BEN MAYO, MD
SHOULDER, ELBOW, HIP, AND KNEE SURGERY

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Phone: 855-750-5757

Surgical Rehabilitation Protocol
PCL Reconstruction w/ MCL

The following information is to help make your recovery from surgery as smooth and rapid as possible. If you have any questions or concerns, contact the Dr. Mayo's team at the number above. You will have appointments with Dr. Mayo at ~1-2 weeks and ~4 weeks postop.

Phase 1: Recovery from Surgery – 0-6 Weeks After Surgery

Goals	• Protection of repaired structures, graft fixation (12 weeks) • Educate patient on rehab progression, caution against posterior tibial translation from gravity and muscle activation • Diminish joint swelling and pain • Restore patellar mobility • Restore full passive knee extension, Gradually improve knee flexion to 90 degrees • Re-establish quadriceps control and activation • Restore independent ambulation within precautions
Precautions	• **NO Hamstring activation or strengthening** • ***Brace***: PCL brace locked in extension when ambulating and sleeping. May be unlocked to 0-90 degrees when non-weight bearing. • ***Weight Bearing***: Toe touch weight bearing in brace locked in extension with crutches for first 6 weeks • ***Range of Motion***: Locked straight at all times for first 7 days post op, then OK for passive range of motion 0-90 degrees. No prone hangs. • **Wound Care**: No swimming or submerging in water until wounds healed • ***Call Dr. Mayo if***: Significant wound drainage or dehiscence, purulence, erythema.
Therapeutic Exercises *See last page for example exercises*	• ***Strengthening***: Quad sets, SLR (no adduction), ankle pumps, core stabilization • ***Proprioception***: None • ***Conditioning***: Upper body only • ***Modalities***: BFR, NMES • ***Manual Therapy***: Patella and soft tissue mobilization, active and passive knee flexion to 90 degrees

Home Instructions	• ***Wound Care***: Remove large bulky dressing on postoperative day 3. Leave white bandaids (Steri-strips) in place. Sutures will be removed at ~2 weeks in clinic.
	• ***Bathing***: Showering permitted once after bulky dressing removed. No submerging in water (bath/pool/lake/etc.) for 4 weeks.
	• ***Driving***: Must be off all narcotic pain meds when operating vehicle
	  ○ 1 week for automatic cars, left leg surgery
	  ○ 6 weeks for standard/manual cars or right leg surgery
	• ***Sleeping***: Sleep with brace locked in extension for 4 week or per MD/PT order
	• ***Ice and Elevation***: Ice for 20 minutes every hour for the first week, elevate leg with knee <u>in full extension</u> with a pillow under the shin bone as much as possible. Ice as needed after 1 week.
	• ***Home Exercise***: As instructed by physical therapy. ROM several times per day. SLR and Quad Sets (up to 300-500 reps a day) in the brace.

Criteria to Progress	☐ Knee ROM: 0-90 degrees ☐ Perform SLR without quad lag and good quad activation ☐ Normalized gait per precautions ☐ Normal patellar mobility ☐ Minimal swelling/inflammation

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Phase 2: Early Strengthening/Neuromuscular Control – 6-12 Weeks After Surgery

