

SPORTS MEDICINE POSTOPERATIVE REHABILITATION PROTOCOLS



SHOULDER AND UPPER EXTREMITY





Department of Orthopaedics
& Rehabilitation

**Gehron Treme MD, Andrew Veitch MD, Dustin Richter MD,
Brandee Black MD, Daniel Wascher MD, Robert Schenck MD**
UNM SPORTS MEDICINE

1213 University Blvd NE, MSC10 5600, 1 University of New Mexico; Albuquerque, NM 87131-0001

Phone: 505-272-2231 Fax: 505-925-4919

Posterior Labral Repair Rehabilitation Protocol (Arthroscopic or Open)

Most patients will start PT at 6 weeks post op

0-2 weeks post-op (may begin these the day after surgery):

- Keep arm in sling/immobilizer at all times
- Remove arm from sling three times per day for the following therapeutic exercises:
 - Fully bend and straighten your fingers, your wrist, and your elbow several times
 - Pendulums (directions and a picture of this can be found on the post-op instruction sheet)
 - Work on finger straightening and use a foam ball to work on hand grip/strength

2-4 weeks post-op:

- Keep arm in sling/immobilizer during the day. It's OK to take arm out of sling/immobilizer at night, but try to limit internal rotation. Keep arm out in front of you whenever out of the sling, and do NOT reach arm behind your back.
- Sub-maximal isometrics for rotator cuff in immobilizer (flexion/extension/abduction/adduction/IR/ER)
- Begin chin tucks for cervical ROM
- Passive ROM with ATC or PT supervision (no shoulder pulleys without supervision)
 - Flexion to 60°, extension neutral, abduction to 90°, ER to 45° (arm at side), IR to neutral only (arm at side)
- Begin scapular strengthening
 - Elevation with shrugs, depression/retraction/protraction with manual resistance
- Ice, TENS, cross friction scar massage, other modalities as needed

6 weeks post-op: Most patients will start PT at 6 weeks post op

- Discontinue sling/immobilizer
- Continue therapeutic exercises as above
- Advance ER PROM to full
- Begin light Theraband ER strengthening with elbow at side
- Passive ROM with shoulder pulleys or with wand
 - Flexion to 90° and abduction to full overhead, as tolerated
 - Extension to 30°
 - ER to 45° with arm at side and in 90° of abduction
 - IR to 30° with arm at side and in 90° of abduction
- Begin standing or supine AAROM with wand
- Begin wall walks in forward flexion and abduction
- Moist heat, thermal ultrasound, TENS, other modalities as indicated

6-8 weeks post-op:

- Continue therapeutic exercises as above
- Advance ROM to full as tolerated, except limit IR to 45° both with arm at side and with arm in 90° of abduction
 - Limit IR to 45° until 12 weeks post-op
 - Strive for glenohumeral:scapular movement of 2:1
- Begin UBE
- Begin wall push-ups
- Begin isotonic rotator cuff strengthening (progress weight/resistance as tolerated up to 6-8 lbs)

- Standing flexion, extension, abduction, and scaption with thumb down (dumbbells or Therabands)
- Standing IR and ER with Therabands (use pillow under arm to keep 25° abduction)
- Scapular strengthening
 - Elevation with dumbbell shrugs
 - Depression with seated press ups (use hand blocks for greater ROM as tolerated)
 - Retraction with prone dumbbell rows or seated Theraband rows
 - Protraction with supine punches (using dumbbells or manual resistance)
- Neuromuscular control
 - PNF patterns D1 and D2 with no more than 3 lbs

8-10 weeks post-op:

- Continue therapeutic exercises as above
- Continue to advance ROM if needed...
 - ...but limit IR to 45° until 12 weeks post-op
- Continue scapular strengthening and standing isotonic rotator cuff strengthening until motion is full
- Begin prone dumbbell strengthening
 - Prone scaption with thumb up and with thumb down
 - Prone horizontal adduction with thumb up and with thumb down
 - Prone extension
- Neuromuscular control
 - Supine dynamic/rhythmic stabilization in 90° flexion and 90° abduction with manual resistance
 - Body blade in 90° flexion and 90° abduction
- Begin isokinetic strengthening with 60° block
 - Speeds of 180°, 150°, 120°, 90°, and 60°/second (8-10 reps at each speed)

10-12 weeks post-op:

- Continue therapeutic exercises as above
- Advance rotator cuff strengthening to 8-10 lbs in all directions
- Continue to advance ROM if needed...but limit IR to 45° until 12 weeks post op
 - At 12 weeks post op, can progress IR to full, with arm at 90° abduction
 - (ER can also be progressed to full if not already there)
- Advance neuromuscular control
 - PNF patterns D1 and D2 with manual resistance
- Standing dynamic/rhythmic stabilization in 90° flexion and 90° abduction with ball against wall and manual resistance
- Continue isokinetic strengthening but advance to 15 reps at each speed

12-14 weeks post-op:

- Continue therapeutic exercises as above
- Advance rotator cuff strengthening to eccentric manual resistance
- Advance neuromuscular control
 - PNF patterns D1 and D2 with manual resistance
- Advance isokinetic strengthening to full ROM
- Begin traditional weight training with machines and progress to free weights as tolerated

14-16 weeks post-op:

- Continue therapeutic exercises as above
- If thrower, begin light tennis ball tossing at 60% velocity for 20-30 feet max
 - Work on mechanics (wind-up, early cocking, late cocking, acceleration, and follow through)
- If thrower, begin isokinetics at higher speeds (240°, 270°, 300°, 330°, 360°/second)

16-24 weeks post-op:

- If thrower, perform isokinetic testing as noted at the end of this protocol (if available)
 - If passes test, begin interval throwing program
 - Must pass test before beginning interval throwing program
 - Re-test monthly until passed
- Continue maintenance strengthening
- Return to sport/activity only if:
 - Pass strength test
 - Completed throwing program
 - No pain with activity

- Surgeon's OK
- No less than 5 months post-op for return to contact sports

Isokinetic Testing Protocol for Throwing Shoulders

- Patient is seated
- Test uninvolved shoulder first
- Position: shoulder in scapular plane at 90° abduction and 30° flexion, with dynamometer at 0° tilt and 90° rotation
- Use 3 sub-max reps and 3 max reps for warm up
- Do 6 reps at 60°/second, then 12 reps at 300°/second (allowing at least one minute of rest between test speeds)

Scores equal to or greater than the following are considered passing:

- ER/IR unilateral ratio: 70%
- ER bilateral ratio: 98%
- IR bilateral ratio: 105%
- ER peak torque/BW ratio: 18%
- IR peak torque/BW ratio: 28%

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Post-operative Rehabilitation Protocol **Rotator Cuff Repair**

___ Biceps tenodesis

Most patients will start PT at 6 weeks post op

Patient will wear a sling for 6 weeks post-op

Unless otherwise specified, do not begin PT until patient has seen MD for 2 week post-op visit.

If biceps tenodesis – no resisted elbow flexion for 3 months post op

PHASE I:

Days 0-14

- May remove sling for gentle pendulum exercise 2-3 times per day.
- Elbow/hand gripping and ROM exercises: perform 4-6 times per day.
- Cryotherapy as needed.

Weeks 2-4

- PROM - Flexion to 90°, Abduction to 90°, ER 30°, IR 30°, Extension 30°. (ER/IR in scapular plane, Flexion/extension at 90° flexion in scapular plane)
- Rhythmic stabilization drills.
- Continue all isometric contractions and use of cryotherapy as needed.
- Initiate scapular isometrics.
- Screen posture
- May begin joint mobilizations grade I and II for pain relief/relaxation.

Weeks 4-5

- PROM - Flexion to 120°, Abduction to 120°, ER 30°, IR 45°, Extension 30°.
- ER/IR in scapular plane and at 90° abduction.
- Initiate ER/IR strengthening using exercise tubing at 0° of abduction (use towel roll under arm).
- Initiate manual resistance ER in supine in scapular plane (light resistance).
- Progress scapular strengthening.
- Initiate prone rowing with arm at 30° of abduction to neutral arm position.
- Initiate prone shoulder extension with elbow flexed to 90°.
- Continue use of ice as needed. May use heat prior to ROM exercises.
- Rhythmic stabilization exercises (flexion at 45°, 90°, 100° and ER/IR at multiple angles).

Weeks 6: **Most patients will start PT at 6 weeks post op**

- Continue all exercises as above
- Advance PROM in all directions as tolerated.
- Joint mobilizations: gentle scapular/glenohumeral joint mobilization as indicated to regain full PROM.
- AAROM and stretching exercises to gain full motion.
- Shoulder flexion
- ER at 90° abduction.
- Initiate AROM exercises.
- Shoulder flexion in scapular plane to 90° of flexion.
- Shoulder abduction to 90°.
- Progress isotonic strengthening exercise program.
- IR/ER tubing (towel under arm).
- Side-lying ER (towel under arm).
- Prone rowing at 45° abduction.
- Prone horizontal abduction (flexed elbow) at 90° abduction.
- Biceps curls (isotonics with very light resistance).
- Slowly progress strengthening to prevent inflammation of tendon.

