

**Goal:**

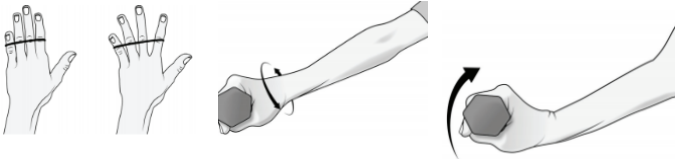
- Passive stretching & strengthening exercises are initiated. (with stabilization)

<b>Intervention</b>	<p><b><u>Strengthening</u></b></p> <ul style="list-style-type: none"> <li>• Freq: Every day for 2 -3 sets / 10 – 15 reps each</li> <li>• Ball squeeze, forearm supination, wrist extension</li> </ul> 
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Phase IV: 6+ weeks

**Goal:**

- Advance strengthening exercises are initiated. (without stabilization)

<b>Intervention</b>	<p><b><u>Strengthening</u></b></p> <ul style="list-style-type: none"> <li>• Freq: Every day for 15-20 reps / 2 – 4 sets</li> <li>• Fingers stretch, forearm supination, wrist extension</li> </ul> 
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# Golfer's Elbow

Condition that causes pain in the medial side of elbow, clinically known as medial epicondylitis. Tight pronator and wrist flexor.

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## Tests

### Medial Epicondylitis Test 1

Palpate the medial epicondyle, flex the elbow 90°, supinate the forearm then extend the wrist, extend the elbow fully

+ = Pain at the medial epicondyle



Medial epicondylitis



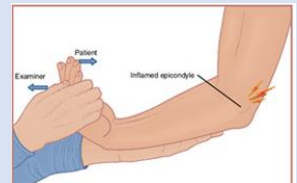
### Medial Epicondylitis Test 2

Stabilize the arm in a table. Ask the patient to make a fist+ supinate the forearm+ flex the wrist, give resistance

+ = Pain at the medial epicondyle



Medial epicondylitis




# Golfer's Elbow Rehabilitation

Phase I: 0 - 3 weeks

**Goal:**


- Minimizing the recurrence of the patient's lateral epicondylitis, reduce the pain and inflammation

<p><b>Immobilization</b></p>	<ul style="list-style-type: none"> <li>• A wrist immobilization splint, along with a counterforce Golfer's elbow band, is fitted for continual basis</li> </ul> 
<p><b>Intervention</b></p>	<ul style="list-style-type: none"> <li>• Manual massage is recommended for 5 mins sessions 2 times a day</li> <li>• Ice for 15 minutes two to three times a day.</li> <li>• Patient education and activity modification: is critical. It is important to review the list of activities &amp; movements that aggravate the pain. Patients should be instructed in lifting objects with the palm up as opposed to grasping objects with the palm down.</li> </ul>

Phase II: 3 weeks

**Goal:**

- Restore flexibility through active stretching exercises.


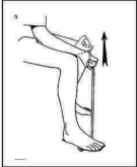
<p><b>Intervention</b></p>	<p><u>Stretching</u></p> <ul style="list-style-type: none"> <li>• Freq: Once per day for 3-5 repetitions, 30 sec hold</li> </ul> 
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# Golfer's Elbow Rehabilitation

Phase III: 4- 6 weeks

**Goal:**

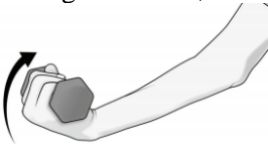
- Passive stretching & strengthening exercises are initiated.

<b>Intervention</b>	<p><b><u>Strengthening</u></b></p> <ul style="list-style-type: none"> <li>• Freq: Every day for 2 -3 sets / 10 – 15 reps each</li> <li>• Wrist flexion with dumbbells or band (arm stabilized )</li> </ul> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p style="text-align: center; font-size: small;">Stage 1 using 1lb. weight</p>
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Phase IV: 6+ weeks

**Goal:**

- Advance strengthening exercises are initiated.

<b>Intervention</b>	<p><b><u>Strengthening</u></b></p> <ul style="list-style-type: none"> <li>• Freq: Every day for 2 -3 sets / 10 – 15 reps each</li> <li>• Fingers stretch, forearm pronation, wrist flexion</li> </ul> 
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# Hand



# Carpal Tunnel Syndrome

Median nerve is compressed, the symptoms include numbness, tingling and weakness in the arm and hand (thumb, index and half of 3<sup>rd</sup> finger).

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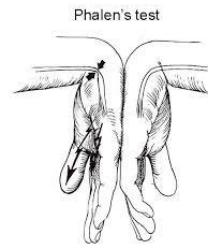
## Tests

### Phalen's test

Ask the patient to maximally flex the wrist while pressing the dorsal side of the hand against each other. Hold for 1 minute  
+ = tingling in the thumb, index, medial half of 3<sup>rd</sup> finger



Carpal tunnel impingement



### Carpal tunnel compression test

With the patient hand supinated, apply compression for 30 sec in the carpal tunnel between the thenar and hypothenar eminence  
+ = tingling, numbness and dull pain



Carpal tunnel impingement



# Non-Surgical Carpal Tunnel Rehabilitation

<b>Immobilization</b>	Rest and splint around the wrist in neutral position to avoid compression on the median nerve during nighttime for 2 weeks or more
<b>Intervention</b>	<p><b>Patient education :</b></p> <ul style="list-style-type: none"> <li>• Take more frequent breaks to rest the hand</li> <li>• Avoid activities that makes the symptoms worse</li> <li>• Cold packs to reduce the swelling</li> </ul> <p><b>Therapeutic exercises:</b></p> <ul style="list-style-type: none"> <li>• Wrist extension and flexion stretching exercise (Once per day for 3-5 repetitions, 30 sec hold)</li> </ul> <div data-bbox="316 671 723 842"> </div> <ul style="list-style-type: none"> <li>• Median nerve glide ( 10 to 15 reps a day – 6 days per week )</li> </ul> <div data-bbox="316 882 529 1078"> </div> <ul style="list-style-type: none"> <li>• Tendon glides (5 - 10 reps, 2 to 3x a day, as tolerated)</li> </ul> <div data-bbox="316 1150 1028 1375"> </div>



# Post-Surgical Carpal Tunnel Rehabilitation

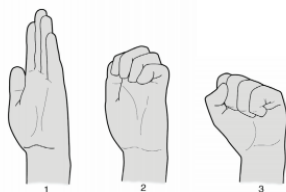
Phase I: 3 – 5 days

- |                     |  |
|---------------------|--|
| <b>Intervention</b> | <ul style="list-style-type: none"><li>• Assess finger mobility</li><li>• Educate patient on ROM for fingers and wrist (<u>no wrist flexion or extension</u>)</li><li>• Instruct patient on suture site care, tendon glides, and edema control</li><li>• Educate patient on splint regimen (full time except for exercises)</li></ul> |
|---------------------|--|

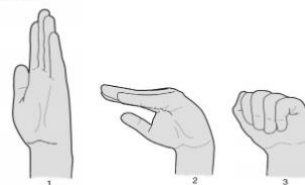
Phase II: 10 - 12 days

- |                     |  |
|---------------------|--|
| <b>Intervention</b> | <ul style="list-style-type: none"><li>• Educate about keeping hand dry until 2 weeks post-op</li><li>• Continue to wear splint and reinforce no heavy lifting</li><li>• Tendon glide</li></ul> |
|---------------------|--|

Series A



Series B



# Post-Surgical Carpal Tunnel Rehabilitation

Phase III: 3 - 4 weeks

<b>Intervention</b>	<ul style="list-style-type: none"> <li>• Ensure proper wound healing, scar mobility, AROM</li> <li>• Review ROM program</li> <li>• Add nerve gliding program</li> <li>• Begin wrist flexion/extension</li> <li>• Wean from splint (wear at night for an additional week)</li> </ul>

Phase IV: week 5 +

<b>Intervention</b>	<ul style="list-style-type: none"> <li>• Full wrist ROM</li> <li>• Continue nerve gliding exercise</li> <li>• Begin gentle grip/pinch strengthening exercises.</li> </ul>

# Cubital Tunnel Syndrome

Ulnar nerve is compressed, the symptoms include numbness, tingling and weakness in the arm and hand (small finger and ring finger).

## Tests

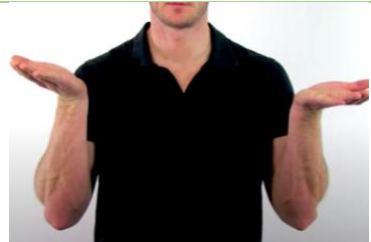
### Elbow Flexion Test

Arms in neutral, elbow is fully flexed+ forearm supinated+ extend the wrist. Hold for maximally 3 minutes

+ = reproduction of pain, numbness, and tingling along the distribution of ulnar nerve



Cubital tunnel syndrome



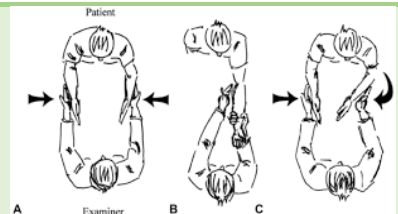
### Scratch collapse test

Arms in neutral. Elbow is at 90<sup>0</sup> of flexion. Apply an IR force and ask the patient to resist it. Then scratch the ulnar nerve and immediately repeat step 1.

