

ACL CLINICAL PRACTICE GUIDELINE

Progression is time and criterion-based, dependent on soft tissue healing, patient demographics, and clinician evaluation. Contact Ohio State Sports Medicine Physical Therapy at 614-293-2385 if questions arise.

Summary of Recommendations

Precautions	<ol style="list-style-type: none"> 1. No testing of repaired or reconstructed ligaments (Lachman, Anterior/Posterior Drawer, Varus/Valgus Stress) prior to 12 WEEKS 2. No isotonic resisted hamstring exercises for 8 weeks with hamstring autograft 3. No loaded open kinetic chain knee extension beyond 45 degrees for 8 WEEKS 4. Meniscus Repair: <ol style="list-style-type: none"> a. No weight-bearing (WB) therapeutic exercise >90° x 8 WEEKS b. PWB x4 WEEKS c. No forced flexion beyond 90° x4 WEEKS
Outcome Tools	<p>Collect at least one of the following at initial evaluation, monthly and discharge. Be consistent with which outcome tool is collected each time.</p> <ol style="list-style-type: none"> 1. IKDC 2. KOOS 3. ACL-RSI 4. Tegner
Strength Testing	<ol style="list-style-type: none"> 1. Isometric testing anytime- fixed at 90° 2. Isokinetic testing no earlier than 12 weeks
Criteria to Discharge Assistive Device	<ol style="list-style-type: none"> 1. <u>ROM</u>: Full active knee extension; no pain on passive overpressure 2. <u>Strength</u>: Able to perform strong quad isometric with full tetany and superior patellar glide and able to perform 2x10 SLR without quad lag 3. <u>Effusion</u>: 1+ or less is preferred (2+ acceptable if all other criteria are met) 4. <u>Weight Bearing</u>: Demonstrates pain-free ambulation without visible gait deviation
Criteria to Initiate Running and Jumping	<ol style="list-style-type: none"> 1. <u>ROM</u>: full, pain-free knee ROM, symmetrical with the uninvolved limb 2. <u>Strength</u>: Isokinetic testing 80% or greater for hamstring and quad at 60°/sec and 300°/sec 3. <u>Effusion</u>: 1+ or less 4. <u>Weight Bearing</u>: normalized gait and jogging mechanics 5. <u>Neuromuscular Control</u>: Pain-free hopping in place
Criteria for Return to Sport	<ol style="list-style-type: none"> 1. <u>ROM</u>: full, painfree knee ROM, symmetrical with the uninvolved limb 2. <u>Strength</u>: Isokinetic testing 90% or greater for hamstring and quad at 60°/sec and 300°/sec 3. <u>Effusion</u>: No reactive effusion ≥ 1+ with sport-specific activity 4. <u>Weight Bearing</u>: normalized gait and jogging mechanics 5. <u>Neuromuscular control</u>: appropriate mechanics and force attenuation strategies with high level agility, plyometrics, and high impact movements 6. <u>Functional Hop Testing</u>: LSI 90% or greater for all tests 7. <u>Physician Clearance</u>



Early Post-Operative Phase (Post-ACLR – 4 weeks)