Criteria to advance to Phase II:

- Full PROM.
- Flexion PROM: >125°.
- ER PROM in scapular plan to >75° (if uninvolved shoulder PROM >80°).
- IR PROM in scapular plan to >75° (if uninvolved shoulder PROM >80°).
- Abduction PROM to >90° in scapular plane.

PHASE II:

Week 7

- Maintain full ROM in all planes.
- Continue dynamic stabilization drills.
- Progress AROM and light strengthening program with the addition of ER/IR tubing
- Lateral raises to 90° of abduction*
- Full can in scapular plan to 90° elevation*
- Prone extension
- Prone serratus punch.
- Elbow flexion and extension
- *Must be able to elevate arm without shoulder or scapular hiking before initiating isotonic; if unable, continue dynamic rhythmic stabilization glenohumeral joint exercises.*
- Progress joint mobilizations to grades III and IV to address capsular restrictions as indicated for all shoulder girdle joints.

Weeks 8-9

- Continue as above
- Initiate light functional activities if physician permits
- In pain free ROM; starting at waist level activities, progression to shoulder level activities, then overhead activities.

Week 10

- Continue with all exercises listed above.
- Progress to fundamental shoulder exercises.
- Strengthening Exercises: addition of the following
- Standing lateral raise to 90°
- Prone Horizontal Abduction – T's.
- Prone Scaption – Y's.
- Initiate isotonic resistance (0.5kg weight) during flexion and abduction if patient exhibits non-painful normal motion without substitution patterns.

Weeks 11-14

- Progress all exercises.
- Continue ROM and flexibility exercises.
- Stretch posterior capsule with cross body adduction stretching.
- Progress strengthening program (increase 0.5kg/10 days if non-painful).
- No residual pain should be present following exercises.
- May begin gradual biceps strength if biceps tenodesis

Criteria to advance to Phase III:

- Full AROM and PROM.
- Pain free with all strengthening exercises.
- Dynamic shoulder stability.

PHASE III:

Weeks 15-20

- Continue ROM and stretching to maintain full ROM.
- Self-capsular stretches
- Sleeper stretch
- Behind the back IR with towel
- Cross body stretch
- Doorway ER stretch
- Progress shoulder strengthening exercises

Fundamental shoulder exercises including:

- Diagonals with resistance band in D2 pattern.
- Push up plus on wall (progress to floor).
- Dynamic hug with band.
- IR at 90° with band.
- Standing forward punch with band.
- ER (supported and unsupported at 90°) with weight or band.
- Biceps curls

Weeks 20-24

- Continue all exercises listed above.
- Gradually increase resistance (patient should not exhibit pain during or after exercise and no substitution pattern).

Criteria to advance to Phase IV:

- Maintenance of full pain-free ROM.
- Functional use of upper extremity.
- Full muscular strength and power.

PHASE IV: Return to Activity Phase (Weeks 24-36)

Weeks 24-26

- Continue fundamental shoulder exercise program (at least 4 times weekly).
- Continue stretching if motion is tight.
- Continue progression to sport and/or work activity/participation.



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Post-operative Rehabilitation Protocol

General Shoulder Arthroscopy

(Debridement, Subacromial Decompression, and/or Distal Clavicle Resection)

0-2 weeks post op

- Modalities as needed
- Sling until comfortable, or until follow up with doctor. May remove for sleep and stretching/ROM exercises
- Most patients are fully out of sling by 1-2 weeks post op
- RC isometrics into flexion, extension, abduction, adduction, IR/ER in neutral
- Scapular exercises—elevation with shrugs, depression, protraction, retraction with manual resistance
- Active/assisted/passive ROM with shoulder pulleys in all directions as tolerated, progress to full
 - Flexion 90°
 - Abduction 90°
 - IR 90°
 - ER 45°
- Avoid horizontal adduction stretching for six weeks with distal clavicle resection

2 weeks post op

- RC exercises IR/ER with Theraband or tubing with arm abducted 20-30°
- If able, may progress further as below

4-6 weeks post op

- Continue as above
- Advance ROM as tolerated
- Begin isotonics for core rotator cuff strengthening, advance the weight on all exercises to 6-8 pounds, 5-6 sets of 15-20 reps
 - Prone flexion with thumb up—arm at 90°, flex arm forward fully, 12 o'clock position
 - Prone abduction to 100° with thumb up—arm at 90° in prone, abduct arm into scapular plane level with body (2 o'clock position for right shoulder surgery)
 - Prone abduction to 45° with thumb up—arm at 90° in prone, abduct arm level with body (4 o'clock position for right shoulder surgery)
 - Prone extension with arm at max ER—arm at 90° in plane of scapula (6 o'clock position)
 - Scaption to 90°--thumb pointing up, elevate arm in plane of scapula (empty can position)
 - Scaption to 60°--thumb pointing down, elevate arm same as above, but stop at 60°
 - Standing or side lying ER—externally rotate arm in 20-30° abduction (pillow helps with position)

- Begin isotonics for SC strengthening, progress as heavy as tolerated
 - Elevation—continue with shrugs, vertical motion only, do not roll shoulders
 - Depression—seated press ups: hands at hips flat on floor, elbows locked, lift bottom off floor while moving only from scapulae (not a dip motion), use hand blocks to increase height when able
 - Protraction—supine, 2” punches, arm flexed to 90°, elbow locked, motion is from scapula as arm is “punched” forward, use hand weights, move to push ups with a plus (push up position and perform same movement with body weight) when able
 - Retraction—prone rows, arm at 90°, elbow locked out or bent to 90°, use hand weight and retract scapulae pinching them together
- Proprioception exercises—rhythmic stabilization, physioball balance exercises, etc.
- PNF patterns D1 and D2 resistance as tolerated
- Isokinetic exercises with 60° block at 30-45° abduction 180, 150, 120, 90, 60°/sec 15 reps up and down spectrum

6 weeks post op

- Begin conventional weight lifting with machine weights and progress slowly to free weights as desired
- Full ROM isokinetics (throwing wand for throwers) and advance to higher speeds when able 240, 270, 300, 330, 360°/sec and up, 15 reps each speed up and down spectrum

Return to Sport/Activity

- Doctor OK
- Passing strength test if requested
- Completion of throwing program if requested
- NO pain with full ROM (Neer or Hawkins tests negative)



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Post-operative Rehabilitation Protocol
SLAP Repair, Bankart Repair, or Biceps Tenodesis

Most patients will start PT at 6 weeks post op

Phase I: Protective Phase (day 1 to week 6)

Weeks 0-2

- Shoulder sling x 6 weeks
- Sleep in sling x 3 weeks
- Shoulder, elbow, and hand ROM
 - **NO** resisted active isolated biceps activity (elbow flexion or forearm supination x 6 weeks)
 - **NO** active external shoulder rotation, extension, or abduction
- Hand gripping exercises
- Passive and gentle active assisted ROM exercises
 - Codmans exercises
 - Flexion and scaption to 90⁰
 - ER to 30⁰ x 4 weeks
 - IR to 45⁰
 - Scapulothoracic AROM in all planes
- Submaximal isometrics for shoulder musculature
- Cryotherapy PRN

Weeks 3-4

- Continue shoulder, elbow, and hand ROM (as above)
 - Advance IR to 60⁰
- **NO** active ER, extension, or elevation
- Initiate scapulothoracic isometrics
- Initiate proprioceptive training (rhythmic stabilization drills)
- Gentle submaximal shoulder isometrics
- Continue use of cryotherapy PRN

Weeks 6: Most patients will start PT at 6 weeks post op

- Continue exercises as above
- Continue to gradually improve ROM
 - Flexion and Scaption to 145⁰ (can progress further if tolerated)

- ER to 50°
- IR to 60°
- Full ROM should be achieved at 8-10 weeks
- Initiate limited AROM/AAROM of shoulder to 90° flexion or abduction
- Continue submaximal shoulder isometrics
- Can begin AROM supination (no resistance/elbow flexed)
- **NO** biceps loading until week 12

Clinical milestones to progress to Phase II:

- Flexion to 125° (can progress further if tolerated)
- Abduction to 70°
- Scapular plane IR to 40°
- ER to 40°

Phase II: Moderate Protection Phase (Weeks 7-12)

Week 7-9

- Continue to progress AROM/PROM (Full by week 10)
- Begin isotonic rotator cuff IR/ER strengthening with bands/weights
- Progressions
 - Submaximal to maximal
 - Slow speeds to fast speeds
 - Known patterns to random patterns
 - Eyes open to eyes closed
 - OKC to CKC
- Exercises
 - Scapular plane elevation
 - Side lying ER
 - Standing rotator cuff series
 - Prone horizontal abduction/extension
- Manual resistance to shoulder
- **NO** biceps loading until week 10