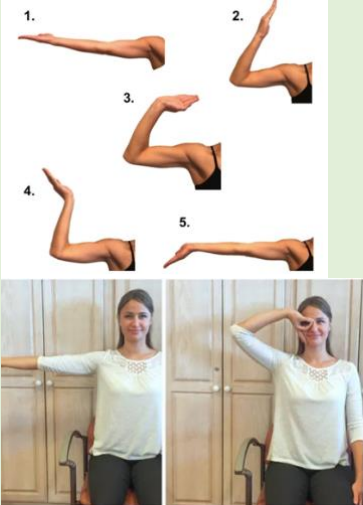
+ = brief loss of patient external rotation force



Cubital tunnel syndrome



# Non-Surgical Cubital Tunnel Rehabilitation

<b>Immobilization</b>	Rest and splint around the elbow in neutral position to avoid compression on the ulnar nerve during nighttime for 2 weeks or more
<b>Intervention</b>	<p><b>Patient education:</b></p> <ul style="list-style-type: none"> <li>• Take more frequent breaks to rest the hand</li> <li>• Avoid activities that makes the symptoms worse</li> <li>• Cold packs to reduce the swelling</li> </ul> <p><b>Therapeutic exercises:</b></p> <ul style="list-style-type: none"> <li>• Ulnar nerve gliding ( hold each position for 5 sec then return to starting position)</li> </ul>  <p>The image contains two parts illustrating the ulnar nerve gliding exercise. The top part shows five numbered diagrams (1-5) of an arm and hand in various positions: 1. Arm extended straight out to the side. 2. Arm bent at the elbow, hand pointing up. 3. Arm bent at the elbow, hand pointing forward. 4. Arm bent at the elbow, hand pointing down. 5. Arm extended straight out to the side, opposite to position 1. The bottom part is a photograph of a woman in a white long-sleeved shirt and black pants, standing in front of a wooden cabinet. She is demonstrating the same five arm positions as shown in the diagrams above.</p>

# Post-Surgical Cubital Tunnel Rehabilitation

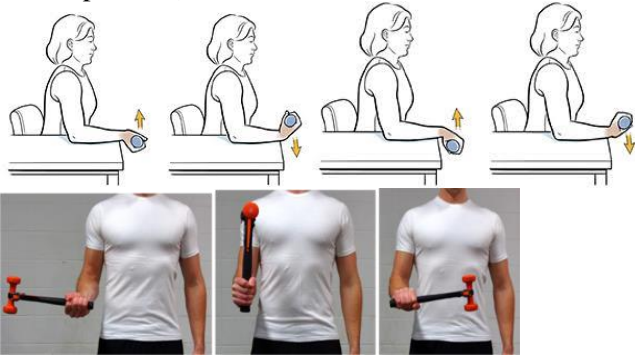
Phase I: 0 – 2 weeks

<b>Intervention</b>	<ul style="list-style-type: none"> <li>• Early finger, wrist, elbow ROM encouraged</li> <li>• No lifting objects over 5 lbs. ( 2 kg)</li> </ul>
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Phase II: 2 - 4 weeks

<b>Intervention</b>	<ul style="list-style-type: none"> <li>• Scar massage and desensitization starting 3 days after suture removal</li> <li>• ROM: encourage elbow, wrist, hand AROM</li> <li>• Stress ball for strengthening</li> <li>• No lifting over 5 lbs. ( 2 kg)</li> </ul>
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Phase III: week 4 +

<b>Intervention</b>	<ul style="list-style-type: none"> <li>• No restrictions</li> <li>• Aggressive strengthening is initiated ( once per day , 10 - 15 reps each )</li> </ul>  <p>The image contains two rows of illustrations. The top row shows four line drawings of a person sitting at a table, performing wrist flexion and extension exercises with a stress ball. The first two drawings show wrist flexion (upward arrow), and the last two show wrist extension (downward arrow). The bottom row shows three photographs of a person performing hammer curls with a mallet, demonstrating the aggressive strengthening phase.</p>
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# De Quervain's syndrome

Painful inflammation of the extensor pollicis brevis and the abductor pollicis longus. Symptoms include pain near the thumb base, swelling near the thumb base, and difficulty moving thumb and wrist.

## Examination:

- Patients present with radial-sided wrist pain which is typically worsened by thumb and wrist motion.
  - Pain or difficulty with tasks such as opening a jar lid.
  - Tenderness overlying the radial styloid is usually present, and fusiform swelling in this region may also be appreciated.
  - Tenderness over the base of the thumb and/or 1st dorsal compartment extensor tendons on the thumb side of wrist.
- 

## Tests

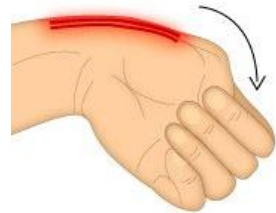
### Finkelstein test

Forearm rested in neutral, ulnar side on the table and off the edge. Thumb is flexed and held inside a fist. Ask the patient to deviate the wrist to ulnar side.


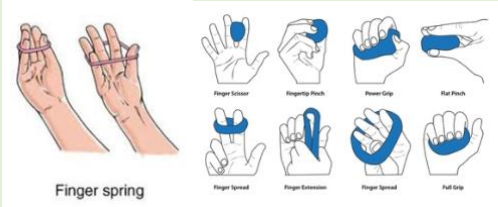
+ = Sharp pain along the radial wrist at the first dorsal compartment



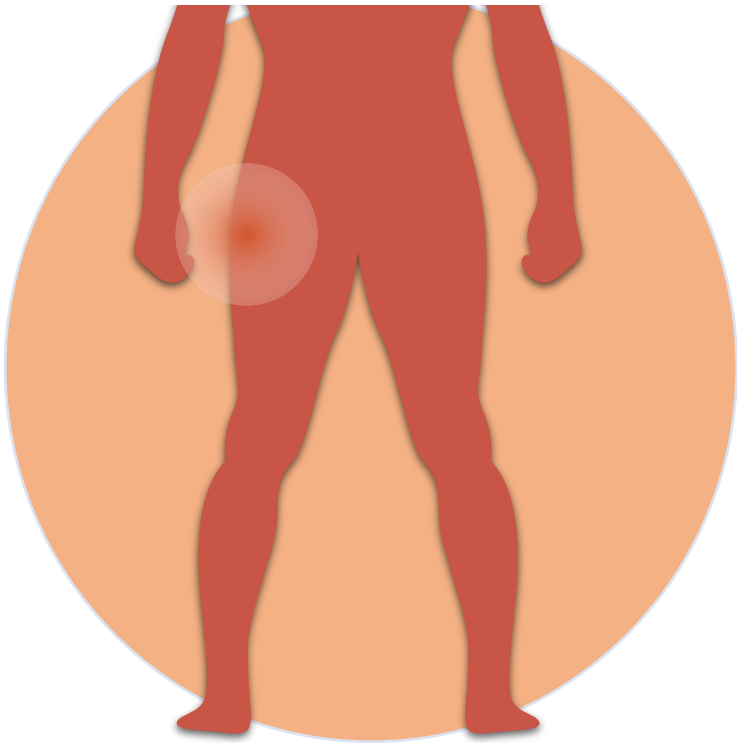
De Quervain's Tenosynovitis



# De Quervain's Rehabilitation

<b>Immobilization</b>	Splint or brace to help rest the tendons. Duration is supervised by therapist, removed gradually according to patient's symptoms.
<b>Intervention</b>	<ul style="list-style-type: none"> <li>• Avoiding repetitive thumb movements as much as possible</li> <li>• <b>Ice/Heat Packs</b> - Heat can help relax and loosen tight musculature, and ice can be used to help relieve inflammation of the extensor sheath.( 15 minutes , two to three times a day)</li> <li>• <b>Massage</b> - Deep tissue massage at the thenar eminence can help relax tight musculature that causes pain (Garston technique)</li> <li>• <b>Stretching</b> - Stretching the thenar eminence muscles into thumb extension and abduction ( hold 15 – 30 sec , repeat two to three times a day )</li> </ul> <div data-bbox="339 738 780 932">  <p>The image shows two illustrations of hand stretches. On the left, a hand is shown with the thumb pulled towards the index finger, labeled 'Opposition stretch'. On the right, a photograph shows a hand being held in a similar position by another hand.</p> </div> <ul style="list-style-type: none"> <li>• <b>Mobilization</b> - Provide a manual radial glide of the proximal row of carpals, then ask the patient to move the thumb into radial abduction adduction. 3 sets of 10 repetitions and followed by eccentric hammer curl exercise with TheraBand.</li> <li>• <b>Strengthening</b> – resisted finger and thumb extension, finger spring, ball squeeze, grip/pinch exercises ( two to three times a day – 10 to 15 reps each )</li> </ul> <div data-bbox="339 1203 837 1410">  <p>The image shows several illustrations of hand exercises. On the left, a hand is shown with a rubber band around the fingers, labeled 'Finger spring'. In the center, there are four small illustrations: 'Finger Spread' (fingers spread apart), 'Finger Pinch' (thumb and index finger pinching), 'Finger Extension' (thumb extended), and 'Full Grip' (hand gripping a ball). On the right, there are two more illustrations: 'Power Grip' (hand gripping a cylindrical object) and 'Full Grip' (hand gripping a ball).</p> </div>