Appointments	Post-operative evaluation should be performed 3-5 days following surgery. Follow-up appointments 1-2x per week, depending on progression towards goals.
Precautions	<ol style="list-style-type: none"> 1. No testing of repaired or reconstructed ligaments (Lachman, Anterior/Posterior Drawer, Varus/Valgus Stress) prior to 12 WEEKS 2. No loaded open kinetic chain knee extension for 8 WEEKS 3. Meniscus Repair: <ol style="list-style-type: none"> a. No weight-bearing (WB) therapeutic exercise >90° x 8 WEEKS b. PWB x4 WEEKS c. No forced flexion beyond 90° x4 WEEKS
Pain and Effusion	<p>≥ 2+ (using Modified Stroke Test)</p> <p>Cryotherapy and compression (ie. Donut, ace wrap, limited WB therapeutic exercise)</p>
ROM	<p>Extension: Emphasis on achieving full knee extension immediately following surgery. If full extension is not achieved by 4 weeks, contact surgeon regarding ROM concerns.</p> <p>Flexion: No forced flexion past 90° for meniscus repairs. ACLR and meniscectomy are able to push for symmetrical flexion as appropriate.</p>
Therapeutic Exercise	<ul style="list-style-type: none"> • Emphasis on quad activation without gluteal co-contraction • Restore patellar mobility • Symmetrical ROM • Decrease effusion • Ambulation with appropriate joint loading and without obvious gait deviation
Suggested Interventions	<ul style="list-style-type: none"> • Extension ROM: bag hangs or prone hangs • Flexion ROM: heel slides, wall slides, upright bike • Patellar mobilization: superior, inferior, medial, lateral • Quad Isometrics; SLR 4-way • TKE: prone and standing • LAQ • Weight shifting, SL balance • Neuromuscular re-education using electrical stimulation (NMES) at 60° knee flexion
NMES Parameters	<ul style="list-style-type: none"> • NMES pads are placed on the proximal and distal quadriceps • Patient: Seated with the knee in at least 60° flexion, shank secured with strap and back support with thigh strap preferred. The ankle pad/belt should be two finger widths superior to the lateral malleoli • The patient is instructed to relax while the e-stim generates at least 50% of their max volitional contraction against a fixed resistance OR maximal tolerable amperage without knee joint pain • 10-20 seconds on/ 50 seconds off x 15 min
Criteria to Discharge Assistive Device	<ol style="list-style-type: none"> 1. ROM: Full active knee extension; no pain on passive overpressure 2. Strength: Able to perform strong quad isometric with full tetany and superior patellar glide and able to perform 2x10 SLR without quad lag 3. Effusion: 1+ or less is preferred (2+ acceptable if all other criteria are met) 4. Weight Bearing: Demonstrates pain-free ambulation without visible gait deviation
Criteria to Progress to Middle Phase of Rehab	<p>ROM: ≥ 0-120 degrees</p> <p>Strength: Quadriceps set with normal superior patellar translation, SLR x 10 seconds without extensor lag</p> <p>Goals: (These do not limit progression to next phase; however, should be addressed with interventions)</p> <p>Effusion: 2+ or less with Modified stroke test</p> <p>Weight Bearing: Able to tolerate CKC therex program without increased pain and ≥ 2+ effusion</p>

Middle Phase of Rehabilitation (4-12 weeks)

Appointments	Goal to increase lower extremity strength. 1-2 visits per week with emphasis on patient compliance with resistance training as part of HEP (2-3 days per week outside of therapy).
Precautions	Open Chain knee extension: <ul style="list-style-type: none"> • Initiate submaximal leg extension 90-45 degrees • Initiate active knee ROM 90-0 degrees (modify if painful) No isolated resisted hamstrings strengthening until 8 weeks
Pain and Effusion	Cryotherapy/compression as needed for reactive effusion. Patellar taping to reduce PF symptoms if present
ROM	<ul style="list-style-type: none"> • Monitor and progress knee ROM, patellar mobility, and LE flexibility • Begin more aggressive techniques to achieve/maintain full knee extension (i.e. weighted bag hang) as needed • Continue bike for ROM and warm up • If full AROM knee extension is not achieved by 4 weeks, contact surgeon regarding ROM concerns.
Suggested Interventions and timelines	<ul style="list-style-type: none"> • Multi-angle knee isometrics from 60-90° for patients unable to tolerate high-intensity NMES • Initiate open chain knee extension exercises <ul style="list-style-type: none"> ○ Unweighted full range LAQ ○ Protected range with isotonic progression • Progress WB quadriceps and hamstring exercises with emphasis on proper LE mechanics (no isolated HS strengthening until 8 weeks) • Progress gluteal and lumbopelvic strength and stability • Progress single leg balance • Endurance: low impact - treadmill walking, stepper, elliptical (6 weeks) • Initiate PWB plyometrics on shuttle (8-10 weeks, see precautions to begin full WB plyometrics) • NMES (see parameters in week 1-4)
Criteria to d/c NMES	<ul style="list-style-type: none"> • <20% quadriceps deficit on isometric or isokinetic testing OR- If a Biodex machine is not available: <ol style="list-style-type: none"> 1. 10 SLR without quad lag 2. Normal gait 3. 10 heel taps to to 60 degrees with good quality 4. 10 rep max on LP and similar effort bilaterally 5. Inability to break quad MMT
Criteria to initiate Running and Jumping	<ol style="list-style-type: none"> 1. <u>ROM</u>: full, pain-free knee ROM, symmetrical with the uninvolved limb 2. <u>Strength</u>: Isokinetic testing 80% or greater for hamstring and quad at 60°/sec and 300°/sec 3. <u>Effusion</u>: 1+ or less 4. <u>Weight Bearing</u>: normalized gait and jogging mechanics 5. <u>Neuromuscular Control</u>: Pain-free hopping in place
Criteria to Progress to Late Phase of Rehab	<ol style="list-style-type: none"> 1. <u>ROM</u>: Maintain full, pain free AROM including PF mobility 2. <u>Effusion</u>: 1+ or less 3. <u>Strength</u>: Isometric or isokinetic quadriceps and hamstrings strength \geq 80% 4. <u>Weight Bearing</u>: Able to tolerate therapeutic exercise program, including jogging progression, without increased pain or >1+ effusion 5. <u>Neuromuscular Control</u>: Demonstrates proper lower extremity mechanics with all therapeutic exercises (bilaterally) 6. <u>Outcome Tools</u>: \geq7/10 on #10 IKDC Questionnaire



