ACLR AND MCL REPAIR CLINICAL PRACTICE GUIDELINE

·Overview

- Progression is time and criterion-based, depending on soft tissue healing, patient demographics, and clinician evaluation.
- For questions, contact Dr. Sujan Gogu's clinic.

Injury Context

ACL Reconstruction and MCL Repair typically follow knee injuries, whether from contact or non-contact incidents, resulting in complete tears of both the ACL and MCL. These injuries often involve the medial meniscus as well.

Surgical Approach

Surgery involves arthroscopic reconstruction of the torn ACL using either an allograft (from a donor) or autograft (from the patient's own tissue). The MCL is repaired at the site of the tear, which could be distally (near the tibia insertion), in the middle, or proximally (near the femur origin).

Recovery Path

Post-surgery, the progression of range of motion depends on the location of the MCL tear. Long-term goals include achieving full range of motion and returning to pre-injury levels of function.

Return to Sports

Athletes typically resume sports activities within 8-12 months post-surgery, varying based on individual comorbidities and the demands of the sport.

Precautions

Ligament Testing	*Before 12 weeks post-surgery*: Avoid testing repaired or reconstructed ligaments (Lachman, Anterior/Posterior Drawer,

	Varus/Valgus Stress)
Hamstring Exercises	*For 8 weeks:* Refrain from isotonic resisted hamstring exercises with hamstring autograft.
Knee Extension	*For 8 weeks:* Avoid loaded open kinetic chain knee extension beyond 45 degrees
Meniscus Repair	1. *For 8 weeks:* No weight-bearing therapeutic exercise beyond 90 degrees. 2. *For 4 weeks:* Partial weight-bearing. 3. *For 4 weeks:* Avoid forced flexion beyond 90 degrees.

Weight Bearing Guidelines	
0-2 weeks	Non-weight bearing (NWB) with brace locked in extension
2-4 weeks	Toe-touch weight bearing (TTWB) with brace locked in extension
4-6 weeks	Weight bearing as tolerated (WBAT) with brace locked in extension
6 weeks onwards	WBAT with brace unlocked, gradually weaning off the brace

MCL Lesion Site Considerations	
Distal Tear	• **Weeks 0-2:** Limit knee flexion ROM to 0-30°. • **Weeks 2-4:** Increase knee flexion ROM to 0-60°. • **Weeks 4-6:** Further increase knee flexion ROM to 0-90°. • **Weeks 6 and beyond:** Flexion ROM as tolerated to prevent long-term valgus laxity.
Proximal or Mid-substance Tear	Accelerate knee flexion ROM to prevent scar formation and maintain functional ROM.

Outcome Measures

Collect at least one of the following at initial evaluation, every 6 weeks, and discharge:

- KDC (International Knee Documentation Committee)
- KOOS (Knee injury and Osteoarthritis Outcome Score)
- ACL-RSI (ACL-Return to Sport after Injury scale)
- Tegner Activity Scale

·Strength Testing

1. **Isometric Testing**
   Anytime after week 8, fixed at 90º knee flexion

2. **Isokinetic Testing**
   No earlier than 12 weeks post-surgery.

Criteria to Discharge Assistive Device

ROM: Achieve full active knee extension without pain on passive overpressure.

Strength: Perform strong quad isometric contraction with full tetany and superior patellar glide. Also, able to perform 20 straight leg raises (SLR) without quadriceps lag.

Effusion: Preferably 1+ or less. Acceptable up to 2+ if all other criteria are met.

Weight Bearing: Demonstrate pain-free ambulation without visible gait deviation.

Criteria to Discharge NMES (Neuromuscular Electrical Stimulation)

- Less than 20% quadriceps deficit on isometric or isokinetic testing, or alternatively:

1. Perform 20 SLR without quad lag.
2. Demonstrate normal gait.
3. Execute 10 heel taps to 60 degrees with good quality.
4. Achieve 10-rep max on leg press and similar bilateral efforts.
5. Show inability to break quad manual muscle testing (MMT).

Criteria to Initiate Running and Jumping

ROM	Full, pain-free knee range of motion symmetrical with the uninvolved limb
Strength	Demonstrate at least 80% strength in hamstrings and quadriceps through isokinetic testing at both 60º/sec and 300º/sec
Effusion	Ideally maintain swelling at 1+ or less
Weight Bearing	Demonstrate normalized gait and jogging mechanics
Neuromuscular Control	Perform pain-free hopping in place without dynamic knee valgus (knee collapsing inward)..