Week 10-12

- Initiate stretching exercises if ROM not full by 10 weeks
 - Flexion and scaption to 180°
 - ER at 90° abduction to 90°
 - IR at 90° abduction to 79°
- Begin submaximal isometrics and AROM for biceps
- Begin more aggressive exercises for rotator cuff and scapulothoracic musculature
- Continue isotonic progressive resistive exercises and manually resisted exercises
- Progress ER motion to 90/90 position
- Begin submaximal exercises above 90° of elevation

Clinical milestones to progress to Phase III

- Flexion to 160°
- Scapular plane ER to 65°
- Abduction to 70°
- Scapular plane IR to 40°

- ER to 40⁰
- ER at 90⁰ to 45⁰
- Scapular plane IR full
- IR at 90⁰ abduction to 45⁰
- Abduction to 150⁰
- Near full symmetrical posterior shoulder mobility
- 4/5 MMT for scapular/rotator cuff muscles
- AROM in appropriate ranges without pain

Phase III: Minimum Protection Phase (Weeks 13-20)

NO THROWING OR OVERHEAD SPORTS UNTIL WEEK 20

Goals:

- Full non painful AROM/PROM
- Restoration of muscle strength, power and endurance
- No pain or tenderness
- Gradual initiation of functional activities

Weeks 13-16

- Continue stretching exercises if needed
- Maintain full ROM
 - ER at 90⁰ abduction up to 120⁰ (throwers)
- Continue phase II exercise progression and principles
- Isotonic elbow flexion and forearm supination
- Can increase intensity and decrease reps
- Initiate light plyometric activities (2 handed, progressing to one)

Weeks 16-20 - **NO THROWING OR OVERHEAD SPORTS UNTIL WEEK 20**

- Continue to progress resistive exercises
- Continue to progress plyometric exercises
- Continue stretching as needed

Clinical Milestones to progress to Phase IV

- Within 10⁰ of full active range of motion from opposite side in all planes of motion
- Full symmetrical posterior shoulder mobility
- 5/5 isometric shoulder MMT
- 5/5 scapulothoracic and rotator cuff MMT

Phase IV: Advanced Strengthening Phase (weeks 21-26)

Goals:

- As above
- Progress functional activities

Weeks 21-26

- Progress interval sports programs
 - Begin throwing from mound (weeks 24-28)

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PHYSICAL THERAPY PROTOCOL / PRESCRIPTION
S/P AC RECONSTRUCTION

1-4 WEEKS POST-OP: First 6 weeks is home program

- ✓ Sling x 6 weeks post-op
- ✓ Pendulum exercises
- ✓ Passive supine elevation using the opposite hand. Passive ER to neutral.
- ✓ Modalities, cryocuff prn
- ✓ Hand, wrist, elbow, PRE's
- ✓ Continue pendulums, passive supine elevation, passive ER
- ✓ Begin scapular strengthening program, in protective range
- ✓ Deltoid isometrics

4-6 WEEKS POST-OP:

- ✓ Joint mobilization & PROM as necessary (passive supine elevation, passive ER)
- ✓ Deltoid isometrics
- ✓ Modalities as needed
- ✓ Begin sub-maximal IR / ER isometric exercises in neutral, arm at side (week 5)
- ✓ Continue scapular strengthening

6-9 WEEKS POST-OP:

- ✓ Begin Theraband IR / ER week 6
- ✓ ROM activities, emphasize flexion. Gentle passive stretch to tolerance forward flexion
- ✓ Deltoid isotonic in scapular plane, **only** after positive rotator cuff strength is determined (esp. flexion)
- ✓ Continue with scapular PRE's. Begin biceps PRE's.
- ✓ Continue with modalities, prn.
- ✓ Progress Rotator cuff isotonic
- ✓ Continue with aggressive scapular exercises
- ✓ Upper extremity PRE's for large muscle groups, i.e. pects, lats, etc.
- ✓ Begin isokinetic program, IR / ER emphasize eccentrics
- ✓ Continue with flexibility activities

9-16 WEEKS POST-OP:

- ✓ Aggressive upper extremity PRE's
- ✓ IR / ER isokinetics, velocity spectrum
- ✓ Begin plyometric program for overhead athletes
- ✓ Posterior capsule stretching after warm-ups

16+ WEEKS POST-OP:

- ✓ Functional Exercises



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- ✓ Plyometrics
- ✓ Continue Isokinetics



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Latarjet Procedure: Post-operative Rehab Protocol

PHASE I (weeks 1-3) - Immediate post-op phase

Goals:

- Minimize/control shoulder inflammation and pain
- Protection of surgical repair
- Gradual restoration of shoulder PROM
- Adequate scapular mobility and function

Patient education/precautions:

- NO AROM of the operative shoulder
- No excessive shoulder external rotation ROM/stretching. STOP at first felt end feel.
- WEAR SLING AT ALL TIMES. Remove only for showering with arm at side.
- No lifting of objects with operative shoulder/arm. Limit use of operative upper extremity.
- Sleep with sling supporting operative shoulder (towel placed under elbow to prevent shoulder extension)
- Education regarding posture, joint protection, positioning, etc.

Activity

- PROM/AAROM/AROM of elbow, wrist, and hand.
- Begin shoulder PROM (PT directed/administered)

Forward flexion/elevation to tolerance

Abduction in scapular plane to tolerance

IR to 45 degrees at 30 degrees abduction

ER in scapular plane from 0-25 degrees; begin at 30-45 degrees abduction.

DO NOT FORCE ANY PAINFUL MOTION. RESPECT ANTERIOR CAPSULE INTEGRITY WITH ER.

- Scapular clock and isometric exercises.
- Ball squeezes
- Frequent ice/cryotherapy for pain and inflammation

Criteria to progress to Phase II

- Patient adherence to precautions and immobilization guidelines
- 100 degrees of passive forward elevation and 30 degrees of passive ER at 20 degrees abduction.
- Completion of phase I activities with minimal to no pain or difficulty.

Phase II (approximately weeks 4-9) - Intermediate Phase

Goals for phase II

- Minimize/control pain and inflammatory response
- Protection of surgical repair/integrity
- Achieve restoration of AROM gradually
- Wean from sling in weeks 6-7.
- Initiate LIGHT waist level activities.

Patient education/Precautions

- No active shoulder movement until adequate PROM with good mechanics
- No lifting with operative shoulder/upper extremity
- No excessive ER ROM/stretching. Respect anterior capsule integrity
- No activities/exercises that place excessive load on anterior shoulder (push-ups, pectoralis flys, etc.)
- Avoid exercises that involve “empty can” /IR position in scaption due to risk of impingement.

Activity

Early Phase II (approx. week 4)

- Progress shoulder PROM (do not force any painful motion)
- Forward flexion/elevation to tolerance
- Abduction in scapular plane to tolerance
- IR to 45 degrees at 30 degrees of abduction
- ER to 0-45 degrees at 30-40 degrees abduction
- Glenohumeral joint mobilizations as indicated when ROM significantly less than expected. Mobilization done in direction of limitation and discontinue once adequate ROM achieved
- Address scapulothoracic and trunk mobility limitations. Mobilizations done in direction of limitation and discontinued when ROM achieved
- Introduce posterior capsule stretching as indicated
- Continue ice/cryotherapy for pain and inflammation

Late Phase II (approx. week 6)

- Progress shoulder PROM (do not force any painful motion)
- Forward flexion/elevation/abduction in scapular plane to tolerance
- IR as tolerated at multiple angles of abduction
- ER to tolerance at multiple angles of abduction ONCE ACHIEVE 35 DEGREES ER AT 0-40 DEGREES OF ABDUCTION.

- Glenohumeral and scapulothoracic joint mobilizations as indicated
- Progress to AAROM/AROM activities of shoulder as tolerated with good mechanics (minimal to no scapulothoracic substitution with up to 90-110 degrees of elevation)
- Begin rhythmic stabilization drills (IR/ER in scapular plane, flexion/extension and abduction/adduction at varying angles of shoulder elevation)
- Continue AROM elbow, wrist, and hand
- Strengthen scapular retractors and upward rotators
- Initiate balanced AROM/strengthening program
- Low dynamic positions initially
- Muscular endurance with high repetition (30-50), low resistance (1-3 lbs)
- Exercises should be progressive in terms of muscle demand/intensity, shoulder elevation, and stress on anterior joint capsule
- Achieve full elevation in scapular plane before beginning elevation in other planes
- All activities should be pain free and without substitution patterns
- Exercises both open and closed-chain
- No heavy lifting or plyometrics at this time
- Initiate “full can” scapular plane to 90 degrees elevation with good mechanics
- Initiate IR/ER strengthening with tubing at 0 degrees of abduction
- Sidelying ER with towel roll
- Manual resistance ER in scapular plane in supine position
- Prone scapular exercise (30/45/90 degrees abduction) in neutral arm position

Criteria to progress to phase III

- Forward elevation PROM at least 155 degrees and AROM 145 degrees with good mechanics
- ER PROM within 8-10 degrees of contralateral side at 20 degrees abduction
- ER PROM at least 75 degrees at 90 degrees abduction
- Appropriate scapular posture at rest and dynamic scapular control with ROM and functional activities.
- Completion of phase II activities with minimal to no pain or difficulty.