Goals	• Protection of graft primary revascularization (8 weeks) • Eliminate inflammation and swelling • Full knee ROM (0-135 degrees) or hyperextension if normal • Normal gait on all surfaces without brace or assistive device, no assistive devices by 8 weeks • Improve lower extremity strength, proprioception, balance, neuromuscular control, and confidence • Demonstrate stability with dynamic knee activities (no varus/valgus deviations)
Precautions	• ***Brace***: Transition to PCL brace, completely unlocked, may remove when non-ambulating. Must wear until 12 weeks minimum. • ***Weight Bearing***: Full weight bearing in hinged knee brace unlocked • ***Range of Motion***: Avoid weight bearing deep squatting past 90. No hyperextension. • ***Call Dr. Mayo if***: Not achieving full range of motion, large effusion.
Therapeutic Exercises *See last page for example exercises*	• ***Strengthening***: Advancement of multi-plane closed chain activities, open chain, core strengthening and functional standing activities • ***Proprioception***: One leg balance, wobble boards, BAPS • ***Conditioning***: Stationary bike, elliptical, swimming • ***Modalities***: BFR, NMES • ***Manual Therapy***: Patella and soft tissue mobilization, passive knee flexion to 135 degrees, prone quadriceps stretching, joint mobilization as needed
Home Instructions	• ***Driving***: OK to drive assuming off narcotic pain medication • ***Sleeping***: OK to remove brace • ***Ice and Elevation***: Ice as needed for pain and swelling after activity • ***Home Exercises:*** As instructed by physical therapy
Criteria to Progress	☐ ROM 0-110 degrees or greater ☐ Minimal swelling/inflammation ☐ No pain with exercises ☐ Normal gait on all surfaces at community level distances ☐ Satisfactory clinical exam by surgeon ☐ Quadriceps strength 75% of contralateral side ☐ Hamstrings equal bilateral ☐ Hamstrings/quadriceps ratio 66% to 75% ☐ Subjective knee scoring (modified Noyes System) 80 points or better

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Phase 3: Advanced Activity Phase – 12-24 Weeks After Surgery

Goals	• Normalize lower extremity strength to >85% non-involved extremity • Begin hamstring strengthening • Enhance muscular power and endurance • Improve neuromuscular control and proprioception exercises • Perform selected sport-specific drills • Initiate plyometric exercises • Improve aerobic endurance • Physician clearance to initiate return to running and functional progression
Precautions	• ***Brace***: Short hinged knee brace for sport specific activity • ***Call Dr. Mayo if***: Increased effusion, knee feels unstable, not full range of motion
Therapeutic Exercises *See last page for example exercises*	• Phase 2 exercises plus plyometric training added • Sport specific activities and skill work • Agility drills and cutting • Sport specific conditioning
Home Instructions	• ***Home exercises*:** Workouts in gym, focus per physical therapist
Criteria to Progress	☐ Near Full Range of Motion within 10-15 degrees full flexion ☐ No pain with forward running, agilities, jump training, or strengthening ☐ Good knee control with single leg dynamic proprioceptive activities ☐ Lower extremity strength greater than or equal to 85% of non-involved by Cybex ☐ Single leg hop test greater or equal to 85% of non-involved ☐ Subjective knee scoring (modified Noyes System) (90 points or better) ☐ Satisfactory clinical exam

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Phase 4: Return to Activity – 24+ Weeks after Surgery to Return

Goals	• Protect graft through ligamentization process • Equal bilateral lower extremity strength • Equal bilateral balance, proprioception, power in lower extremity • 100% global function rating • Achieve maximal strength and endurance • Progress skill training • Gradual return to full-unrestricted sports
Precautions	• ***Brace***: No brace recommended • ***No return to full participation in cutting, pivoting, or contact sports until cleared by Dr.* Mayo**
Therapeutic Exercises *See last page for example exercises*	• Continue all exercises • Non-contact sport specific drills • Improve conditioning
Home Instructions	• ***Home Exercises***: Workouts in gym, focus per physical therapist
Criteria for Full Return to Sport	☐ Minimum 9 months post surgery for cutting/pivoting/contact sports ☐ Limb symmetry greater than 90% on dynamometer for quad and hamstring ☐ 6 meter single leg hop for time (seconds) >90% contralateral ☐ Single leg hop for distance >90% contralateral leg ☐ Functional Lower Extremity Evaluation (FLEE) Test – Composite score ≥ 90% LSI ☐ ACL-RSI >75 ☐ Final return to play determined by Dr. Mayo

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Sample Rehabilitation Exercises by Phase

Phase I

Week 0-6

Week 0-6:

Range of Motion
- Ankle pumps
- Pressure into full, passive knee extension, no hyperextension
- Active and passive gradual knee flexion 0-90 degree
- **Technique for PT/AT assisted ROM is as follows: Patient supine, maintain anterior pressure on proximal tibia as knee is flexed**
- **No prone hangs**
- Gastrocnemius stretch
- Heel slides, Passive prone knee flexion, seated flexion stretch