# Hip





# Snapping Hip syndrome

Also known as Coxa Saltans, characterized by a snapping sensation, and/or audible “click” noise, in or around the hip in movement

Causes:

- **External (most common):** iliotibial band snapping over the greater trochanter of the femur.
- **Internal:** Iliopsoas tendon snapping over a bony prominence of the pelvis.
- **Intra-articular** (least common)

## Key

- **External:** gradual onset of snapping or pain located laterally over the greater trochanter. describe a sense that the hip is dislocating. may also have coxa vara.
- **Internal:** gradual onset of painful sensation coming from deep within the anterior groin when moving hip from flexion into extension or external rotation.
- **Intra-articular:** sudden onset of snapping or clicking from an injury or traumatic event to the hip capsule

## Tests

### Ober's test (external SHS)

Patient side-lying and palpate the greater trochanteric. abduct and extend the patient hip with knee flexed 90° . Slowly lower the leg to adduction.

+ = Hips remain abducted



Tight iliotibial band or tensor fascia latae



### Stinchfield test ( Internal SHS)

Patient supine with the hip flexed at 30° and knee extended. ask the patient to flex the hip and resist the motion

+ = Pain in the anterior groin



Internal hip snapping syndrome



# Tests

## Thomas test

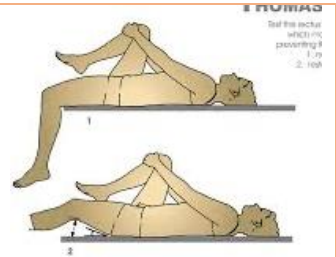
Patient supine. Ask the patient to bring the knee to the chest as far as possible and hold it. Ask the patient if he feels stretch in the groin



Tight iliopsoas if the opposite leg lifting of the table



Tight iliotibial band if the opposite leg moved to abduction



# Snapping Hip rehabilitation

- Examination findings of each individual patient should guide the impairment-based approach to treatment.
- Patients may benefit from stretching of anterior hip structures or the iliotibial band and its associated structures.





# Hip Osteoarthritis

Degenerative type of arthritis that occurs most often in people 50 years and older, it may occur in younger people, too. (e.g., Sickle cell disease patients)

Characterized by:

- Pain and stiffness that worse in the morning, or after sitting.
  - Pain in groin or laterally around the hip
  - Pain that flares up with vigorous activity
  - "Locking" or "sticking" of the joint, and a grinding noise (crepitus)
  - Decreased range of motion in the hip, may cause limping
- 



## Physical Examination

- Tenderness over the hip
  - Limited ROM in one or more of hip abduction, flexion, extension and adduction
  - Pain when pressure is placed on the hip
  - Gait abnormalities
-

# Tests

## Cluster of Sutlive tests

1- Patient supine, flex the knee  $90^{\circ}$ , move the hip to opposite shoulder and apply compression to the femur. Assess patient's symptoms in the groin

2- From the same position of step 1, move the hip into IR apply compression while moving the hip into add. Assess the patient symptoms in the groin

3- Patient in prone, flex the knee into  $90^{\circ}$ , perform IR of hip, measure with goniometer  
+ = hip IR  $\leq 25$

4- Patient report pain when squatting

5- Active hip flexion causes lateral pain

6- Active hip extension causes pain



# Hip OA Rehabilitation

Note: Always adhere to the local protocol

## Intervention

Intervention differs in each patient depending on the history and patient status, but mainly it consists of:

- Minimizing activities that aggravate the condition, such as climbing stairs.
- Hydrotherapy with exercises to decrease the weight on hip
- Strengthening of the hip and surrounding muscles
- Ice and heat

## Assistive devices

- Walking supports like a cane, crutches, or a walker
- Long-handled reacher to pick up low-lying things



# Total Hip Replacement

A total hip replacement is a surgical procedure in which both damaged surfaces of the hip joint are replaced with prosthetic substitutes.

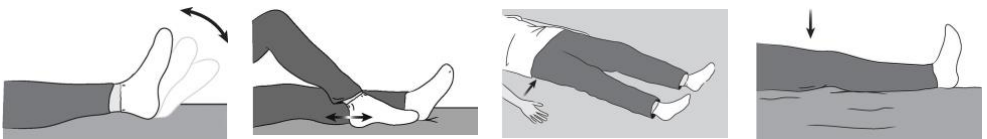
## Precaution

- Posterior Approach. Bending the hip more than 90°. Rotating the hip internally. Crossing the leg
- Anterolateral Approach. Swinging the leg outside. Moving the leg backward. Rotating the hip outward.
- Global Precautions are a combination of the above precautions.

## THR rehabilitation protocol

Note: Always adhere to the local protocol

- Elevation: Elevating the lower extremity periodically throughout the day can help reduce swelling. 3 to 4 times a day for 30 minutes.
- ICE: Ice should be used consistently throughout the day while in the hospital
- Exercises:
  - 1- ankle pump:** ask the patient to slowly push the foot up and down. Repeat this exercise several times, as often as every 5 or 10 minutes.
  - 2- Bed-Supported Knee Bends:** ask the patient to slide foot toward the buttocks, bending the knee and keeping the heel on the bed. Repeat 10 times for 3 sets along the day.
  - 3- Buttock Contractions:** squeezing buttocks and holding for 5 sec. Repeat 10 times for 3 sets along the day.
  - 4- Quadriceps Set:** ask the patient to contract thigh muscle. Try to straighten the knee. holding for 5 sec. Repeat 10 times for 3 sets along the day.



# THR rehabilitation

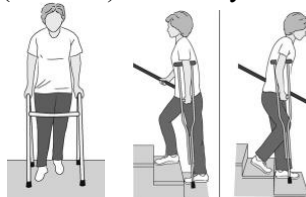
**5- SLR:** with the knee fully straightened on the bed. Lift the leg several inches. Hold for 5 to 10 seconds. Slowly lower.

**6- standing knee raises:** Lift the operated leg toward the chest. Do not lift the knee higher than the waist. holding for 5 sec. Repeat 10 times for 3 sets along the day.

**7- Standing Hip Abduction:** Be sure the hip, knee and foot are pointing straight forward. With the knee straight, lift the leg out to the side. holding for 5 sec. Repeat 10 times for 3 sets along the day.



- Ambulation: Early walking will help to regain hip movements.
- Stair climbing is an excellent strengthening and endurance activity. The steps shouldn't be higher than (7 inches) and always use a handrail for balance.

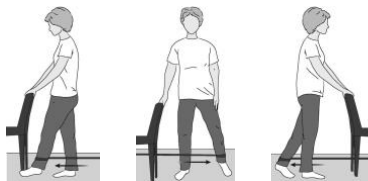


- Advanced Exercises: after the pain and swelling reduce, when the patient's condition is stable, we begin resistive exercises

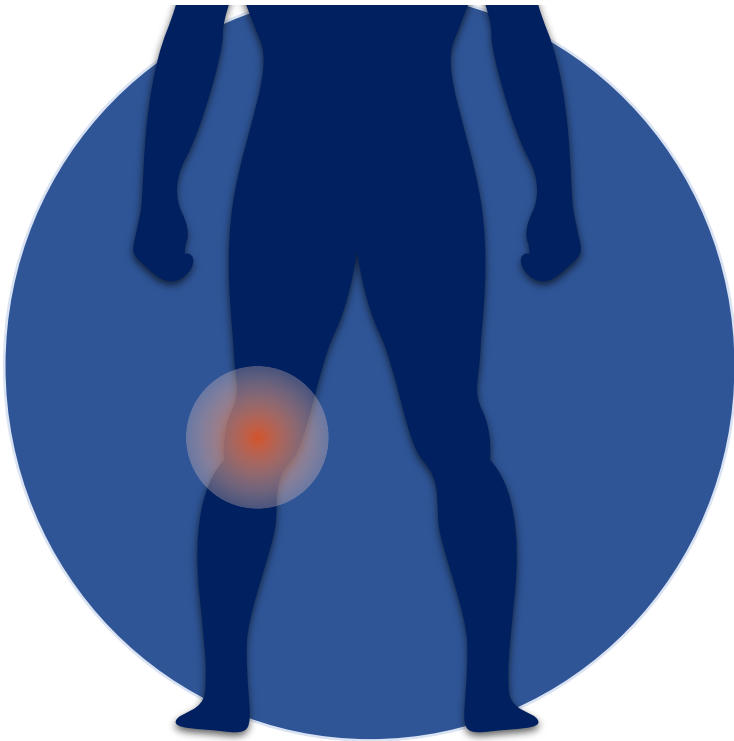
1- **Resistive Hip Flexion:** ask the patient to bring the operated leg forward keeping the knee straight. Allow the leg to return to its previous position.