PHASE III (approximately weeks 10-15)

Goals

- Normalize strength, endurance, and neuromuscular control
- Return to chest level functional activities
- Gradual and planned progression of anterior joint capsule stress

Precautions

- No aggressive overhead activities/strengthening that overstress anterior joint capsule
- Avoid contact sports/activities
- No strengthening or functional activities in any plane until near full ROM and strength in that plane of

movement

- Patient education regarding gradual increase of shoulder activities

Activities

- Continue AROM and PROM as needed/indicated
- Initiate biceps strengthening with light resistance, progress as tolerated
- Gradual progression of pectoralis major/minor (avoid positions of excessive stress to anterior joint capsule)
- Subscapularis strength progression (push-up plus, cross body diagonals, forward punch, IR resistance band at 0/45/90 degrees abduction, etc)

Criteria to progress to phase IV

- PROM forward elevation within normal limits
- PROM ER at all angle at all angles of shoulder abduction within normal limits
- AROM forward elevation within normal limits with good mechanics
- Good rotator cuff and scapular muscular performance for chest level activities
- Completion of phase III activities with minimal to no pain or difficulty

Phase IV (approx. weeks 16-20) Overhead activities/return to activities phase

Goals

- Stretching and PROM as needed/indicated
- Maintain full non-painful AROM
- Return to full work activities
- Return to full recreational activities

Precautions

- Excessive anterior joint capsule stress
- Avoidance of “triceps dips, wide grip bench press, military press, or lat pulls behind head. Always “see your elbows” when weight lifting.
- No throwing or overhead athletic moves until 4 months post-op or cleared by MD.

Activity

- Continue all exercises from phase III
- Overhead strengthening if ROM and strength below 90 degrees elevation is good
- Shoulder stretching/strengthening at least 4 x a week
- Return to upper extremity weight lifting program with emphasis on larger, primary upper extremity muscles (deltoids, latissimus dorsi, pectoralis major)
- Push-ups with elbows not flexing past 90 degrees
- Plyometrics/interval sports program if appropriate/cleared by PT and MD
- May initiate pre injury level activities/vigorous sports if appropriate/cleared by MD

KNEE AND LOWER EXTREMITY



**Gehron Treme MD, Andrew Veitch MD, Dustin Richter MD,
Brandee Black MD, Daniel Wascher MD, Robert Schenck MD**
UNM SPORTS MEDICINE

1213 University Blvd NE, MSC10 5600, 1 University of New Mexico; Albuquerque, NM 87131-0001

Phone: 505-272-2231 Fax: 505-925-4919

Post-operative Rehabilitation Protocol

Achilles Tendon Repair

Note: Patient will be in a plantar flexed splint until 2 weeks post op

Phase I

2 weeks post op

- Start physical therapy
- Walking boot with heel lift insert – Weight bearing as tolerated
- Inversion/eversion exercises—iskinetics, tubing, manual resistance, etc.
- Active dorsiflexion exercises to increase ROM
- Passive dorsiflexion to neutral only
- Modalities as needed
- Warm whirlpool
- No resisted plantar flexion (active and passive plantar flexion motion ok)
- Talocrural joint mobs as needed

Phase II

6 weeks post op

- Remove walking boot - WBAT
- PRE's for gastroc/soleus strengthening as tolerated (prevent Achilles tendonitis)
- Work to increase full gastroc/soleus ROM
- Proprioception exercises—single leg stands, stable and unstable surfaces
- Normalize gait

Phase III

12-16 weeks post op

- Full ROM
- Normal gait
- Near full strength—able to stand on toes of affected side in full plantar flexion, or able to do 4x25 single foot heel raises
- Start jogging program if strength acceptable, no limp with gait, and ROM is full



*Department of Orthopaedics
& Rehabilitation*

**Gehron Treme MD, Andrew Veitch MD, Dustin Richter MD,
Brandee Black MD, Daniel Wascher MD, Robert Schenck MD**
UNM SPORTS MEDICINE

1213 University Blvd NE, MSC10 5600, 1 University of New Mexico; Albuquerque, NM 87131-0001

Phone: 505-272-2231 Fax: 505-925-4919

Post-operative Rehabilitation Protocol
ACL & MCL or Posterolateral Corner Reconstruction

Patient will be in a brace, full ROM and touch down weight bearing for 6 weeks post op.

Phase I: Immediate post-operative (weeks 1- 6)

Goals:

- Protect graft and graft fixation
- Control inflammation/swelling
- 0-120 flexion AROM as tolerated first 4 weeks.
- Educate patient on rehabilitation progression
- Restore normal gait on level surfaces

Weight bearing Status:

- TDWB x 6 weeks with crutches
- Brace full ROM. Sleep with locked in extension.
-

Exercises:

- Patellar mobilization/scar mobilization
- Hamstring curls – add weight as tolerated
- Heel slides
- Quad sets (consider NMES for poor quad sets)
- Gastroc/Soleus stretching
- Hamstring stretches
- Gastroc/Soleus strengthening
- SLR, all planes. Add weight as tolerated to hip abduction, adduction and extension.
- If available, deep-water jogging for ROM and swelling.
- Closed Kinetic Chain Quadriceps strengthening activities as tolerated (wall sit, step ups, mini squats, leg press 90-30 degrees)
- Quadriceps isometrics at 60° and 90°
- If available, aquatics for normalizing gait, weight bearing and strengthening
- Balance/Proprioception
- Stationary Bike – initially for promotion of ROM – progress light resistance as tolerated

Criteria for advancement to Phase II:

- Full PROM flexion/extension
- Good quad set, SLR without extension lag
- Minimal swelling/inflammation
- Normal gait on level surfaces

PHASE II: Post-operative weeks 6 to 10

D/C brace at week 6 and advance to WBAT

Goals:

- Restore normal gait with stair climbing
- Maintain full extension, progress toward full flexion range of motion
- Protect graft and graft fixation
- Increase hip, quadriceps, hamstring and calf strength
- Increase proprioception

Exercises:

- Continue with range of motion/flexibility exercises as appropriate for the patient
- Continue closed kinetic chain strengthening as above progressing as tolerated – can include one-leg squats, leg press, step ups at increased height, partial lunges, deeper wall sits, lunge walks.
- Stairmaster (begin with short steps, avoid hyperextension)
- Nordic Trac or elliptical machine for conditioning.
- Stationary bike- progress time and resistance as tolerated
- Continue to progress proprioceptive activities - ball toss, balance beam, mini-tramp balance
- Continue hamstring, gastroc/soleus stretches
- Continue to progress hip, hamstring and calf strengthening as tolerated
- If available, begin running in the pool (waist deep) or on an unweighted treadmill at 8 weeks.

Criteria to advance to Phase III include:

- No patellofemoral pain
- Minimum of 120 degrees of flexion
- Sufficient strength and proprioception to initiate running.
- Minimal swelling/inflammation

PHASE III: Post-operative weeks 10 to 16

Goals:

- Full range of motion
- Improve strength, endurance and proprioception of the lower extremity to prepare for sport activities
- Avoid overstressing the graft
- Protect the patellofemoral joint
- Normal running mechanics
- Strength approximately 70% of the uninvolved lower extremity per isokinetic evaluation (if available)

Exercises:

- Continue flexibility and ROM exercises as appropriate for patient
- Initiate OKC Knee extensions 90°-30°, progress to eccentrics

- If available, isokinetics (with anti-shear device) – begin with mid-range speeds (120o/sec- 240o/sec)
- **Progress toward full weight bearing running at 12 weeks**
- Begin swimming if desired
- Recommend isokinetic test with anti-shear device at 12 weeks to guide continued strengthening.
- Progressive hip, quadriceps, hamstring, calf strengthening
- Cardiovascular/endurance training via Stairmaster, elliptical, bike
- Advance proprioceptive activities

Criteria for advancement to Phase IV:

- No significant swelling/inflammation.
- Full, pain-free ROM
- No evidence of patellofemoral joint irritation
- Strength approximately 70% of uninvolved lower extremity per isokinetic evaluation
- Sufficient strength and proprioception to initiate agility activities
- Normal running gait

PHASE IV: Post-operative months 4 through 6

Goals:

- Symmetric performance of basic and sport specific agility drills
- Single hop and 3 hop tests 85% of uninvolved lower extremity
- Quadriceps and hamstring strength at least 85% of uninvolved lower extremity per isokinetic strength test

Exercises:

