Meniscus Repair Protocol
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The following document is an evidence-based rehabilitation protocol for knee arthroscopy with meniscus repair. The protocol is both chronologically and criterion based for advancement through four post-operative phases:

- **Phase 1**: Maximum protection
- **Phase 2**: Progressive stretching and early strengthening
- **Phase 3**: Advanced strengthening and plyometrics
- **Phase 4**: Return to sports functional program

**Repair types:**
- **Body** - Often concomitant with a ligament injury
- **Root** - Often isolated tear
  - Slower rehabilitation progression to minimize hoop stress on meniscus

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<th>Weightbearing</th>
<th>Crutches or assistive device</th>
<th>Brace</th>
<th>ROM Limitations</th>
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<tr>
<td><strong>Body</strong></td>
<td>Toe touch weight bearing for 4 weeks</td>
<td>Wean over 1-2 weeks with progression to FWB at 5-6 weeks post-operative</td>
<td>0°-30°, gradually open 10-20° as quad function improves</td>
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<tr>
<td><strong>Root</strong></td>
<td>Toe touch weight bearing for 6 weeks</td>
<td>Wean over 1-2 weeks with progression to FWB at 7-8 weeks post-operative</td>
<td>0°-30°, gradually open 10-20° as quad function improves</td>
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Key factors in determining progression include:
- Anatomic site of tear
- Suture fixation – risk of failure if rehabilitation is too vigorous
- Location of tear – anterior vs posterior
- Other pathology such as ligamentous injury
Phase 1 – Maximum Protection Phase

Post-operative weeks 0-4 (body)
Post-operative weeks 0-6 (root)

Goals for Phase 1

▪ Protect surgical repair
▪ Decrease inflammation and swelling
▪ Restore normal knee extension
▪ Educate patient on post-operative restrictions, gait, and tissue healing
▪ Maintain tibiofemoral and patellofemoral joint mobility
▪ Facilitate appropriate quadriceps activation

Criteria for progression to Phase 2

▪ Minimal pain with Phase 1 exercises
▪ Knee ROM 0-90°
▪ Perform straight leg raise without lag sign
▪ Normal neuromuscular firing patterns of knee musculature

Brace

▪ Post-op hinged knee brace, unlocked 0-30°
▪ Gradually unlock in 10-20° increments as quad function improves
▪ Transition to Recover knee brace as quadriceps function improves

Weight Bearing

▪ Toe-touch only (TTWB) for 4 weeks for body repair, 6 weeks for root repair
  ○ Maximum of 20-25 lbs through affected leg

Range of Motion

▪ Gentle active and passive ROM 0-90°
▪ Restrict hamstring activation for medial posterior horn repairs
▪ Progression managed by physician’s office

Stretching

▪ Emphasis on terminal knee extension
▪ Heel prop for extension, calf stretch, prone hang

Manual Therapy

▪ Patellar mobilization – all directions
▪ Scar mobilization, soft tissue mobilization, lymph edema message as needed

NMES

▪ Quadriceps re-education
▪ Consider home unit if insurance allows

Strengthening

▪ Ankle pumps, calf sets
▪ Quadriceps sets, prone terminal knee extension
▪ Open kinetic chain hip strength including straight leg raises – all planes with goal of no lag sign
▪ Gluteal and core strengthening

Cardiovascular

▪ Upper body ergometer

Aquatics

▪ Initiate aquatic therapy when surgical incisions have healed
  • Focus on normalizing weight bearing and gait
  • Consider alternating between land and water-based sessions if available

Modalities

▪ Instruct on cryotherapy use with Game Ready or IceMan – at least three times per day for 20-30 minutes with leg elevated above heart
▪ NMES unit at home if significant quadriceps lag present
▪ Compression to be worn during all waking hours
  • May remove to sleep
Phase 2 – Moderate Protection Phase

Post-operative weeks 4-12
Post-operative weeks 6-12

Goals for Phase 2

▪ Minimize pain and inflammation
▪ Introduce gentle strengthening
▪ Restore full knee ROM
▪ Progress weight-bearing and ROM
▪ Normalize gait pattern with proper lower extremity biomechanics OR ability to unilateral WB without pain

Criteria for progression to Phase 3

▪ Minimal pain with Phase 2 exercises
▪ Normalized gait
▪ Single leg balance > 15 seconds
▪ Forward step down or SL squat to specific ROM
▪ Full pain-free knee ROM
▪ Descend 8” stair with proper knee control/alignment

Brace
▪ Recover brace (neoprene sleeve with medial/lateral support) with knee sleeve
▪ Wear when up and active

Weight Bearing
▪ Progress to weight bearing as tolerated, if not already done
  ○ Increase by 25% body weight every 3-4 days until FWB

Strengthening
▪ Continue Phase 1 strengthening exercises
▪ Progress to closed kinetic chain as able (demonstrates strong quadriceps contraction, minimal swelling, able to bear at least 50% body weight)
  ○ Standing TKE, leg press, mini squats/weight shifts, forward step up program (8” stair goal), double leg bridging
▪ Progress closed kinetic chain quadriceps strength with progression from bilateral to unilateral
  ○ Leg press, squats, step-up/downs, lateral stepping, multidirectional lunges

Proprioception
▪ DL balance
  ○ Progress stable to unstable surfaces
  ○ Add perturbation and dual tasking as able