2- **Resistive Hip Abduction**

3- **Resistive Hip Extensions**



# Knee





# Anterior cruciate ligament

An ACL injury is a tear or sprain of the anterior cruciate, most commonly occur during sports that involve sudden stops or changes in direction. Many people hear and feel a "pop" sound, severe pain, and swelling.

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## Tests

### Lachman test

Patient supine. Knee in about 20-30° flexion. Place one hand behind the tibia and the other on the thigh. Thumb on the tibial tuberosity. Pull the tibia anteriorly

+ = Excessive motion



Torn ligament

(always compare with the non-affected side)



### Anterior drawer test

Patient supine. Hips flexed to 45°, knee 90°.

Grasps the proximal lower leg, attempt to translate the lower leg anteriorly.

+ = Tibia translate anteriorly , excessive motion or lack end feel

(always compare with the non-affected side)






# Post-Surgical ACL Rehabilitation

Note: Always Adhere to the local rehabilitation program

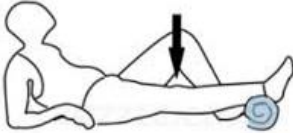
Phase I: immediate post-op (0 – 2 weeks after surgery)

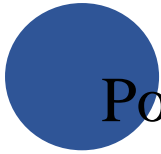
## Goals

- Protect graft • Reduce swelling, minimize pain • Restore patellar mobility
- Restore full extension, gradually improve flexion
- Minimize atherogenic muscle inhibition, re-establish quad control, regain full active extension
- Patient education ( Keep your knee straight and elevated when sitting or lying down - Do not rest with a towel placed under the knee - Do not actively kick the knee out straight; support the surgical side when performing transfers - Do not pivot on surgical side)

<b>Weight bearing</b>	<b>Walking</b> <ul style="list-style-type: none"> <li>• Initially brace locked, crutches</li> <li>• May start walking without crutches if pain free (Allograft and hamstring autograft continue PWB with crutches for 6 weeks unless otherwise instructed)</li> <li>• May unlock brace once able to perform SLR without lag</li> <li>• May stop use of brace after 6 weeks and once adequate quad control is achieved</li> <li>• Leading with the non-surgical side when going up the stairs, leading with the crutches and surgical side when going down the stairs</li> </ul>
<b>Intervention</b>	<b>Swelling Management</b> <ul style="list-style-type: none"> <li>• Ice, compression, elevation</li> <li>• Retrograde massage</li> <li>• Ankle pumps</li> </ul> 

# Post-Surgical ACL Rehabilitation

<b>Intervention</b>	<p><b>Range of motion/Mobility</b></p> <ul style="list-style-type: none"><li>• <a href="#">Patellar mobilizations</a>: superior/inferior and medial/lateral</li><li>• Supine active free knee flexion extension and heel slides</li><li>• Low intensity, long duration extension stretches: <a href="#">heel prop</a></li><li>• <a href="#">Supine active hamstring stretch</a> and <a href="#">supine passive hamstring stretch</a></li></ul> <p><b>Strengthening</b></p> <ul style="list-style-type: none"><li>• <a href="#">Quad sets</a></li><li>• Straight leg raise (Do not perform straight leg raise if you have a knee extension lag) *confirm with physician before doing SLR*</li><li>• Hip abduction in supine position for the first 2 weeks</li></ul> 
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# Post-Surgical ACL Rehabilitation

Phase II: intermediate post-op (3 – 5 weeks)

## Goals

- Continue to protect graft
- Maintain full extension, restore full flexion (contra lateral side)
- Normalize gait

<b>Intervention</b>	<p><b>Range of motion/Mobility</b></p> <ul style="list-style-type: none"><li>• Stationary bicycle</li><li>• Gentle stretching all muscle groups: prone quad stretch, standing quad stretch</li></ul> <p><b>Strengthening</b></p> <ul style="list-style-type: none"><li>• Prone hamstring curls</li><li>• Step ups and <a href="#">step ups with march</a></li><li>• Partial squat exercise, <a href="#">Ball squats</a>, wall slides, <a href="#">mini squats from 0-60<sup>0</sup></a> ( progress through these ex's from week 3-5 )</li><li>• <a href="#">Hip abduction in sidelying position</a></li><li>• <b>Lumbopelvic strengthening</b> : <a href="#">bridge &amp; unilateral bridge</a>, <a href="#">sidelying hip external rotationclamshell</a>, <a href="#">bridges on physioball</a>, <a href="#">bridge on physioball with roll-in</a>, <a href="#">bridge on physioball alternating</a>, <a href="#">hip hike</a> ( progress through these ex's from week 3-5 )</li></ul> <p><b>Balance/proprioception</b></p> <ul style="list-style-type: none"><li>• Single leg standing balance (knee slightly flexed) static progressed to dynamic and level progressed to unsteady surface</li><li>• <a href="#">Lateral step-overs</a></li><li>• Joint position re-training</li></ul>
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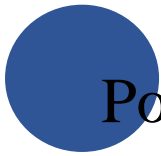
# Post-Surgical ACL Rehabilitation

Phase III: late post-op (6 – 8 weeks)

## Goals

- Continue to protect graft site
- Maintain full ROM
- Safely progress strengthening
- Promote proper movement patterns
- Avoid post exercise pain/swelling
- Avoid activities that produce pain at graft donor site

<b>Intervention</b>	<p><b>Range of motion/Mobility</b></p> <ul style="list-style-type: none"><li>• Rotational tibial mobilizations if limited ROM Cardio</li><li>• Elliptical, stair climber, flutter kick swimming, pool jogging</li></ul> <p><b>Strengthening</b></p> <ul style="list-style-type: none"><li>• Gym equipment: leg press machine, seated hamstring curl machine and hamstring curl machine, hip abductor and adductor machine, hip extension machine, roman chair, <a href="#">seated calf machine</a></li></ul> <p>**The following exercises to focus on proper control with emphasis on good proximal stability</p> <ul style="list-style-type: none"><li>• Squat to chair</li><li>• <a href="#">Lateral lunges</a></li><li>• <a href="#">Romanian deadlift</a></li><li>• Single leg progression: partial weight bearing single leg press, slide board lunges: <a href="#">retro</a> and <a href="#">lateral</a>, step ups and step ups with march, lateral step-ups, step downs, single leg squats, single leg wall slides</li><li>• Knee Exercises for additional exercises and descriptions</li></ul> <p><b>Balance/proprioception</b></p> <ul style="list-style-type: none"><li>• Progress single limb balance including perturbation training</li></ul>
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# Post-Surgical ACL Rehabilitation

Phase IV: transitional (9 – 12 weeks)

## Goals

- Maintain full ROM • Safely progress strengthening
- Promote proper movement patterns
- Avoid post exercise pain/swelling
- Avoid activities that produce pain at graft donor site

<b>Intervention</b>	<ul style="list-style-type: none"><li>• Begin sub-max sport specific training in the sagittal plane</li><li>• Bilateral PWB plyometrics progressed to FWB plyometrics</li></ul>
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Phase V: early return to sport (3 - 5 months)

## Goals

- Safely progress strengthening
- Safely initiate sport specific training program
- Promote proper movement patterns
- Avoid post exercise pain/swelling
- Avoid activities that produce pain at graft donor site

<b>Intervention</b>	<ul style="list-style-type: none"><li>• Interval running program</li><li>• Return to Running Program</li><li>• Progress to plyometric and agility program (with functional brace if prescribed)</li><li>• Agility and Plyometric Program</li></ul>
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Phase VI: unrestricted return to sport (+ 6 months)

## Goals

- Continue strengthening and proprioceptive exercises
- Symmetrical performance with sport specific drills
- Safely progress to full sport

<b>Intervention</b>	<ul style="list-style-type: none"><li>• Multi-plane sport specific plyometrics program</li><li>• Multi-plane sport specific agility program</li><li>• Include hard cutting and pivoting depending on the individuals' goals (~7 mo)</li><li>• Non-contact practice→ Full practice→ Full play <b>(consult with sport physio)</b></li></ul>
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# Meniscus Tear

Conservative management is sometimes enough to relieve the pain of a torn meniscus. In other cases, however, a torn meniscus requires surgical repair.