- Continue and progress flexibility and strengthening program based on individual needs and deficits.
- Initiate plyometric program as appropriate for patient's athletic goals
- Agility progression including, but not limited to:
 - Side steps
 - Crossovers
 - Figure 8 running
 - Shuttle running
 - One leg and two leg jumping
 - Cutting
 - Acceleration/deceleration/sprints
 - Agility ladder drills
- Continue progression of running distance based on patient needs.
- Initiate sport-specific drills as appropriate for patient
- Assessment of running on treadmill

Criteria for advancement to Phase V:

- No patellofemoral or soft tissue complaint
- Necessary joint ROM, strength, endurance, and proprioception to safely return to work or athletics

PHASE V: Begins at 6 months post-op

Goals:

- Safe return to athletics/work
- Maintenance of strength, endurance, proprioception
- Patient education with regards to any possible limitations

Exercises:

- Gradual return to sports participation
- OK to return to practice and gradually reintegrate into practice based scrimmaging

- Maintenance program for strength, endurance



*Department of Orthopaedics
& Rehabilitation*

**Gehron Treme MD, Andrew Veitch MD, Dustin Richter MD,
Brandee Black MD, Daniel Wascher MD, Robert Schenck MD**
UNM SPORTS MEDICINE

1213 University Blvd NE, MSC10 5600, 1 University of New Mexico; Albuquerque, NM 87131-0001

Phone: 505-272-2231 Fax: 505-925-4919

Post-operative Rehabilitation Protocol **ACL Reconstruction**

Phase I: Immediate post-operative (weeks 1- 4)

Goals:

- Protect graft and graft fixation
- Control inflammation/swelling
- Full AROM as tolerated first 4 weeks.
- Educate patient on rehabilitation progression
- Restore normal gait on level surfaces

Weight bearing Status:

- Weight-bearing as tolerated immediately post-op with crutches
- Wean from crutches for ambulation by 2 weeks as patient demonstrates normal gait mechanics and good quad control.
- No brace needed

Exercises:

- Patellar mobilization/scar mobilization
- Hamstring curls – add weight as tolerated (for patellar tendon autograft procedure only)
- Heel slides
- Quad sets (consider NMES for poor quad sets)
- Gastroc/Soleus stretching
- Hamstring stretches
- Gastroc/Soleus strengthening
- SLR, all planes. Add weight as tolerated to hip abduction, adduction and extension.
- If available, deep-water jogging for ROM and swelling.
- Closed Kinetic Chain Quadriceps strengthening activities as tolerated (wall sit, step ups, mini squats, leg press 90-30 degrees)
- Quadriceps isometrics at 60° and 90°
- If available, aquatics for normalizing gait, weight bearing and strengthening
- Balance/Proprioception
- Stationary Bike – initially for promotion of ROM – progress light resistance as tolerated

Criteria for advancement to Phase II:

- Full PROM flexion/extension
- Good quad set, SLR without extension lag
- Minimal swelling/inflammation
- Normal gait on level surfaces

PHASE II: Post-operative weeks 4 to 10

Goals:

- Restore normal gait with stair climbing
- Maintain full extension, progress toward full flexion range of motion
- Protect graft and graft fixation
- Increase hip, quadriceps, hamstring and calf strength
- Increase proprioception

Exercises:

- Continue with range of motion/flexibility exercises as appropriate for the patient
- Continue closed kinetic chain strengthening as above, progressing as tolerated – can include one-leg squats, leg press, step ups at increased height, partial lunges, deeper wall sits, lunge walks.
- Stairmaster (begin with short steps, avoid hyperextension)
- Nordic Trac or elliptical machine for conditioning.
- Stationary bike- progress time and resistance as tolerated
- Continue to progress proprioceptive activities for patellar tendon autograft procedures, initiate for hamstring tendon autograft procedures – ball toss, balance beam, mini-tramp balance
- Continue hamstring, gastroc/soleus stretches
- Continue to progress hip, hamstring and calf strengthening as tolerated
- If available, begin running in the pool (waist deep) or on an unweighted treadmill at 8 weeks.

Criteria to advance to Phase III include:

- No patellofemoral pain
- Minimum of 120 degrees of flexion
- Sufficient strength and proprioception to initiate running.
- Minimal swelling/inflammation

PHASE III: Post-operative weeks 10 to 16

Goals:

- Full range of motion
- Improve strength, endurance and proprioception of the lower extremity to prepare for sport activities
- Avoid overstressing the graft.
- Protect the patellofemoral joint
- Normal running mechanics
- Strength approximately 70% of the uninvolved lower extremity per isokinetic evaluation (if available)

Exercises:

- Continue flexibility and ROM exercises as appropriate for patient
- Initiate OKC Knee extensions 90°-30°, progress to eccentrics
- If available, isokinetics (with anti-shear device) – begin with mid-range speeds (120o/sec- 240o/sec)
- **Progress toward full weight bearing running at 12 weeks**

- Begin swimming if desired
- Recommend isokinetic test with anti-shear device at 12 weeks to guide continued strengthening.
- Progressive hip, quadriceps, hamstring, calf strengthening
- Cardiovascular/endurance training via Stairmaster, elliptical, bike
- Advance proprioceptive activities

Criteria for advancement to Phase IV:

- No significant swelling/inflammation.
- Full, pain-free ROM
- No evidence of patellofemoral joint irritation
- Strength approximately 70% of uninvolved lower extremity per isokinetic evaluation
- Sufficient strength and proprioception to initiate agility activities
- Normal running gait

PHASE IV: Post-operative months 4 through 6

Goals:

- Symmetric performance of basic and sport specific agility drills
- Single hop and 3 hop tests 85% of uninvolved lower extremity
- Quadriceps and hamstring strength at least 85% of uninvolved lower extremity per isokinetic strength test

Exercises:

- Continue and progress flexibility and strengthening program based on individual needs and deficits.
- Initiate plyometric program as appropriate for patient's athletic goals
- Agility progression including, but not limited to:
 - Side steps
 - Crossovers
 - Figure 8 running
 - Shuttle running
 - One leg and two leg jumping
 - Cutting
 - Acceleration/deceleration/sprints
 - Agility ladder drills
- Continue progression of running distance based on patient needs.
- Initiate sport-specific drills as appropriate for patient
- Assessment of running on treadmill

Criteria for advancement to Phase V:

- No patellofemoral or soft tissue complaint
- Necessary joint ROM, strength, endurance, and proprioception to safely return to work or athletics

PHASE V: Begins at 6 months post-op

Goals:

- Safe return to athletics/work
- Maintenance of strength, endurance, proprioception
- Patient education with regards to any possible limitations

Exercises:

- Gradual return to sports participation
- Ok to return to practice with team with gradual reintegration to practice scrimmaging
- Maintenance program for strength, endurance



Department of Orthopaedics
& Rehabilitation

**Gehron Treme MD, Andrew Veitch MD, Dustin Richter MD,
Brandee Black MD, Daniel Wascher MD, Robert Schenck MD**
UNM SPORTS MEDICINE

1213 University Blvd NE, MSC10 5600, 1 University of New Mexico; Albuquerque, NM 87131-0001

Phone: 505-272-2231 Fax: 505-925-4919

Post-operative Rehabilitation Protocol

ACL Reconstruction with Meniscus Repair or Microfracture

___ **Meniscus Repair**

___ **Microfracture**

Phase I: Immediately postoperative (weeks 0- 4)

Goals:

- Protect graft and graft fixation
- Minimize effects of immobilization
- Control inflammation/swelling
- ROM: 0-90 when supine (such as heel slides) **for pts with meniscus repair.**
- Brace 0-90 degrees for ADLs until 6 weeks post-op **for patients with meniscus repair.**
- Educate patient on rehabilitation progression
- Full ROM and not brace for patients with microfracture

Weight bearing Status:

- TTWB (25%) for 2 weeks, 50% until 4-6 weeks post-op, then advance to full weight bearing.

Exercises:

- Patellar mobilization/scar mobilization
- Hamstring curls – add weight as tolerated
- Heel slides
- Quad sets (consider NMES for poor quad sets)
- Gastroc/Soleus stretching
- Hamstring stretches
- Gastroc/Soleus strengthening
- SLR, all planes, with brace in full extension until quadriceps strength is sufficient to prevent extension lag – add weight as tolerated to hip abduction, adduction and extension.
- Closed Kinetic Chain Quadriceps strengthening activities as tolerated (wall sit, step ups, mini squats, leg press 90-30 degrees)
- Quadriceps isometrics at 60° and 90°
- Balance/Proprioception
- Stationary Bike – initially for promotion of ROM – progress light resistance as tolerated

Criteria for advancement to Phase II:

- Full PROM flexion/extension
- Good quad set, SLR without extension lag
- Minimal swelling/inflammation
- Normal gait on level surfaces

PHASE II: Post-operative weeks 4 to 10

Goals:

- Restore normal gait with stair climbing after brace is discontinued at 6 weeks
- Maintain full extension, progress toward full range of motion at 6+ weeks
- Protect graft and graft fixation
- Increase hip, quadriceps, hamstring and calf strength
- Increase proprioception

Exercises:

- Continue with range of motion/flexibility exercises as appropriate for the patient
- Continue closed kinetic chain strengthening as above, progressing as tolerated – can include one-leg squats, leg press, step ups at increased height, partial lunges, deeper wall sits, lunge walks.
- Stairmaster (begin with short steps, avoid hyperextension)
- Nordic Trac or elliptical machine for conditioning.
- Stationary bike- progress time and resistance as tolerated
- Continue to progress proprioceptive activities for patellar tendon autograft procedures, initiate for hamstring tendon autograft procedures – ball toss, balance beam, mini-tramp balance
- Continue hamstring, gastroc/soleus stretches
- Continue to progress hip, hamstring and calf strengthening as tolerated
- If available, begin running in the pool (waist deep) or on an unweighted treadmill at 8 weeks.

