7858 Shrader Road
Richmond, Virginia 23294
Anterior Cruciate Ligament (ACL)
Reconstruction Guidelines

Anterior Cruciate Ligament Reconstruction Guidelines

The following guidelines are for criteria-based and patient specific progression. Phases and
time frames are designed to give the clinician a general sense of progression. Progression through the
phases may vary in individuals with concomitant injuries/procedures such as graft choice, donor site, chondral injury, meniscal injury, and ligament injury.

See Appendix for guidelines for concomitant surgeries.

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Acute Care: Day of Surgery

PRECAUTIONS	▪ Avoid prolonged sitting, standing, and walking ▪ Begin 20% Flat-Foot Partial Weight Bearing with crutches ▪ Avoid advancing weight bearing (WB) too quickly which may prolong recovery ▪ Avoid pain with walking and exercises ▪ Avoid painful activities ▪ Avoid putting heat on knee ▪ Avoid weightbearing without brace ▪ Avoid ambulating without crutches ▪ Do not put a pillow under the operated knee- keep extended when resting and sleeping
TREATMENT RECOMMENDATIONS	▪ Transfer training ▪ Gait training WBAT with assistive device on level surfaces and stairs ▪ Patient education: • Edema management • Activity modification • Brace management

	▪ Initiate and emphasize importance of HEP • Quadriceps sets, gluteal sets, ankle pumps ▪ Seated knee AAROM ▪ Straight leg raise with brace locked in extension, if able ▪ Passive knee extension with towel roll under heel
EMPHASIZE	▪ Control swelling ▪ Quadriceps contraction ▪ Independent transfers ▪ Gait training with appropriate assistive device ▪ P/AAROM (focus on extension) ▪ Appropriate balance of activity and rest
MINIMUM CRITERIA FOR DISCHARGE	▪ Independent ambulation with appropriate assistive device on level surfaces and stairs ▪ Independent brace management ▪ Independent with transfers ▪ Independent with HEP

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POST-OPERATIVE PHASE I: WEEKS 0-2

GOALS	▪ Full passive extension ▪ Minimum of 90° knee flexion ▪ Normalize patella mobility ▪ Progressive weight bearing to WBAT ▪ Control post-operative pain / swelling ▪ Prevent quadriceps inhibition ▪ Promote independence in home therapeutic exercise program
PRECAUTIONS	▪ Avoid active knee extension 40 → 0° ▪ Avoid ambulation without brace locked at 0° ▪ Avoid heat application ▪ Avoid prolonged standing/walking ▪ Avoid ambulation without crutches ▪ Do not put a pillow under the operated knee for comfort when elevating extremity

TREATMENT RECOMMENDATIONS	▪ Begin 20% Flat-Foot Partial Weight Bearing, Progress to Weight Bearing as Tolerated by Week 1 ▪ Passive knee extension with towel under the heel ▪ Quadriceps Re-education: Quadriceps sets with towel under knee with Neuromuscular Electric Stimulation or Biofeedback ▪ Patellar Mobilization ▪ Active ROM knee flexion to tolerance, Active Assist knee extension to 0° ▪ Hip progressive resisted exercises ▪ Calf Strengthening ▪ Bilateral Leg Press in 5 – 80° arc (requires knee flexion >90°), ▪ Proprioception/Balance Training (requires bilateral weight bearing) ▪ Short (90mm) Crank Stational Bicycle (requires knee flexion > 85°) ▪ SLR all planes with brace (progress to without brace) ▪ Cryotherapy for pain and edema

	▪ Upper Extremity Ergometry, as tolerated
EMPHASIZE	▪ Patellar Mobility ▪ Full PROM Knee Extension ▪ Improving Quadriceps Contraction ▪ Controlling pain and effusion ▪ Compliance with HEP and Precautions
MINIMUM CRITERIA FOR ADVANCEMENT TO NEXT PHASE	▪ Able to SLR without quadriceps lag or pain ▪ 0° knee extension, minimum of 90° knee flexion ▪ Able to demonstrate unilateral (involved extremity) weight bearing without pain ▪ Pain and Swelling Controlled

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POST-OPERATIVE PHASE II: WEEK 3-6

GOALS	▪ ROM 0° - 130°, progressing to full ROM ▪ Good Patella Mobility ▪ Minimal Swelling ▪ Restore Normal Gait (non-antalgic) without Assistive Device ▪ Ascend 8" stairs with Good Control, without Pain
PRECAUTIONS	▪ Avoid descending stairs reciprocally until adequate quadriceps control & lower extremity alignment ▪ Avoid pain with therapeutic exercise & functional activities
TREATMENT RECOMMENDATIONS	▪ Continue Phase I Activities ▪ AROM knee flexion to tolerance ▪ Progression from seated to standing (wall slides) ▪ AAROM knee extension to 0° ▪ Straight leg raises (SLR) PRE's in all planes ▪ With brace locked at 0° in supine until no extension lag demonstrated

TREATMENT RECOMMENDATIONS (CONT.)	▪ Leg press bilaterally in 80°-5° arc if knee flexion ROM > 90° (Progression from bilaterally to 2 up/1 down, to unilateral) ▪ Mini squats progressing to 0°-60°, initiating movement with hips ▪ Forward step-up progression starting with 2″-4″ ▪ Terminal knee extension in weight bearing ▪ Consider blood flow restriction (BFR) program with FDA approved device if patient cleared by surgeon and qualified therapist available ▪ Hip-gluteal progressive resistive exercises ▪ May introduce Romanian Dead Lift (RDL) toward end of phase ▪ Hamstring strengthening (unless hamstring autograft) ▪ Calf strengthening (Progression from bilateral to unilateral calf raises) ▪ Flexibility exercises