## Symptoms

- A popping sensation, Swelling or stiffness
- Pain, especially when twisting or rotating the knee
- Difficulty flexing or extending the knee fully
- Locking sensation, feeling of knee giving way

## Tests

### McMurry test

Patient supine + full knee flexion

- Lateral meniscus = rotate the tibia medially then extend the knee
- Medial meniscus = rotate the tibia laterally then extend the knee

Repeat it several time

+ = Click sound or pain

(always compare with the non-affected side)

y's



### Apley's test

patient prone + 90° knee flexion

Traction of tibia + lateral and medial rotation

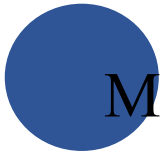
Compression on tibia + lateral and medial rotation

+ = Compression is painful

\* If traction shows excessive motion or pain it is ligamentous injury\*

(always compare with the non-affected side)





# Meniscus Tear Rehabilitation

Note: Always adhere to the local protocol

Phase I: immediate post-op (0 – 2 weeks)

## Goals

- Protect the repair site, reduce swelling, minimize pain
- Restore patellar mobility
- Restore full extension
- Minimize atherogenic muscle inhibition, re-establish quad control
- Patient education (Keep the knee straight and elevated when sitting or lying | Do not rest with a towel placed under the knee | Do not actively bend the knee; support surgical side when performing transfers | Do not pivot on surgical side)

<b>Weight bearing</b>	<b>Walking</b> <ul style="list-style-type: none"> <li>• Brace locked, crutches</li> <li>• Partial weight bearing or according to protocol</li> <li>• leading with the non-surgical side when going up the stairs, leading with the crutches and surgical side when going down the stairs</li> </ul>
<b>Intervention</b>	<b>Swelling Management</b> <ul style="list-style-type: none"> <li>• Ice, compression, elevation</li> <li>• Retrograde massage</li> <li>• Ankle pump</li> </ul> <b>Range of motion/Mobility</b> <ul style="list-style-type: none"> <li>• Patellar mobilizations: superior/inferior and medial/lateral</li> <li>• <a href="#">Seated assisted knee flexion extension</a> and <a href="#">heel slides with towel</a></li> <li>• Low intensity, long duration extension stretches: <a href="#">heel prop</a></li> <li>• Supine passive hamstring stretches</li> </ul> <b>Strengthening</b> <ul style="list-style-type: none"> <li>• <a href="#">Quad sets</a></li> <li>• NMES high intensity (2500 Hz, 75 bursts) supine knee extended 10 sec/50 sec, 10 contractions, 2x/wk during sessions</li> <li>• Straight leg raises (Do not perform straight leg raise if you have a knee extension lag) *confirm with the surgeon*</li> </ul>





# Meniscus Tear Rehabilitation

Phase II : intermediate post-op ( 3 – 5 weeks )

## Goals

- Continue to protect repair
- Reduce pain, minimize swelling
- Maintain full extension
- Flexion < 120<sup>0</sup>

<b>Weight bearing</b>	<b>Walking</b> <ul style="list-style-type: none"> <li>• Continue partial weight bearing</li> <li>• Consult with physician regarding unlocking brace</li> </ul>
<b>Intervention</b>	<b>Range of motion/Mobility</b> <ul style="list-style-type: none"> <li>• Stationary bicycle: gentle range of motion only (see Phase III for conditioning)</li> </ul> <b>Cardio</b> <ul style="list-style-type: none"> <li>• Upper body ergometer ( UBE)</li> </ul> <b>Strengthening</b> <ul style="list-style-type: none"> <li>• Calf raises</li> <li>• Lumbopelvic strengthening side-lying hip external rotation-clamshell, plank Balance/proprioception</li> <li>• Double limb standing balance utilizing uneven surface (wobble board)</li> <li>• Joint position re-training</li> <li>• <a href="#">Hip abduction</a></li> </ul>



# Meniscus Tear Rehabilitation

Phase III: late post-op ( 6 – 8 weeks )

## Goals

- Continue to protect repair, avoid post exercise pain/swelling
- Maintain full extension.
- Flexion within 10 degrees of contralateral side
- Safely progress strengthening
- Promote proper movement patterns, Normalize the gait

<b>Weight bearing</b>	Can discontinue use of brace/crutches after 6 wks , and once adequate quad control is achieved
<b>Intervention</b>	<p><b>Range of motion/Mobility</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Supine active hamstring stretches</a></li> <li>• Standing gastrocnemius stretch and soleus stretch</li> <li>• Gentle stretching all muscle groups: prone quad stretch, standing quad stretch, kneeling hip flexor stretch</li> <li>• Rotational tibial mobilizations if limited ROM</li> </ul> <p><b>Cardio</b></p> <ul style="list-style-type: none"> <li>• Stationary bicycle, flutter kick swimming, pool jogging</li> </ul> <p><b>Strengthening</b></p> <ul style="list-style-type: none"> <li>• Partial squat exercise 0-60<sup>0</sup> Ball squats, wall slides, mini squats from 0-60<sup>0</sup> (progress through these ex's from week 6 – 8)</li> <li>• Hamstring strengthening prone hamstring curls</li> <li>• Lumbopelvic strengthening bridges on physioball, <a href="#">bridge on physioball with roll-in</a>, bridge on physioball alternating, hip hike (progress through these ex's from week 6 – 8)</li> <li>• Gym equipment: leg press machine, hip abductor and adductor machine, hip extension machine, roman chair, seated calf machine</li> </ul> <p><b>Balance/proprioception</b></p> <ul style="list-style-type: none"> <li>• Single limb balance progress to uneven surface including perturbation training</li> </ul>



# Meniscus Tear Rehabilitation

Phase IV : transitional ( 9 – 12 weeks)

## Goals

- Maintain full ROM
- Safely progress strengthening
- Promote proper movement patterns
- Avoid post exercise pain/swelling

<b>Intervention</b>	<p><b>Cardio</b></p> <ul style="list-style-type: none"> <li>• Elliptical, stair climber</li> </ul> <p><b>Strengthening</b></p> <ul style="list-style-type: none"> <li>• Squat to chair</li> <li>• Lateral lunges</li> <li>• Single leg progression: partial weight bearing single leg press, slide board lunges: retro and lateral, step ups and step ups with march, lateral step-ups, step downs, single leg squats, single leg wall slides</li> <li>• Gym equipment: seated hamstring curl machine and hamstring curl machine</li> <li>• Romanian deadlift</li> </ul>
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Phase V: early return to sport ( 3-5 months)

## Goals

- Safely progress strengthening
- Safely initiate sport specific training program
- Promote proper movement patterns
- Avoid post exercise pain/swelling

<b>Intervention</b>	<ul style="list-style-type: none"> <li>• Interval running program to Return to Running Program</li> <li>• Progress to plyometric and agility program (with functional brace if prescribed)</li> </ul>
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# Meniscus Tear Rehabilitation

Phase VI: unrestricted return to sport ( +6 months)

## Goals

- Continue strengthening and proprioceptive exercises
- Symmetrical performance with sport specific drills
- Safely progress to full sport

<b>Intervention</b>	<ul style="list-style-type: none"><li>• Multi-plane sport specific plyometrics program</li><li>• Multi-plane sport specific agility program</li><li>• Include hard cutting and pivoting depending on the individuals' goals</li><li>• Non-contact practice→ Full practice→ Full play ( consult with sport physio)</li></ul>
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# Total Knee Replacement

A total knee replacement is a surgical procedure whereby the diseased knee joint is replaced with artificial material

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## TKR Rehabilitation

Note: Always adhere to the local protocol

Phase I (surgery - to about 2 weeks after surgery)

### Goals

- Safe transfers and ambulation with assistive device, progressing distance towards one half mile, heel strike and use of available knee flexion during gait
- Restore ROM, increasing each visit toward 125<sup>0</sup> flexion, and 0<sup>0</sup> extension
- Each patient must be encouraged to get back more ROM than he or she previously had.
- Active extension without lag

<b>Precaution</b>	<ul style="list-style-type: none"><li>• Pain should not persist after rehabilitation visits for more than 24 hours and should be within patients' tolerance.</li></ul>
<b>Intervention</b>	<ul style="list-style-type: none"><li>• Ice, electrical stimulation (E-stim) to augment poor quad contraction, and TENS for pain control if other means are unsatisfactory.</li><li>• Quadriceps set, straight leg raise, Hamstring sets, supine heel slides, extension on bolster</li><li>• Sit to stand squats with WBAT</li><li>• Supine leg press from 0<sup>0</sup> of extension to current flexion end range versus minimal weight, (20-40 lbs) and stationary bike with no resistance if able to get on and off.</li></ul>



# TKR Rehabilitation

Phase II (3-6 weeks)

## Goals

- ROM 0-125<sup>0</sup>, quadriceps strength without lag in SLR and SAQ (sitting).
- Functional ambulation and gait normalization, stairs with reciprocal gait, use of affected knee with equal WB with sit to stand transfers
- Begin walking short distances without an assistive device. This needs to be with a useful, non-antalgic gait pattern.