Criteria to advance to Phase III include:

- No patellofemoral pain
- Minimum of 120 degrees of flexion
- Sufficient strength and proprioception to initiate running.
- Minimal swelling/inflammation

PHASE III: Post-operative weeks 10 to 16

Goals:

- Full range of motion
- Improve strength, endurance and proprioception of the lower extremity to prepare for sport activities
- Avoid overstressing the graft,
- Protect the patellofemoral joint
- Normal running mechanics
- Strength approximately 70% of the uninvolved lower extremity per isokinetic evaluation (if available)

Exercises:

- Continue flexibility and ROM exercises as appropriate for patient
- Initiate OKC Knee extensions 90°-30°, progress to eccentrics
- If available, isokinetics (with anti-shear device) – begin with mid-range speeds (120o/sec- 240o/sec)

- **Progress toward full weight bearing running at 12 weeks**
- Begin swimming if desired
- Recommend isokinetic test with anti-shear device at 12 weeks to guide continued strengthening.
- Progressive hip, quadriceps, hamstring, calf strengthening
- Cardiovascular/endurance training via Stairmaster, elliptical, bike
- Advance proprioceptive activities

Criteria for advancement to Phase IV:

- No significant swelling/inflammation.
- Full, pain-free ROM
- No evidence of patellofemoral joint irritation
- Strength approximately 70% of uninvolved lower extremity per isokinetic evaluation
- Sufficient strength and proprioception to initiate agility activities
- Normal running gait

PHASE IV: Post-operative months 4 through 6

Goals:

- Symmetric performance of basic and sport specific agility drills
- Single hop and 3 hop tests 85% of uninvolved lower extremity
- Quadriceps and hamstring strength at least 85% of uninvolved lower extremity per isokinetic strength test

Exercises:

- Continue and progress flexibility and strengthening program based on individual needs and deficits.
- Initiate plyometric program as appropriate for patient's athletic goals
- Agility progression including, but not limited to:
 - Side steps
 - Crossovers
 - Figure 8 running
 - Shuttle running
 - One leg and two leg jumping
 - Cutting
 - Acceleration/deceleration/sprints
 - Agility ladder drills
- Continue progression of running distance based on patient needs.
- Initiate sport-specific drills as appropriate for patient
- Assessment of running on treadmill

Criteria for advancement to Phase V:

- No patellofemoral or soft tissue complaint
- Necessary joint ROM, strength, endurance, and proprioception to safely return to work or athletics

PHASE V: Begins at 6 months post-op

Goals:

- Safe return to athletics/work
- Maintenance of strength, endurance, proprioception
- Patient education with regards to any possible limitations

Exercises:

- Gradual return to sports participation
- Ok to begin practice with team and reintegrate into scrimmaging at practice gradually

- Maintenance program for strength, endurance



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**Gehron Treme MD, Andrew Veitch MD, Dustin Richter MD,
Brandee Black MD, Daniel Wascher MD, Robert Schenck MD**
UNM SPORTS MEDICINE

1213 University Blvd NE, MSC10 5600, 1 University of New Mexico; Albuquerque, NM 87131-0001

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Post-operative Rehabilitation Protocol

Knee Arthroscopy - General

(Partial Meniscectomy / Loose Body Removal / Shaving Chondroplasty)

Phase I – Acute Phase:

Goals:

- Diminish pain, edema
- Restore knee range of motion (goal 0-115, minimum of 0 degrees extension to 90 degrees of flexion to progress to phase II)
- Reestablish quadriceps muscle activity/re-education (goal of no quad lag during SLR)
- Educate the patient regarding weight bearing as tolerated, use of crutches, icing, elevation and the rehabilitation process

Weight bearing:

- Weight bearing as tolerated. Discontinue crutch use as swelling and quadriceps recruitment dictates and normal gait mechanics are restored.

Modalities:

- Cryotherapy for 15 min 4 times a day
- Electrical stimulation to quadriceps for functional retraining as appropriate
- Electrical stimulation for edema control- high volt galvanic or interferential stimulation as needed

Therapeutic Exercise:

- Quadriceps sets
- SLR
- Hip adduction, abduction and extension
- Ankle pumps
- Gluteal sets
- Heel slides
- ½ squats
- Active-assisted ROM stretching, emphasizing full knee extension (flexion to tolerance)
- Hamstring and gastroc/soleus and quadriceps stretches
- Bicycle for ROM when patient has sufficient knee ROM. May begin partial revolutions to recover motion if the patient does not have sufficient knee flexion

Phase II: Internal Phase:

Goals:

- Restore and improve muscular strength and endurance

- Reestablish full pain free ROM
- Gradual return to functional activities
- Restore normal gait without an assistive device
- Improve balance and proprioception

Weight bearing status:

- Patients may progress to full weight bearing as tolerated. Patients may require one crutch or cane to normalize gait before ambulating without assistive device.

Therapeutic exercise:

- Continue all exercises as needed from phase one
- Cardio equipment- stairmaster, elliptical trainer, treadmill and bike.
- Lunges- lateral and front
- Leg press
- Lateral step ups, step downs, and front step ups
- Knee extension 90-40 degrees
- Closed kinetic chain exercise terminal knee extension
- Four way hip exercise in standing
- Proprioceptive and balance training
- Stretching exercises- as above, may need to add ITB and/or hip flexor stretches

Phase III – Advanced activity phase:

Goals:

- Enhance muscular strength and endurance
- Maintain full ROM
- Return to sport/functional activities/work tasks

Therapeutic Exercise:

- Continue to emphasize closed-kinetic chain exercises
- May begin plyometrics/vertical jumping
- Begin running program and agility drills (walk-jog) progression, forward and backward running, cutting, figure of eight and carioca program
- Sport specific drills

Criteria for discharge from skilled therapy:

- 1) Non-antalgic gait
- 2) Pain free /full ROM
- 3) LE strength at least 4+/5
- 4) Independent with home program
- 5) Normal age appropriate balance and proprioception
- 6) Resolved edema



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Post-operative Rehabilitation Protocol
Cartilage or OCD repair / OATS / Microfracture

Range of Motion: Knee flexion 200 times/day

50% weight bearing for 6 weeks post op

Use of crutches for 6 weeks post op

Pain/edema reduction

Enhance quad recruitment

0-2 weeks post op

- Range of motion (CPM or manual)
- Pain/edema control
- Quad recruitment with Time Modulated AC (also known as Russian Stim)
- Quad sets/hamstring co-contractions at multiple angles 10x10, 2-3 times daily
- SLR in brace at 0° until quad can maintain knee locked
- Heel slides in brace
- Patella mobilizations if necessary
- Obtain full extension if lacking

2 weeks post op

- Continue as above
- Aquatic therapy—after post op visit with doctor, perform functional ROM in waist deep water or deeper, forward and retro-walking, marching, lateral stepping
- Stationary bike with seat high; lower to normal seat height as tolerated
- Leg press with maximum 50% BW
- Leg extensions within ROM restrictions, use high volume and light weight
- Leg curls within ROM restrictions, use high volume and light weight

6 weeks post op

- Full WB
- No pivoting, twisting, hopping, jumping, running
- Encourage full ROM as tolerated
- Normalize gait mechanics
- Progress PRE's open/closed chain as tolerated

- Isokinetic exercises 180, 150, 120, 90, 60°/sec, 8-10 reps up and down each speed
- Treadmill forward and retro walking
- Cable column exercises
- Single leg stands for proprioception
- Cardiovascular equipment of choice
- Slide board—start with short distance and increase as tolerated
- Be aware of PTF signs and symptoms and manage accordingly

8 weeks post op

- Continue as above
- Full ROM
- All exercises on affected leg only
- Increase PRE's for strength, high intensity to low volume
- Single leg squats

10 weeks post op

- Continue as above
- Plyometrics—with both feet, and move to single leg ASAP
- Assess light jogging on treadmill

12 weeks post op

- Continue as tolerated
- Sport specific drills
- Plyometrics for speed and power
- Work quad to within 15% or less difference



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Post-operative Rehabilitation Protocol **Meniscal Repair**