Strengthening
- NO HAMSTRING STRENGHTENING, ACTIVATION, OR GUARDING
- Straight leg raises (Flexion, Abduction, **NO Adduction**)
- Quadriceps activation sets and stimulation
- Calf strengthening , Resisted plantarflexion in long sitting, progressing to standing calf raise with full knee extension
- Multi-angle isometric at extension
- Knee extension 90-40 degrees
- OKC passive/active joint repositioning 90,60, 30 degrees
- Standing hip extension from neutral

Manual Therapy/Modalities
- NMES is strongly recommended
- Patellar mobilization
- Blood flow restriction

Phase II

Week 6-12

Week 6-8:

Range of Motion
- Advance ROM, avoid hyperextension
- Hamstring and Achilles mobilization

Strengthening
- Progress isometric strengthening program
- Leg press (0-90 degrees)
- Knee extension
- OK for OKC knee extension, no flexion
- Hip Abduction and Adduction, no resistance below knee
- Hip Flexion and Extension
- Lateral Step-Overs, Lunges (straight plane and multi-plane drills)
- Lateral Step Ups, Front Step Downs
- Wall slides/squats
- Vertical Squats
- Seated Toe Calf Raises (no standing)

Endurance
- Bicycle foot forward on pedal, no toe clips to minimize hamstring activity, seat higher than normal
- Stair Stepper Machine
- Pool Program (Running, agility, Backward Running, Hip and Leg Exercises)
- Unloading treadmill walking

Proprioception/Plyometric
- Proprioception Drills
- Biodex Stability System (Balance, Squats, etc)
- Progress to balance and ball throws
- Tilt board repositioning, balance, and squats (perturbation)

Week 8-12
- Continue all exercises listed in Weeks 4-6

Strengthening
- Leg Press Sets (single and double leg) 0-90 degrees
- Isokinetic exercises (90 to 40 degrees) (120 to 240 degrees/second)

Proprioception/Plyometric
- Plyometric Leg Press
- Biodex stability system
- Training on tilt board
- Perturbation Training

Endurance
- Walking Program
- Bicycle/Stair Stepper/Elliptical Machine for endurance
- May initiate running program (weeks 10-12) (Physician Decision) with brace

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Phase III
Weeks 12-24

Strengthening
- OK to begin hamstring strengthening
- Continue strengthening - advance resistance and repetitions (ball hamstring curls, single leg press, core stabilization)
- Continue all strengthening drills
- Leg press
- Squats
- Hip Abd/Adduction
- Hip Flex/Ext
- Knee Extension
- Hamstring curls
- Standing toe calf raises
- Step down
- Lateral step ups
- Lateral lunges
- Romanian Dead Lifts
- Plyometric leg press
- Bridges
- Neuromuscular training
- Lateral step-overs cones
- Tilt board drills
- May initiate lateral agility drills
- Backward running
- Spin bike
- Cybex training

Proprioception/Plyometric
- Pre-running exercises (low skips, punch steps, double punch steps, hurdle walks, high skips, kickbacks, step-overs)
- Advance proprioceptive exercises (BOSU, single leg dynamic balance, dual task balance)
- Agility drills (ladder, side shuffles, crossovers, backwards run, quick start/stops, zig-zags, cutting)
- Jump training (shuttle training, trampoline, landing technique, box jumps, single leg hops, tuck jumps)
- Return to running – treadmill, with transition to level outdoor surfaces

Endurance/Sport Specific
- Initiate running program (weeks 12) (Physician Decision) with brace
- May initiate light sport program (golf) (Surgeon Decision) with brace
- Swimming – no breast stroke or “Frog kick”

Phase IV
Weeks 24+
- Continue strengthening exercises
- Continue neuromuscular control drills
- Continue plyometrics drills
- Progress running and agility program
- Gradually progress level of participation in sport specific training
- Running/cutting/agility drills
- Gradual return to sport drills
- Running on all surfaces