<b>Precaution</b>	<ul style="list-style-type: none"><li>• ROM to be achieved with minimal force provided by PT</li><li>• running is not allowed</li><li>• TKR patients have a 25% higher fall rate within the first year post-operative, hence some structured balance/proprioception movements are reasonable</li></ul>
<b>Intervention</b>	<ul style="list-style-type: none"><li>• Knee ROM as needed</li><li>• QS, SAQ, SLR, supine and/or standing, leg press, sit to stand squats, single leg balance, gastrocnemius strengthening, step ups in multiple directions, lunges through partial range.</li><li>• Standing total knee extension (TKE) with TheraBand</li><li>• Hip and core strengthening as needed</li><li>• Stand to floor transfer training</li><li>• Neuromuscular reeducation, equalizing weight bearing during function, balance and proprioception</li><li>• Stationary bicycle in partial or full revolutions if incision looks OK during and pain does not limit use</li></ul>



# TKR Rehabilitation

Phase III (6-12 weeks )

## Goals

- ROM 0-125<sup>0</sup>
- No extensor lag
- Normal gait without assistive device
- Stairs with reciprocal gait for 1-2 flights up and down with or without rails
- Independent transfers to and from the ground
- Independent function pertaining to personal goals

<b>Precaution</b>	<ul style="list-style-type: none"><li>• Lifting more than 50 lbs (23kg) should be discouraged during functional activities most of the time</li><li>• 30-50 lbs is reasonable on occasion, but the patients need to know that repeated heavy lifting is discouraged</li><li>• Emphasis needs to be on continuing fitness activity so that patients do not gain weight after TKR</li></ul>
<b>Intervention</b>	<ul style="list-style-type: none"><li>• Therapeutic exercise versus bodyweight, in functional, dynamic movements</li><li>• Lateral and multidirectional movements during strengthening as well</li><li>• Continued lower extremity strengthening, emphasizing quadriceps, hip and core strengthening</li><li>• Continued emphasis on use of the affected side during function such as rising from sitting, moving from stand to sit</li><li>• Stationary bike for ROM and fitness with some resistance after 6 weeks if not painful</li><li>• Walking without devices, up to a mile or more after 6 weeks</li></ul>



# Medial Collateral Ligament Injury

Occur following a traumatic valgus force, often while the knee is slightly flexed.

## Grades

Grade	Symptoms	Signs	Tests
<b>I</b>	<ul style="list-style-type: none"> <li>• Mild medial pain</li> <li>• Possibility of swelling and limping</li> <li>• Medial edema</li> <li>• Tenderness</li> </ul>	<ul style="list-style-type: none"> <li>• Medial edema</li> <li>• Tenderness</li> </ul>	<ul style="list-style-type: none"> <li>• Positive valgus stress test</li> </ul>
<b>II</b>	<ul style="list-style-type: none"> <li>• Moderate medial pain</li> <li>• Swelling and limping</li> <li>• Instability</li> </ul>	<ul style="list-style-type: none"> <li>• Medial edema</li> <li>• Tenderness</li> </ul>	<ul style="list-style-type: none"> <li>• Positive MacMurray's test (if meniscus is involved)</li> <li>• Positive valgus stress test</li> </ul>
<b>III</b>	<ul style="list-style-type: none"> <li>• Severe medial pain</li> <li>• Swelling</li> <li>• Knee gives way into valgus</li> </ul>	<ul style="list-style-type: none"> <li>• Marked medial edema</li> <li>• Tenderness</li> </ul>	<p>Lachman test for ACL stability should be accomplished when a grade III MCL instability is present</p>



# Tests

## Valgus stress test

- patient supine, the knee is fully extended. place one hand laterally to the knee and the other grabbing the lower tibia and slightly externally rotated. Palpate the medial joint line while Applying abducting force at the the foot, and a valgus force through the knee joint.
- The second part of the test applies the same valgus stress with the knee flexed to 30°
- + = excessive gabbing in the medial side and reproduction of pain
- Any asymmetry is considered a positive finding and medial laxity of 3 to 5mm (compared to the other side) shows an injury to the superficial MCL.
- Laxity of 5 to 7 mm suggests injury to the deep MCL, and posteromedial corner.



## Swain test

Performed with the knee flexed to 90° and the tibia externally rotated. When the knee is externally rotated in flexion, the collateral ligaments are tightened while the cruciate are relatively lax

+ = Pain along the medial side of the joint indicates injury to the MCL complex



# MCL Rehabilitation

Note: Always adhere to the local protocol

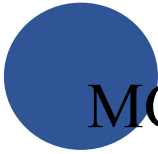
## Grade I MCL rehabilitation

Phase I : 0 – 4 weeks

### **Goals:**

- Early protected ROM
- Prevent quadriceps atrophy, Decrease effusion/pain

<b>Intervention</b>	<b>Pain / swelling management</b> <ul style="list-style-type: none"><li>• ICE ( ice , compression , elevation )</li></ul> <b>ROM and mobility</b> <ul style="list-style-type: none"><li>• PROM/AAROM to maintain ROM</li><li>• Whirlpool for ROM (Cold for first 3-4 days, then warm)</li></ul> <b>Strengthening</b> <ul style="list-style-type: none"><li>• Isometrics quads: Quad sets, Straight leg raises</li><li>• Adduction isometrics</li><li>• Hamstring isometric sets</li><li>• Electrical muscle stimulation to quads (8 hours a day)</li></ul>
<b>Assistive device</b>	Crutches, weight bearing as tolerated



# MCL Rehabilitation

Note: Always adhere to the local protocol

## Grade I MCL rehabilitation

Phase II : 4 – 6 weeks

### Goals:

- Full painless ROM , Restore strength
- Ambulation without crutches, weight bearing as tolerated with brace if needed
- Return to sport when strength, agility, controls equal or better than unaffected leg

<b>Intervention</b>	<ul style="list-style-type: none"><li>• Continue strengthening program</li><li>• Continue electric muscle stim to quads during isotonic strengthening</li><li>• Full ROM exercise</li><li>• Water exercises, running in water forward and backward</li><li>• Flexibility exercises, hamstrings, quads, IT Band, etc.</li><li>• Proprioception training (balance drills)</li><li>• Emphasize closed kinetic chain exercises, lunges, squats, lateral lunges, wall squats, lateral step-ups</li><li>• Bicycle for endurance with the appropriate progression</li><li>• Weight shifts</li><li>• Tilt board squats</li><li>• May initiate isokinetic, sub-maximal → maximal fast contractile velocities</li><li>• Begin running program if full painless extension and flexion are present</li></ul>
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# MCL Rehabilitation

Note: Always adhere to the local protocol

## Grade II MCL rehabilitation

	<b>Goal of Treatment</b>	<b>Physio Treatment</b>
<b>Phase 1</b> 0 – 4 wks	<ul style="list-style-type: none"><li>• Control swelling</li><li>• Knee flex to 90°+</li><li>• Knee extension to -30°+</li><li>• Quadriceps 4/5 strength</li><li>• Hamstrings 4+/5 strength</li><li>• Gluteals (esp glut max) 4+/5 strength</li></ul>	<ul style="list-style-type: none"><li>• Knee bracing limiting knee flexion (0-30°), cease device when patient walking with neutral gait</li><li>• WBAT with crutches as needed</li><li>• Knee flexion/ext ROM exercises as tolerated</li><li>• Quadriceps/VMO strengthening</li><li>• Gluteal, calf and hamstring strengthening</li><li>• Gait retraining</li></ul>
<b>Phase 2</b> 4 – 6 wks	<ul style="list-style-type: none"><li>• FWB</li><li>• Eliminate swelling</li><li>• Full knee ROM</li><li>• Quadriceps +/5 strength</li><li>• Hamstrings 5/5 strength</li><li>• Gluteals (esp glut max) 5/5 strength</li></ul>	<ul style="list-style-type: none"><li>• ROM exercises</li><li>• Stationary bike and specific muscle exercises as tolerated</li><li>• Progress exercises from specific to functional once full ROM and strength achieved, include proprioception, agility, balance, sports specific</li></ul>
<b>Phase 3</b> 6 – 10 wks	<ul style="list-style-type: none"><li>• Full ROM, strength, squat</li><li>• Proprioceptive training</li><li>• Return to light jog</li><li>• Return to restricted sports specific drills</li></ul>	<ul style="list-style-type: none"><li>• As above – increase complexity, repetitions and weights</li><li>• Jumping &amp; landing drills</li><li>• Agility drills</li></ul>
<b>Phase 4</b> 8 – 12 wks	<ul style="list-style-type: none"><li>• Full ROM, strength, endurance</li><li>• Return to sport</li></ul>	<ul style="list-style-type: none"><li>• High level sports specific training</li></ul>

Adapted from Brukner & Khan, 2012 and Edson, 2006



# MCL Rehabilitation

Note: Always adhere to the local protocol

## Grade III MCL Rehabilitation

12 – 16 weeks

- Immobilised in brace locked in extension for 3-6/52, based on alignment, 3/52 NWB if significant valgus, toe-touch WB if neutral alignment
- ROM twice a day if neutral alignment, ROM after 3/52 if valgus alignment
- Brace unlocked at 3/52, progressive WB if neutral alignment
- If valgus alignment – begin ROM out of brace at 3/52 but maintain locked brace until up to 6/52, WB dependent on valgus laxity
- Isolated strengthening of quads, hamstrings, gluteals, calves during the 6/52 PWB period
- Closed chain exercises initiated as tolerated, based on WB status
- Progressive ROM and strengthening until full ROM and function
- Begin running, proprioception, agility exercises
- Return to sport, with taping for up to 12/12 as required

Adapted from Edson, 2006

# Chondromalacia

Also known as “runner’s knee” is a condition where the cartilage on the undersurface of the patella (kneecap) deteriorates and softens

## Causes

- Poor alignment due to a congenital condition
  - Weak hamstrings and quadriceps
  - Muscle imbalance between the adductors and abductors
  - Repeated stress to the knee joints, such as from running, skiing, or jumping
  - A direct blow or trauma to kneecap
- 

## Tests

### Clarke's Test

Patient supine. place the web space of your hand just superior to the patella while applying pressure downward and inferiorly and ask the patient to contract the quad.