- Standard Meniscus Repair**
- Meniscus Root Repair**

Brace 0-90° for 6 weeks post op
50% weight bearing for 6 weeks post op
TDWB for 6 weeks if meniscus root repair
Use of crutches for 6 weeks post op
Pain/edema reduction
Enhance quad recruitment

0-2 weeks post op

- Pain/edema control
- Quad recruitment with Time Modulated AC (aka Russian Stim)
- Quad Sets/Hamstring co-contractions at multiple angles 10x10, 2-3 times daily
- SLR in brace at 0° until quad can maintain knee locked
- Heel slides in brace
- Patella mobilizations if necessary
- Obtain full extension if lacking

2 weeks post op

- Continue as above
- Aquatic therapy-after post op visit with doctor, perform functional ROM in waist deep water or deeper, forward and retro-walking, marching, lateral stepping
- Stationary bicycle with seat high, lower to normal seat height as tolerated
- Leg press with 50% BW max
- Leg extensions within ROM restrictions, use high volume and light weight
- Leg curls within ROM restrictions, use high volume and light weight

6 weeks post op

- Full WB
- No pivoting, twisting, hopping, jumping, running
- Encourage full ROM as tolerated

- Normalize gait mechanics
- Progress PREs open/closed chain as tolerated
- Isokinetic exercises 180, 150, 120, 90, 60°/sec, 8-10 reps up and down each speed
- Treadmill forward and retro-walking
- Cable column exercises
- Single leg stands for proprioception
- Cardiovascular equipment of choice
- Slide board-start with short distance and increase as tolerated
- Be aware of PTF signs and symptoms and manage accordingly

8 weeks post op

- Continue as above
- Full ROM
- All exercised on affected leg only
- Increase PREs for strength, high intensity low volume
- Single leg squats

10 weeks post op

- Continue as above
- Plyometrics-with both feet, move to single leg ASAP
- Assess light jogging on treadmill

12 weeks post op

- Continue as tolerated
- Sport specific drills
- Plyometrics for speed and power
- Work quad to within 15% or less difference

5 months post op

- Full return to sport involving pivoting, squatting, twisting, running

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UNM SPORTS MEDICINE

1213 University Blvd NE, MSC10 5600, 1 University of New Mexico; Albuquerque, NM 87131-0001

Phone: 505-272-2231 Fax: 505-925-4919

Post-operative Rehabilitation Protocol

MPFL reconstruction with or without Tibial Tubercle Osteotomy

Phase I – Acute Phase: 0-2 Weeks

Goals:

- Diminish pain, edema
- Brace locked in extension
- Reestablish quadriceps muscle activity/re-education (goal of no quad lag during SLR)
- May perform quad work out of brace
- Educate the patient regarding weight bearing as tolerated, use of crutches, icing, elevation and the rehabilitation process

Weight bearing:

- Weight bearing as tolerated. Discontinue crutch use as swelling and quadriceps recruitment dictates

Modalities:

- Cryotherapy for 15 min 4 times a day
- Electrical stimulation to quadriceps for functional retraining as appropriate
- Electrical stimulation for edema control- high volt galvanic or interferential stimulation as needed

Therapeutic Exercise:

- Quadriceps sets
- SLR
- Hip adduction, abduction and extension
- Ankle pumps
- Gluteal sets
- Heel slides
- Hamstring and gastroc/soleus and quadriceps stretches

Phase II: 2-6 weeks

Goals:

- Restore and improve muscular strength and endurance
- ROM 0-90
- Open brace to 0-90 degrees
- Work toward normal gait
- Improve balance and proprioception

Weight bearing status:

- Patients may progress to full weight bearing as tolerated. Patients may require one crutch or cane to

normalize gait before ambulating without assistive device.

Therapeutic exercise:

- Continue all exercises as needed from phase one
- Lateral step ups, step downs, and front step ups
- Closed kinetic chain exercise terminal knee extension
- Four way hip exercise in standing
- Proprioceptive and balance training
- Stretching exercises- as above, may need to add ITB and/or hip flexor stretches

Phase III – 6-12 weeks

Goals:

- Discontinue brace
- Enhance muscular strength and endurance
- Full ROM
- Improve quad control and strength

Therapeutic Exercise:

- Continue to emphasize closed-kinetic chain exercises
- Advance quad and hamstring strengthening
- Core control and kinetic chain exercises

Phase IV – 3-6 months

Goals:

- Enhance muscular strength and endurance
- Core control
- Advance to full activity

Therapeutic Exercise:

- Continue to emphasize closed-kinetic chain exercises
- Begin running and sports specific drills
- Advance to agility drills
- Continue Core control and kinetic chain exercises



*Department of Orthopaedics
& Rehabilitation*

**Gehron Treme MD, Andrew Veitch MD, Dustin Richter MD,
Brandee Black MD, Daniel Wascher MD, Robert Schenck MD**
UNM SPORTS MEDICINE

1213 University Blvd NE, MSC10 5600, 1 University of New Mexico; Albuquerque, NM 87131-0001

Phone: 505-272-2231 Fax: 505-925-4919

Post-operative Rehabilitation Protocol
Knee Multiple Ligament Injury Reconstruction / Repair
(ACL, PCL, +/- MCL, LCL, or PLC)
or
PCL and Posterolateral Corner Reconstruction

The goals of this protocol are to protect the reconstructions while preventing knee stiffness. Early passive ROM exercises are very important, as is preventing excessive anterior and/or posterior tibia translation.

The patient will be in brace)preferably PCL Jack brace for 6 months

The patient will be touch down weight bearing for 6 weeks post op

Goals:

- Full knee ROM—all ROM exercises must be performed in the prone or side lying position for the first six weeks
- Touch down weight bearing in brace, must use crutches for the first six weeks
- Pain/edema reduction
- Begin and enhance normalization of quad recruitment
- Prevent anterior/posterior translation and tibia rotation

1day – 6 weeks post op

- Modalities as needed
- Brace locked at 0° for the first two weeks. Can be unlocked only for prone ROM exercises by ATC or PT.
- Brace full ROM if able to tolerate from weeks 2-6
- Teach partner to perform home stretching exercises 2-3 times daily
- ROM exercises: In prone position or side lying only, grip the heads of the gastroc/soleus group and maintain neutral pressure proximally to the tibia while flexing the knee
- Advance ROM as tolerated
- Begin patella mobilizations
- Scar management
- Quad sets/SLR in brace at 0° (assist patient with this exercise until solid quad contraction developed, prevent posterior sag) 10x10 3 times daily. May use ankle weights as they will increase anterior translation
- NO hamstring isometrics for seven weeks
- Seated calf exercises
- Time modulated AC (also known as Russian stim) in full extension



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- Teach quad exercises for home program
- PT visits twice weekly for the first month

2 weeks post op

- Continue as above
- Stationary bike to increase ROM. Start with high seat, and progress to normal seat height when able, resistance as tolerated

3 weeks post op

- Continue as above
- Leg press with both legs
- Leg extensions with anti shear device or cuff weights. Progress weight as tolerated, keep resistance proximal

6-8 weeks post op

- Continue as above
- May begin aquatic therapy emphasizing normal gait, marching forward/backward
- Weaning off crutches and normalize gait mechanics
- Full WB as tolerated
- ROM—prone flexion 120° or more, and advance to full ASAP
- Treadmill walking—forward and retro
- Closed and open chain tubing exercises
- Single leg stands for balance/proprioception on Airex pad or trampoline
- Chair/wall squats—keep tibia perpendicular to floor
- Unilateral step-ups—start with 2” height and progress to normal step height as able

10 weeks post op

- Continue as above
- All exercises should be on affected leg only at this time
- ROM should be progressing; if not, contact doctor
- Stairmaster
- Slide board—start with short distance and progress as tolerated
- Fitter
- Versa climber
- Nordic track and elliptical trainers
- Cable column exercises—retro walking, lateral stepping, NO cross over stepping or shuffling



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- Standing leg curls with cuff weights or seated leg curls with NK table at 5 pounds max
- Advance strengthening for quads as tolerated

12 weeks post op

- Continue as above
- Advance hamstring strengthening into prone position
- Assessment of jogging on treadmill
- Lateral movement supervised by ATC or PT
 - Stepping, shuffling, hopping, cariocas
- Isokinetic exercises 180, 150, 120, 90, 60°/sec 8-10 reps each speed up and down spectrum
- Jack Brace may be removed for sleeping but continued for all daytime activity

16-24 weeks post op

- Continue as above
- Plyometrics—low intensity vertical and lateral hopping to begin, use both feet and move to one foot ASAP
 - Volume for plyometrics (this is not a conditioning exercise, but a strengthening one) for rehabilitation
 - 40-60 foot contacts/session for beginners
 - 60-80 foot contacts/session for intermediate
 - 80-100+ foot contacts/session for advanced
- If plyometric exercise intensity is high, the volume must be decreased. Give ample recovery time between sets.
- 2-3 sessions per week, preferably on weight lifting days
- Initiate sport specific activities under supervision by ATC or PT

24 weeks post op (6 months +)

- Continue as above
- D/C brace
- Emphasize strength and power development
- Running and sport specific drills under ATC or PT supervision
- Isokinetic test for quad strength difference $\leq 15\%$ and unilateral hamstring/quad strength ratio of 65% or better
- Continue strength testing monthly until patient passes, then perform functional testing
- Functional testing is appropriate for people returning to advanced recreational activities or sports



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**Gehron Treme MD, Andrew Veitch MD, Dustin Richter MD,
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UNM SPORTS MEDICINE

1213 University Blvd NE, MSC10 5600, 1 University of New Mexico; Albuquerque, NM 87131-0001

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Post-operative Rehabilitation Protocol

Hamstring Tendon Repair

Phase 1

- 0-2 weeks: Toe touch weight bearing with crutches in brace if placed post op
- 2-4 weeks: Advance weight bearing to 25-50%
Begin passive ROM of knee and hip. Limit knee extension to brace parameter if present.
- 4 weeks: Gentle active ROM exercises without restriction without brace at PT. Continue brace for ambulation if present.