Criteria for Return to Sports

ROM	Full, pain-free knee range of motion symmetrical with the uninvolved limb
Strength	Demonstrate at least 90% strength in hamstrings and quadriceps through isokinetic testing at both 60º/sec and 300º/sec
Effusion	No reactive effusion ≥ 1+ during sport-specific activities
Weight Bearing	Demonstrate normalized gait and jogging mechanics
Neuromuscular Control	Demonstrate proper mechanics and effective strategies for absorbing forces during high-level agility drills, plyometric

	exercises, and high-impact activities
Functional Hop Testing	Achieve limb symmetry index (LSI) of 90% or greater for all hop tests
Physician Clearance	Obtain clearance from a physician specializing in sports medicine or orthopedics.

Early Post-Operative Phase (0-4 weeks)

Appointments	• **Post-operative evaluation:** Within 3-5 days. • **Follow-up PT appointments:** 1-2 times per week based on progress.
Precautions	1. **Avoid testing repaired ligaments:** (Lachman, Anterior Drawer, Valgus Stress) until 12 weeks post-surgery. 2. **Avoid loaded open kinetic chain knee extension exercises:** For 8 weeks. 3. **Weight-bearing:** ● Non-weight-bearing (NWB) for 0-2 weeks with brace locked in extension. ● Toe-touch weight-bearing (TTWB) for weeks 2-4 with brace locked in extension.
Pain and Effusion	**1. Goal:** Maintain effusion ≤ 2+ (using Modified Stroke Test). **2. Utilize cryotherapy and compression:** As needed.
Range of Motion (ROM)	1. **Achieve full knee extension:** Immediately post-surgery. 2. **Flexion guidelines vary based on MCL lesion location:** ● **Distal MCL lesion:** 0-30° flexion PROM/AAROM weeks 0-2, 0-60° weeks 2-4. ● **Meniscal repairs:** Avoid forced flexion beyond 90º.

Therapeutic Exercise	**1. Quad activation:** Focus on activating the quadriceps without engaging the glutes. **2. Patellar mobility:** Restore and ensure symmetrical extension range of motion (ROM). **3. Effusion reduction:** Use controlled exercises to minimize swelling.
Suggested Interventions	1. **Extension PROM:** Use bag hangs or prone hangs to improve extension. 2. **Flexion PROM/AAROM:** Perform heel slides or wall slides with a slight varus position. 3. **Stationary bike:** Start with bike exercises, gradually increasing the range of motion. 4. **Patellar mobilization:** Address all aspects: superior, inferior, medial, and lateral. 5. **Quad Isometrics and SLR exercises:** Do these with a brace until there's no extensor lag. **6. Balance and hip exercises:** Practice single-leg balance with the non-involved leg and multidirectional hip exercises for the involved leg (e.g., Reverse Steamboats). **7. Neuromuscular Re-education (NMES):** Start once 60º knee flexion is achieved.
NMES Parameters at 60º	1. **Setup:** Place pads on proximal and distal quadriceps. **2. Positioning:** Position the patient with the knee at 60º flexion for optimal stimulation. **3. Sessions:** Follow specific timing and intensity guidelines to enhance muscle activation.

Criteria to Progress to Middle Phase of Rehab

1. **ROM:** Achieve at least 0-90 degrees, with a focus on full knee extension.

2. **Strength:** Show normal superior patellar translation and perform 20 straight leg raises (SLR) without extensor lag.
3. **Effusion:** Maintain swelling at 2+ or less using the Modified Stroke Test.

Middle Phase of Rehabilitation (4-12 weeks)	
Appointments	• **Frequency**: Aim for 1-2 visits per week, focusing on strength and ROM training. Ensure compliance with Home Exercise Program (HEP) 2-4 days per week.
Precautions	• Avoid dynamic knee valgus: Maintain proper alignment during all activities, including warm-ups and endurance exercises. • Open Chain Knee Extension: • Start with submaximal leg extensions (90-45 degrees). • Begin knee Active Range of Motion (AROM) from 90-0 degrees, adjusting for pain. • Hamstring Strengthening: Avoid isolated resisted hamstring exercises until 8 weeks if using a hamstring autograft. • Weight Bearing: • 0-6 weeks: Weight-Bearing As Tolerated (WBAT) with the brace locked in extension initially, then unlocked from 6 weeks, gradually weaning from the brace.
Pain and Effusion	• Manage Effusion: Use cryotherapy and compression as needed. • Patellar Taping: Consider for patellofemoral symptoms if present.
Range of Motion (ROM)	• Distal MCL Lesions: • Weeks 4-6: Progress knee flexion ROM to 0-90 degrees. • Weeks 6+: Increase flexion ROM as tolerated. • Monitor and Advance: Continue to improve knee ROM,