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

Appointments	Increased frequency from previous stage to 1-2x per week when appropriate to initiate plyometric training and return to running program.
Precautions	<p>Criteria to initiate hopping</p> <ul style="list-style-type: none"> • Full, pain free ROM • ≤ 1+ effusion • ≥ 7 /10 on #10 IKDC Questionnaire (Appendix A) • ≥ 80% isometric strength symmetry (hamstrings and quadriceps) OR 20 heel touches on 8 inch step with good mechanics <p>Criteria to initiate jogging (in addition to above criteria)</p> <ul style="list-style-type: none"> • Hop downs with appropriate landing mechanics • Audible rhythmic strike patterns and no gross visual compensation
Pain and Effusion	Effusion may increase with increased activity, ≤1+ and/or non-reactive effusion for progression of plyometrics
ROM	Full, symmetrical to contralateral limb, and painfree with overpressure
Therapeutic Exercise	<ul style="list-style-type: none"> • Performance of the quadriceps, hamstrings and trunk dynamic stability • Muscle power generation and absorption via plyometrics • Sport- and position-specific activities • Begin agility exercises between 50-75% effort (utilize visual feedback to improve mechanics as needed) • Advance plyometrics: Bilateral to single leg, progress by altering surfaces, adding ball toss, 3D rotations, etc.
Suggested Interventions	<p>Therapeutic Exercise/Neuromuscular Re-education</p> <ul style="list-style-type: none"> • Squats, leg extension, leg curl, leg press, deadlifts, lunges (multi-direction), crunches, rotational trunk exercises on static and dynamic surfaces, monster walks, PWB to FWB jumping • Single-leg squats on BOSU with manual perturbation to trunk or legs, Single-leg BOSU balance, single-leg BOSU Romanian deadlift <p>Agility</p> <ul style="list-style-type: none"> • Side shuffling, Carioca, Figure 8, Zig-zags, Resisted jogging (Sports Cord) in straight planes, backpedaling <p>Plyometrics</p> <ul style="list-style-type: none"> • Single-leg hop downs from increasing height (up to 12" box), Single-leg hop-holds, Double and single-leg hopping onto unstable surface, Double and single-leg jump-turns, Repeated tuck jumps
Criteria for Return to Sport	<ol style="list-style-type: none"> 1. <u>ROM</u>: full, pain free knee ROM, symmetrical with the uninvolved limb 2. <u>Strength</u>: Isokinetic testing 90% or greater for hamstring and quad at 60°/sec and 300°/sec 3. <u>Effusion</u>: No reactive effusion ≥ 1+ with sport-specific activity 4. <u>Weight Bearing</u>: normalized gait and jogging mechanics 5. <u>Neuromuscular control</u>: appropriate mechanics and force attenuation strategies with high level agility, plyometrics, and high impact movements 6. <u>Functional Hop Testing</u>: LSI 90% or greater for all tests 7. <u>Physician Clearance</u>