Phase 2

- 6 weeks: Discontinue brace.
Advance weight bearing to full.
Gait training.
Continue active and passive ROM exercises.
Begin isotonic exercises through limited ROM avoiding terminal flexion and extension.
Begin aquatherapy if available.
Core strengthening.
Closed chain exercises.

- 8 weeks: Advance isotonic strengthening to include full ROM
Begin dynamic training and sports/vocation specific exercises.

Phase 3

- 10 weeks: Initiate dry land jogging.
Isokinetic strength evaluation at 60°/sec, 120°/sec, 180°/sec and compare to contralateral side.
Continue to advance sports/vocation specific exercises.
Return to sport/vocation with 80% return of isokinetic strength compared to contralateral limb

(anticipated at 6-9 months post op).



*Department of Orthopaedics
& Rehabilitation*

Dustin Richter, MD

UNM SPORTS MEDICINE

915 Camino De Salud NE, MSC10 5600, 1 University of New Mexico; Albuquerque, NM 87131-0001

Phone: 505-272-2231 Fax: 505-925-4919

Hip Arthroscopy Rehabilitation Protocol

General guidelines:

- despite the minimally invasive nature of hip arthroscopy, significant work was performed inside the hip joint and time is required for the repaired structures to heal
- systematic approach to rehabilitation (generally under the guidance of a physical therapist with experience in hip rehab) is critical to ensuring optimal outcome
- physical therapy should start within 1 to 3 days after surgery
- each patient's recovery highly individual and therapy protocol should be customized to the patient
- progression through therapy phases is pain- and function-dependent, not time-dependent
- pushing the rehabilitation too quickly may aggravate the hip and delay recovery
- precautions:
 - crutches and partial weight-bearing to protect repair for 4 weeks depending on procedure
 - avoid excessive external rotation and flexion (stresses repair)
 - avoid early active hip flexion that can lead to hip flexor tendonitis
 - avoid advancing too rapidly through therapy protocol to prevent flare-ups
 - no driving until permission from surgeon (usually around 4 weeks)
 - medications help reduce risk of abnormal bone formation (heterotopic ossification) and blood clot (DVT or deep venous thrombosis)
- early post-operative goals include reducing post-operative pain, swelling and inflammation while avoiding stiffness and improving motion
- late post-operative goals include restoring motion and strength, normalizing gait, and conditioning
- ultimate goal is to return to prior or desired level of activity after eradicating the structural or mechanical problem responsible for symptoms
- the degree of hip damage may require careful consideration of modifying activities to reduce stress on the joint and prevent further problems

Phase I (weeks 0 to 3)

- goals:
 - recover from surgery
 - protect repair
 - reduce post-operative pain, swelling, and inflammation
 - crutch training to unload hip while normalizing gait
 - prevent muscular inhibition
 - encourage mobility
 - promote wound healing (sutures out 10 to 14 days)
- protected weight-bearing (50% of body weight, foot flat weightbearing)
 - use two crutches to limit weight while stepping on the operative leg
 - maintain foot flat on the ground (reduces force in the hip joint)
- hip joint mobilization
- manual therapy
- scar massage
- modalities to reduce swelling and inflammation
- hip passive range of motion within post-op restrictions
 - no external rotation > neutral
 - no hip flexion > 90 degrees
 - other precautions depend on the procedure performed
- muscle activation
 - hip isometrics (glut, quad, and hamstring sets, abductor and adductor isometrics)
 - heel slides (active-assisted range of motion)
 - pelvic tilts
 - double legged supine bridge
 - seated knee extension
 - prone knee flexion
- standing exercises (keep knee straight)
 - abduction and adduction without resistance
 - flexion and extension without resistance
 - double heel rises
- standard stationary bike with high seat (to prevent hip flexion >90) with no resistance
- criteria to progress to phase II
 - minimal pain with phase I exercises
 - minimal limitations in range of motion (90 degrees of hip flexion with minimal pain)
 - normalized heel to toe gait with two crutches and partial weightbearing

Phase II (weeks 4 to 6)

- goals:
 - protect repair
 - increase range of motion
 - transition from crutches
 - normalize gait
 - progressively increase muscle strength

- transition from crutches at the 4 week mark
 - start with single crutch on opposite side from surgery, unload the operative hip during gait
 - may transition to no crutches once comfortable and no significant gait deviations
 - may continue to need crutches when planning to walk a distance or be on your feet for a longer time
- progress with hip range of motion
 - no external rotation > 20 degrees
 - no hip flexion > 105 degrees
 - prone hip rotations
- manual therapy
 - massage portal sites
 - hip joint mobilizations
 - deep tissue mobilization
 - pelvic and lumbar spine joint mobilizations
 - desensitize irritable nerve distributions
- muscle activation
 - progress core strengthening
 - hip strengthening
 - hip flexor activation (careful with active / resisted hip flexion to prevent inflammation)
 - clam shells
 - single-leg bridges
 - leg presses (minimal resistance)
 - weight-shifting
 - ¼ mini squats
 - quadruped superman
 - standing exercises
 - abduction and adduction with low resistance
 - flexion and extension with low resistance
- standard stationary bike – increase duration and resistance as tolerated
- pool therapy recommended after portals healed
 - decrease depth with each successive week (start at chest deep and progress to waist deep)
 - 4-direction walking
 - step-ups
- criteria to progress to phase III
 - minimal pain with phase II exercises
 - 105 degrees of hip flexion, 20 degrees of external rotation with minimal pain
 - pain free / normal gait pattern
 - hip flexion strength >60% of opposite side
 - hip abduction/adduction strength, internal/external rotation strength >70% opposite side

Phase III (weeks 7 to 10)

- goals:
 - protect repair
 - normalize motion and strength
 - normalize gait
 - improve endurance and conditioning
 - improve neuromuscular control, balance, and proprioception
- normalize hip range of motion
 - no restrictions
 - symmetry with unaffected side
- manual therapy
 - massage portal sites
 - hip joint mobilizations
 - deep tissue mobilization
- hip strengthening
 - increase resistance with active exercises
 - clamshells with theraband
 - sidelying planks
 - physioball hamstring
 - side-stepping with resistance
 - lunges
- neuromuscular training
 - core stabilization
 - single leg balance
 - side steps over cups
 - step-ups with eccentric lowering
 - Bosu squats
- standard stationary bike – continue to increase duration and resistance, lower seat to allow increasing hip flexion
- elliptical machine with minimal resistance
- may use treadmill walking program
- continue pool therapy, increase speed and duration, decrease depth
- criteria to progress to phase IV
 - symmetrical range of motion
 - hip flexion strength >70% of opposite side
 - hip abduction/adduction strength, internal/external rotation strength >80% opposite side
 - cardiovascular fitness returning to pre-operative level

Phase IV (weeks 11 to 14)

- goals:
 - normalize function

- sports specific training
- prepare return to activity
- continue phase III exercises with progressive increase in intensity
- manual therapy as indicated
- core strengthening
- advance proprioceptive training
- start introducing low-impact plyometrics
- increase resistance and duration on bike and elliptical
- pool running
- swimming as tolerated
- sport-specific agility drills

Final phase (14 weeks & beyond)

- traditional weight-training
- increased intensity of plyometrics
- start running progression
- sport specific drills without pain
- cardiovascular fitness at or better than pre-operative level

Return to sports / activities

- full pain-free range of motion symmetrical to opposite side
- symmetrical hip strength
- stable pelvis
- ability to perform sport-specific drills at full speed without pain

MEET OUR SPORTS MEDICINE TEAM



Gerald Demarest, MD, Matt Lilley, MD (Sports Fellow 2017), Dustin Richter, MD, Andrew Veitch, MD (Head Team Physician Lobo Athletics), Blake Obrock, (Sports Fellow 2017), Brandee Black, MD, Gehron Treme, MD, Daniel Wascher, MD, Robert Schenck, MD (Chairman Department of Orthopaedics)