+ = Pain with movement of patellofemoral joint



Patellofemoral joint dysfunction





# Chondromalacia Rehabilitation

Note: Always adhere to the local protocol

## Phase I (Acute Phase)

### Goals

- Control pain and inflammation
- Begin pain free flexibility exercises
- Establish quadriceps activation
- Establish pain free knee rom

<b>Intervention</b>	<p><b>Range of Motion and Flexibility</b></p> <ul style="list-style-type: none"> <li>• Cycle with minimal resistance (if pain free)</li> <li>• Heel slides (in pain free arc)</li> <li>• Lower extremity stretching (based on individual assessment) (rectus femoris, IT band, hamstring, hip rotators, gastrocnemius )</li> </ul> <p><b>Strength</b></p> <ul style="list-style-type: none"> <li>• Quad sets (intensity and flexion angle guided by pain)</li> </ul>
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## Phase II (Sub-acute )

### Goals

- Continued protection of injured joint
- Continue to improve flexibility
- Begin to strengthen areas of weakness/instability

<b>Intervention</b>	<p><b>Range of Motion and Flexibility</b></p> <ul style="list-style-type: none"> <li>• Cycle (slow progression of resistance) range of motion and flexibility</li> <li>• Continue flexibility from Phase I</li> </ul> <p><b>Strength</b></p> <ul style="list-style-type: none"> <li>• Begin open chain strengthening (based on strength assessment)</li> <li>• Knee extension (SAQ, if painful use LAQ in pain-free arc) ( straight leg raise, hip abduction, hip extensors, hip external rotators, hamstring curls )</li> </ul>
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# Chondromalacia Rehabilitation

Phase III (Sub-acute )

## Goals

- Continue to avoid exacerbation of symptoms
- Continue to maximize return of strength and flexibility
- Establish closed chain strength and stability

<b>Intervention</b>	<b>Range of Motion and Flexibility</b> <ul style="list-style-type: none"><li>• Continue cycle</li><li>• Continue lower extremity stretching from Phase I and II</li></ul> <b>Strength</b> <ul style="list-style-type: none"><li>• Continue progression of open chain program with ankle weights</li><li>• Can add gym equipment (leg press, ham curl, multi-hip)</li><li>• Squats to 90° (stress pain free range and proper frontal/sagittal plane mechanics)</li><li>• Step up progressions (forward step ups, lateral step ups)</li><li>• Pain free closed chain hip strengthening</li></ul> <b>Cardio</b> <ul style="list-style-type: none"><li>• Cycle with progressive resistance</li><li>• Elliptical (if pain free)</li><li>• Swimming</li></ul>
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# Chondromalacia Rehabilitation

## Phase IV (Return to Sport)

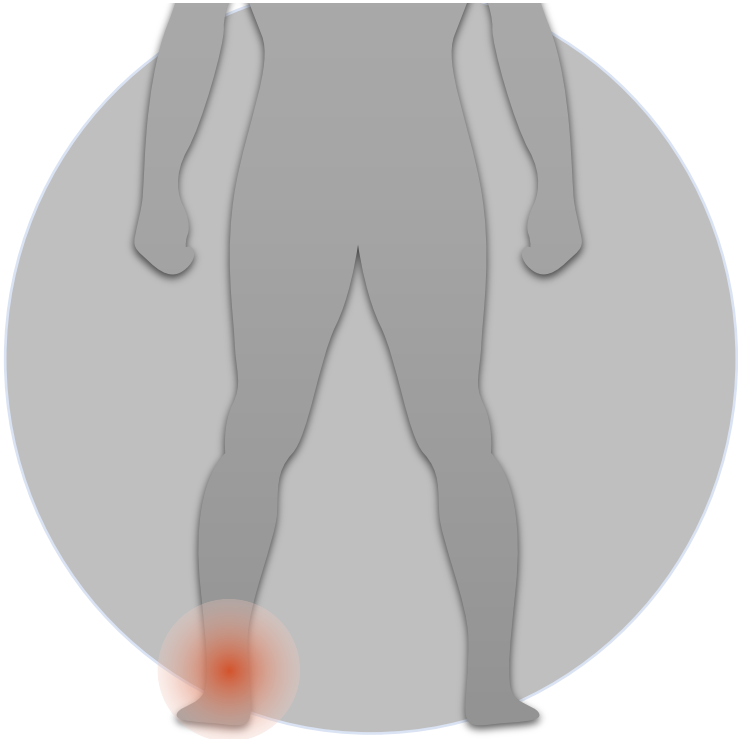
### Goals

- Continue to avoid patella femoral overload
- Progress with single leg strengthening
- Achieve adequate strength and flexibility to return to activity

<b>Intervention</b>	<b>Flexibility</b> <ul style="list-style-type: none"><li>• Continue daily stretching</li></ul> <b>Cardio</b> <ul style="list-style-type: none"><li>• Continue cycle, elliptical, swimming</li><li>• Return to running progression (supervised by Physician or Physical Therapist)</li></ul> <b>Strength</b> <ul style="list-style-type: none"><li>• Continue SLR program and gym Equipment Progression</li><li>• Continue Step-Up progressions (lateral step-ups, cross over step-ups)</li><li>• Static lunge</li><li>• Lateral lunge</li><li>• Progressive single leg strengthening (single leg squat, split squat, single leg dead lift)</li></ul>
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# Ankle



# Ankle sprain

Inversion-type, lateral ligament injuries represent approximately 85% of all ankle sprains. Poor rehabilitation increases the chances of this injury recurrence

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## Tests

### Talar tilt test

Anterior talofibular: foot in plantar flexion with patient sitting , invert the foot

Calcaneofibular: foot in anatomical position, invert the foot

+ = pain or/and excessive inversion



### Anterior drawer test

Patient supine, the ankle is flexed 10- 15 , stabilize the calcaneus with one hand, fixate the tibia as close as possible with the other hand. Draw the foot anteriorly with the hand on calcaneus.

+ = increased anterior translation compared to the sound side




# Ankle Sprain Rehabilitation

**Note:** Always adhere to the local protocol

Phase I ( 0- 2 weeks )

**Goals :**

- Diminish pain and inflammation
- Improve flexibility and range of motion
- Reduce swelling

<p><b>Intervention</b></p>	<ul style="list-style-type: none"> <li>• Modalities: Ice, compression, elevation, electrical stimulation</li> <li>• ROM: PROM, AAROM, AROM within pain free range</li> <li>• Protection: Protect ligaments from further trauma through use of taping, splinting, orthotics, braces, or casts in severe instances based on clinical judgement and patient presentation</li> <li>• Weight bearing as tolerated : Utilize assistive device as deemed appropriate for normalization of gait pattern</li> </ul>
<p><b>Exercise example</b></p>	<ul style="list-style-type: none"> <li>• Ankle alphabet</li> <li>• PROM in all ankle planes</li> <li>• Gastroc/soleus stretching</li> <li>• Gait training with various assistive devices progressing to no assistive devices based on pain level</li> <li>• Modalities for pain relief and edema control</li> <li>• Other Activities: May perform core, hip, and knee strengthening exercises for proximal stabilization</li> <li>• Proprioception training: Single-leg stance with stable surface, Balance board ball toss, Step up onto balance board.</li> </ul> 

# Ankle Sprain Rehabilitation

Phase II ( 2 - 3 weeks ) progressive ROM and early strengthening

**Goals :**

- Improve muscular strength and endurance
- Progress to full active and passive ROM
- Improve total body proprioception and control

<b>Intervention</b>	<ul style="list-style-type: none"> <li>• Modalities as indicated: Edema and pain controlling treatments</li> </ul> <p><b>ROM exercises</b> AROM Strengthening: Isometric, eccentric, or concentric exercises in pain free range with/without weight bearing</p> <p><b>Exercise Examples (progress according to symptoms)</b></p> <ul style="list-style-type: none"> <li>• Dorsiflexion/plantarflexion/inversion/eversion TheraBand exercises in pain free range</li> <li>• Foot intrinsic strengthening</li> <li>• Ankle isometrics</li> <li>• Squats stable surface, Lunges stable surface</li> <li>• Calf raises and toe raises</li> <li>• Single leg stance with stable/unstable surface and eyes open/eyes closed</li> <li>• Rocker board</li> <li>• Treadmill walking, Biking, and Pool Program</li> </ul> <p><b>Other Activities</b> Progress core, hip, and knee strengthening exercises with focus on stabilization if deemed appropriate</p>
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# Ankle Sprain Rehabilitation

Phase III: Advanced Strengthening & Neuromuscular control

## Goals

- Return to strength training with appropriate modifications
- Improve muscular power, speed, agility, and neuromuscular control
- Improve proper body mechanics and movement patterns
- Increase overall proximal stability