Cardiovascular
▪ Stationary bike, elliptical trainer, stair climber
▪ Retrograde treadmill walking

Aquatics
▪ Continue phase 1 aquatics, as needed

Modalities
▪ Utilize cryotherapy and other modalities, as needed
Phase 3 – Advanced Strengthening, Proprioception and Plyometric

Post-Operative Weeks 12-20

Goals for Phase 3
- Minimize pain and inflammation
- Maintain full knee ROM
- Improve muscle strength and endurance
- Quad girth within 1 cm of contralateral
- Improve neuromuscular control
- Initiate return-to-running progression
- Initiate plyometrics and agility training
- Isokinetic test ≥ 85% limb symmetry (or force plate/dynamometer)

Criteria for progression to Phase 4
- Minimal pain with Phase 3 exercises
- Isokinetic test ≥ 85% limb symmetry
- No apprehension with basic plyometric and agility activity
- Initiated return-to-running progression with proper lower extremity biomechanics and without pain
- Reports confidence in lower extremity with sport specific activities

Stretching
- Continue stretching of all lower extremity musculature, as needed

Manual Therapy
- As needed to maintain range of motion and flexibility

Strengthening
- Continue Phase 2 strengthening exercises
- Introduce isokinetic knee extension (full arc, pain and crepitus free)
- Single leg exercise progressions (step-ups/downs, lunges, squats & RDLs)
  - Progress to multi-directional stepping patterns
  - Progress stable to unstable surfaces
  - Add perturbations
- Progressive hip and hamstring strengthening
  - Multi-directional band walks and stability training
  - Introduce eccentric hamstring strength training
- Core Stabilization
  - Focus on rotational patterns

Neuromuscular Control
- Incorporate unstable surfaces and dynamic movement patterns with functional strengthening progression
- Incorporate dual tasking and sport-specific progressions

Advanced Gait Re-Training & Agility
- Initiate return-to-running progression (12-14 weeks)
  - Utilize Alter-G treadmill or underwater treadmill, if available
  - 14+ weeks: sagittal plane jogging, sub-maximal ladder drills
  - 16+ weeks: advance to multi-directional running, sub-maximal pivoting and cutting

Plyometrics
- Initiate and gradually progress return hoping activities
  - Sagittal → Frontal → Rotational
  - Double leg → Single leg
  - Ascending → Descending → Repetitive box jumps/hops

Aquatics
- Advanced gait re-training
- Plyometric drills

Athletic Republic
- Consider ACL Bridge as early as 12 weeks post-operatively if needed to enhance functional demands

Work Conditioning
- Consider at 12 weeks if physically demanding occupation

Modalities
- Utilize cryotherapy, thermotherapy, and electrical modalities as needed
Phase 4 – Return to Sports Functional Program
Post-Operative Weeks 20+

Goals for Phase 4
▪ Minimize pain and inflammation
▪ Restore muscle strength and endurance
▪ Restore neuromuscular control
▪ Safe and effective return to previous level of function for sport or activity
▪ Forward step down or SL squat to 60°

Independent Gym Based Program (HEP)
▪ Stretching as needed
▪ Single leg strength stabilization, and power development with emphasis on dynamic knee control
▪ Continue incorporation of core integrated exercises with functional strengthening progression

Agility & Plyometrics
▪ Advanced agility and plyometric drills
  ○ Progress towards full speed with sudden changes in direction
  ○ Incorporate dual tasking and sport-specific progressions
  ○ Continue focus on proper lower extremity biomechanics

Sport-Specific Training
▪ Initiate sport-specific training programs
  ○ Interval sport programs for running, cycling, swimming, skating, throwing, golfing, etc.
  ○ Olympic/power weight-lifting exercises
▪ Transition to Athletic Republic program if competitive or recreational athlete with specific goals for return-to-sport
▪ Progress return-to-running program
  ○ Progress distances, speed intervals, surfaces, hill training, and sprint work if appropriate

Activity-Specific Training
▪ Transition to work re-conditioning program if physical laborer or if specific occupational demands

Modalities
▪ Utilize cryotherapy and other modalities as needed

Brace
▪ Custom fit functional brace to be utilized for contact or potential contact sports or activities for ~1 year post-op

Return to Sport Testing (6-12 months post-op per MD)
▪ Balance: Y-balance testing within 4 cm of unininvolved side
▪ Strength: Knee isokinetic test ≥ 90-95% of the uninvolved side, lateral step-down test without compensation
▪ Hop testing: ≥ 90-95% limb symmetry
▪ Agility: Full speed sport-specific drills without pain or compensation
▪ Tampa Scale to determine readiness to return-to-play
* This protocol has been adapted from the Brigham and Women’s Hospital protocol for Meniscal Repair. That referenced protocol was adopted from Brotzman & Wilk, as published in Brotzman SB, Wilk KE, *Clinical Orthopaedic Rehabilitation*. Philadelphia, PA: Mosby Inc; 2003:315-319.

This protocol was updated and reviewed in April 2020 by Jonathon Henry, MD, Stacey Hladish, PA-C, MSPS, LAT, ATC, Rebecca Donnay, PT, DPT, SCS, Dan Reznichek, PT, DPT, MS, SCS, LAT, and Joe Woldt, PT, DPT, SCS.