	patellar mobility, and lower extremity flexibility. • Progress Exercises: Move from Active Assisted Range of Motion (AAROM) to AROM exercises. • Stationary Bike: Begin for ROM and warm-up, maintaining a slight varus knee position for distal MCL lesions.
Suggested Interventions and Timelines	• Multi-Angle Knee Isometrics: Use (60-90°) if high-intensity NMES is not tolerated. • Open-Chain Knee Extension: • Start with unweighted full range leg extensions. • Progress to protected range isotonic exercises. • Weight-Bearing Strengthening: • Include lunges, shuttle exercises, steamboats, side-stepping, leg press, and step-up/down. • Emphasize proper lower extremity mechanics and avoid knee valgus. • Gluteal and Lumbopelvic Strength: Progress exercises targeting these areas. • Single-Leg Balance and Proprioception: Enhance through specific exercises. • Endurance Activities: • Start biking at week 6. • Introduce treadmill walking, stepper, and elliptical by week 8. • Partial Weight-Bearing (PWB) Plyometrics: Begin on a shuttle by weeks 8-10, referring to criteria for full weight-bearing plyometrics.
Criteria to Discharge NMES	• **Discharge Criteria**: Achieve less than 20% quadriceps deficit on isometric or isokinetic testing, or meet specific functional test criteria if equipment is unavailable.

Criteria to Progress to Late Phase of Rehab:

· **Range of Motion (ROM):** Full, pain-free AROM with patellofemoral mobility.
· **Effusion:** Swelling ≤ 1+.
· **Strength:** At least 80% strength in quadriceps and hamstrings.
· **Weight Bearing:** Tolerate therapeutic exercises, including PWB plyometrics, without increased pain or swelling.
· **Neuromuscular Control:** Proper lower extremity mechanics in all exercises.
· **Outcome Tools:** Score ≥ 7/10 on the IKDC Questionnaire.

Late Phase of Rehabilitation (Weeks 12-Return to Sport)

Appointments	**Frequency:** Increase to 1-2 times per week as appropriate for initiating plyometric training and returning to running
Criteria to Initiate Running and Jumping	1. **Range of Motion (ROM):** Full, pain-free knee ROM, symmetrical with the uninvolved limb. 2. **Strength:** Achieve 80% or greater strength in hamstrings and quadriceps via isokinetic testing at 60º/sec and 300º/sec. 3. **Effusion:** Swelling ≤ 1+ and/or non-reactive effusion. 4. **Weight Bearing:** Normalized gait and jogging mechanics. 5. **Neuromuscular Control:** Ability to perform pain-free hopping in place
Pain and Effusion	**Monitor and Manage:** Ensure effusion remains ≤ 1+ and non-reactive for progression to plyometrics.
ROM	**Ensure Full and Symmetrical ROM:** Comparable to the contralateral limb, with pain-free overpressure.
Therapeutic Exercise	• **Dynamic Stability:** Focus on quadriceps, hamstrings, and trunk stability. • **Plyometrics:** Implement muscle power generation and absorption. • **Sport-Specific Activities:** Introduce activities specific to the sport and position. • **Agility Exercises:** Begin at 50-75% effort, using visual

	feedback for mechanical improvements. • **Advanced Plyometrics:** Progress from bilateral to single-leg, vary surfaces, and add challenges like ball toss and 3D rotations
Suggested Interventions	1. **Therapeutic Exercise/Neuromuscular Re-education:** ● Include squats, leg extensions, leg curls, leg presses, deadlifts, multi-directional lunges, rotational trunk exercises on various surfaces, resisted side steps, monster walks, and partial to full weight-bearing jumping exercises. ● Incorporate single-leg squats on BOSU, single-leg BOSU balance with manual perturbations or a ball, and single-leg BOSU Romanian deadlifts. 2. **Agility Drills:** ● Practice side shuffling, carioca, figure 8 drills, zig-zags, resisted jogging (with a Sport Cord) in straight planes, backpedaling, and ladder drills. 3. **Plyometrics:** • Include single-leg hop downs from increasing heights (up to 12” box), single-leg hop-holds, double and single-leg hopping onto unstable surfaces, double and single-leg jump-turns, and repeated tuck jumps.

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Criteria for Return to Sport:

1. ROM: Full, pain-free knee ROM, symmetrical with the uninvolved limb.

2. Strength: Isokinetic testing 90% or greater for hamstring and quadriceps at 60º/sec and 300º/sec.

3. Effusion: No reactive effusion and ≤ 1+ with sport-specific activity.

4. Weight Bearing: Normalized gait and jogging mechanics.

5. Neuromuscular Control: Demonstrate appropriate mechanics and force attenuation strategies during high-level agility, plyometrics, and high-impact movements.

6. Functional Hop Testing: Achieve Limb Symmetry Index (LSI) 90% or greater for all hop tests.

7. Physician Clearance: Obtain clearance from a physician before returning to full sport participation.