<b>Specific instruction</b>	Continue with previous exercise program; ensure core/hip stability; symmetrical strength should be present in both hip abductors and extensors
<b>Intervention</b>	<p><b>Suggested Treatments</b></p> <ul style="list-style-type: none"> <li>• Manual Therapy: Soft tissue work, talocrural and subtalar glides for improved ankle mobility.</li> <li>• Exercises: Strengthening, proprioceptive, and beginner agility/power exercises</li> </ul> <p><b>Exercise Examples ( progress according to symptoms)</b></p> <ul style="list-style-type: none"> <li>• Treadmill running with varying inclines</li> <li>• Resisted side stepping</li> <li>• BOSU squats and BOSU lunges</li> <li>• Front/side plank with progressions</li> <li>• Bridging with progressions</li> <li>• Double leg hopping forward, backward, sideways</li> <li>• Dry land jogging/running</li> </ul> <p><b>Other Activities</b></p> <ul style="list-style-type: none"> <li>• Begin practice with sport activity in controlled environment with additional support as deemed necessary (ex. Taping, braces)</li> </ul>

# Ankle Sprain Rehabilitation

## Phase IV: Return to Sport

### Goals

- Progression of strengthening exercises to replicate movements performed during sport activity
- Development of individualized maintenance program in preparation for discontinuation of formal rehabilitation
- Eliminate possible fear of movement and/or re-injury through use of graded introduction of higher level agility and power exercises

<b>Specific instruction</b>	Continue previous exercise program
<b>Intervention</b>	<p><b>Suggested Treatments</b></p> <ul style="list-style-type: none"> <li>• Modalities: Relief of exercise related muscle soreness through e-stim and cryotherapy</li> <li>• Manual Therapy: Soft tissue work, talocrural and subtalar glides</li> <li>• Exercises: High level strengthening, power, and agility based exercises</li> </ul> <p><b>Exercise Examples</b></p> <ul style="list-style-type: none"> <li>• Single leg hopping forward, backward, sideways</li> <li>• Single leg and double leg dot drills with various patterns</li> <li>• Agility ladder exercises</li> <li>• Box jumps, depth jumps over obstacle/hurdle</li> <li>• Single leg bounding</li> <li>• Unstable surface landing strategies</li> <li>• Sprinting, shuffling, backwards running</li> <li>• Sport specific agility/plyometric training</li> </ul> <p><b>Other Activities</b></p> <p>Return to sport practice in more unpredictable environment in a graded manner with additional support as deemed necessary (ex. Taping, braces)</p>

# Achilles Tendon Rupture

- A complete or partial tear that occurs when the tendon is stretched beyond its capacity

## Signs & symptoms

- Sudden pain (like a kick or a stab) in the back of the ankle or calf—often subsiding into a dull ache
- A popping or snapping sensation
- Swelling on the back of the leg between the heel and the calf
- Difficulty walking (especially upstairs) and difficulty rising up on the toes

## Tests

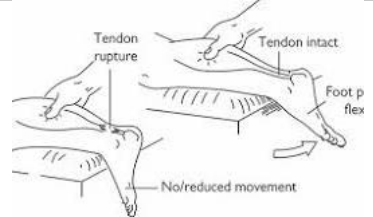
### Thompson test

Patient prone with the feet hanging off the edge of the bed, squeeze the calf muscle. normally you should observe a plantar flexion of the feet

+ = absent plantar flexion



Achilles tendon rupture



### Gap palpation test

Patient prone and the course of the Achilles tendon is palpated along the continuity of the tendon. Palpate any gaps in set continuity.

+ = palpable gap along the tendon



Achilles tendon tear





# Tests

## **Matles test**

Patient prone, ask the patient to flex the knee to  $90^{\circ}$  and observe the feet position.

Normally the feet will stay into slight plantar flexion.

+ = Feet will go into neutral position or dorsi flexion.

Rupture will tend the foot more into dorsal flexion



# Post-Surgical Achilles Tendon Rupture Rehabilitation

Note: Always adhere to the local protocol

Phase I (2 weeks after surgery)

**Goals:**

- Protection of the surgically repaired tendon
- Wound healing

<b>Intervention</b>	<ul style="list-style-type: none"> <li>• Boot in locked plantarflexion (20-30<sup>0</sup>)</li> <li>• Touchdown weight bearing (TDWB) using the axillary crutches</li> <li>• Avoid long periods of dependent positioning of the foot during the first week to assist in wound healing</li> </ul>
<b>Cardiovascular exercises</b>	<ul style="list-style-type: none"> <li>• Upper Body Ergometer (UBE) circuit training</li> </ul>

Phase II (usually 4 weeks after surgery)

**Goals:**

- Normalize gait with weight bearing as tolerated (WBAT) using the boot and axillary crutches
- Protection of the post-surgical repair
- Active dorsiflexion to neutral

<b>Intervention</b>	<ul style="list-style-type: none"> <li>• Slowly wean from using boot: Begin by using 1-2 ¼ inch heel lifts in tennis shoes for short distances on level surfaces then gradually remove the heel lifts during the 5th and 8th week depending on the surgeon</li> <li>• Avoid over-stressing the repair (forceful plantarflexion while in a dorsiflexed position; aggressive passive ROM; and impact activities)</li> </ul>
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<b>Intervention</b>	<ul style="list-style-type: none"> <li>• Frontal and sagittal plane stepping drills (sidestep, cross-over step, grapevine step)</li> <li>• Active ankle ROM</li> <li>• Gentle gastroc/soleus stretching</li> <li>• Static balance exercises (begin in 2 foot stand, then 2 foot stand on balance board or narrow base of support and gradually progress to single leg stand)</li> <li>• 2 foot standing nose touches</li> <li>• Ankle strengthening with resistive tubing</li> <li>• Low velocity and partial ROM for functional movements (squat, step back, lunge)</li> <li>• Hip and core strengthening</li> <li>• Pool exercises if the wound is completely healed</li> </ul>
<b>Cardiovascular exercise</b>	<ul style="list-style-type: none"> <li>• Upper extremity circuit training or UBE</li> </ul>

# Post-Surgical Achilles Tendon Rupture Rehabilitation

Phase III (usually 8 weeks after surgery)

## Goals:

- Normalize gait on all surfaces without boot or heel lift
- Single leg stands with good control for 10 seconds
- Active ROM between 15<sup>0</sup> of dorsiflexion and 50<sup>0</sup> of plantarflexion
- Good control and no pain with functional movements, including step up/down, squat and lunges

<b>Precaution</b>	<ul style="list-style-type: none"> <li>• Avoid forceful impact activities</li> <li>• Do not perform exercises that create movement compensations</li> </ul>
<b>Intervention</b>	<ul style="list-style-type: none"> <li>• Frontal and transverse plane agility drills (progress from low velocity to high, then gradually adding in sagittal plane drills)</li> <li>• Active ankle ROM</li> <li>• Gastroc/soleus stretching</li> <li>• Multi-plane proprioceptive exercises – single leg stand</li> <li>• Single foot standing nose touches</li> <li>• Ankle strengthening – concentric and eccentric gastroc strengthening</li> <li>• Functional movements (squat, step back, lunge)</li> <li>• Hip and core strengthening</li> </ul>
<b>Cardiovascular exercise</b>	<ul style="list-style-type: none"> <li>• Stationary bike, Stair Master, swimming</li> </ul>



**Gastroc Stretch**  
Stand with right foot back, leg straight, forward leg bent. Keeping heel on floor, turned slightly out, lean into wall until stretch is felt in calf.



**Soleus Stretch**  
Stand with right foot back, both knees bent. Keeping heel on floor, slightly turned out, lean into wall until stretch is felt in lower calf.



Nose touch



**Achilles stretch**

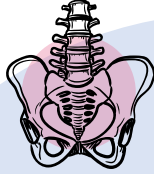
# Post-Surgical Achilles Tendon Rupture Rehabilitation

Phase IV (usually 4 months after surgery)

**Goals:**

- Good control and no pain with sport/work specific movements, including impact

<b>Precaution</b>	<ul style="list-style-type: none"> <li>• Post-activity soreness should resolve within 24 hours</li> <li>• Avoid post-activity swelling</li> <li>• Avoid running with a limp</li> </ul>
<b>Intervention</b>	<ul style="list-style-type: none"> <li>• Impact control exercises beginning 2 feet to 2 feet, progressing from 1 foot to other and then 1 foot to same foot</li> <li>• Movement control exercise beginning with low velocity, single plane activities and progressing to higher velocity, multi-plane activities</li> <li>• Sport/work specific balance and proprioceptive drills</li> <li>• Hip and core strengthening</li> <li>• Stretching for patient specific muscle imbalances</li> </ul>
<b>Cardiovascular exercise</b>	<ul style="list-style-type: none"> <li>• Replicate sport/work specific energy demands</li> </ul>



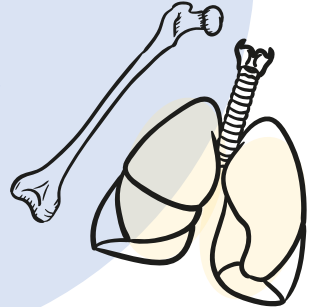
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