TREATMENT RECOMMENDATIONS (CONT.)	▪ Proprioception board/balance system (Progression from bilateral to unilateral weight bearing) ▪ Once single leg stance achieved with good alignment and control, progress from stable to unstable surfaces ▪ Standard crank stationary bicycle for ROM and/or cycling (requires 115° knee flexion) ▪ Upper extremity ergometry, as tolerated ▪ Gait training WBAT ▪ Edema management, e.g. cryotherapy (no submersion until cleared by surgeon), elevation, gentle edema mobilization avoiding incision ▪ Progressive home exercise program ▪ Patient education regarding monitoring of response to increase in activity level and weightbearing
EMPHASIZE	▪ Knee ROM ▪ Patella mobility ▪ Quadriceps contraction ▪ Normalizing gait pattern

	▪ Activity level to match response and ability
MINIMUM CRITERIA FOR ADVANCEMENT TO NEXT PHASE	▪ ROM 0 - 130° ▪ Normal gait pattern ▪ Demonstrate ability to ascend 8″ step ▪ Good patella mobility

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POST-OPERATIVE PHASE III: WEEKS 7-12

GOALS	▪ Restore Full ROM ▪ Able to descend 8" stairs with good leg control & no pain ▪ Improve ADL endurance ▪ Improve lower extremity flexibility ▪ Protect patello-femoral joint
PRECAUTIONS	▪ Avoid pain with therapeutic exercise & functional activities ▪ Avoid running and sport activity until adequate strength development and MD clearance
TREATMENT RECOMMENDATIONS	▪ Continue Previous Phase Activities ▪ SLR Progressive Resistance Exercise (PRE) in all planes ▪ Isometric knee extension at 60° ▪ Open chain knee extension progression (At week 12 initiate PRE in limited arc 90°-40°) ▪ Leg press eccentrically

TREATMENT RECOMMENDATIONS (CONT.)	▪ Progress squats to 0°-90°, initiating movement with hips ▪ Continue forward step-up progression ▪ Initiate step-down progression starting with 2″-4″ ▪ Lateral Step-Ups, Crossovers and Lunges ▪ Continue foundational hip-gluteal progressive resistive exercises ▪ Continue hamstring and calf strengthening ▪ Core and UE strengthening ▪ Consider BFR program with FDA approved device if patient cleared by surgeon and qualified therapist available ▪ Proprioception training (Progress to perturbation training) ▪ Cardiovascular conditioning ▪ Stationary bicycle ▪ Elliptical when able to perform 6″ step-up with good form ▪ Gait training WBAT ▪ Cryotherapy

TREATMENT RECOMMENDATIONS (CONT.)	▪ Ice with passive knee extension with towel under heel as needed to maintain ROM ▪ Progressive home exercise program ▪ Patient education regarding monitoring of response to increase in activity level
EMPHASIZE	▪ Address impairments ▪ Functional movement ▪ Functional strength
MINIMUM CRITERIA FOR ADVANCEMENT TO NEXT PHASE	▪ Ability to perform 8" step-down with good control and alignment without pain ▪ Full symmetrical knee ROM ▪ Symmetrical squat to parallel ▪ Single leg bridge holding for 30 seconds ▪ Balance testing (e.g. Star Excursion Test, Biodex Balance System™) ▪ Quadriceps isometrics 70% of contralateral lower extremity (tested with dynamometer at 60° at 12 weeks)

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POST-OPERATIVE PHASE IV: WEEKS 13-26

GOALS	▪ Demonstrate ability to run pain free ▪ Maximize strength and flexibility as to meet demands of ADLS ▪ Hop Test > 75% limb symmetry
PRECAUTIONS	▪ Initiate return to running/sport only when cleared by physician ▪ Avoid pain with exercises and functional training ▪ Monitor tolerance to load, frequency, intensity and duration ▪ Avoid too much too soon
TREATMENT RECOMMENDATIONS	▪ Open chain knee extension progression ▪ At week 12 initiate PRE in limited arc 90°-40° (Progress to 90°-0° by end of phase IV) ▪ Progress leg press eccentrically ▪ Functional strengthening ▪ Progress squats to 0°-90°, initiating movement with hips

TREATMENT RECOMMENDATIONS (CONT.)	▪ Progress to single leg squats ▪ Forward step-up and step-down progression ▪ Progress lateral step-ups, crossovers and Progress lunges ▪ Initiate running progression (see appendix) ▪ Initiate plyometric progression (see appendix) ▪ Continue foundational hip-gluteal progressive resistive exercises ▪ Continue hamstring and calf strengthening ▪ Flexibility exercises and foam rolling ▪ Core and UE strengthening ▪ Consider BFR program with FDA approved device if patient cleared by surgeon and qualified therapist available ▪ Progress proprioception training (Incorporate agility and controlled sports-specific movements) ▪ Progress cardiovascular conditioning (Stationary Bike and Elliptical)

TREATMENT RECOMMENDATIONS (CONT.)	▪ Cryotherapy and/or compression therapy ▪ Progressive home exercise program ▪ Patient education regarding monitoring of response to increase in activity level
EMPHASIZE	▪ Return to normal functional activities
MINIMUM CRITERIA FOR ADVANCEMENT TO NEXT PHASE	▪ No swelling ▪ Normal neurovascular assessment ▪ Normal scar and patellar mobility ▪ Normal quadriceps contraction ▪ Full LE ROM, flexibility, and strength ▪ Quantitative assessments ≥ 85% of contralateral lower extremity (*Note that uninvolved side may be deconditioned; use pre-injury baseline or normative data for comparison if available)

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POST-OPERATIVE PHASE V: WEEK 27-Discharge

GOALS	▪ Lack of apprehension with sport specific movements ▪ Maximize strength and flexibility as to meet demands of individual's sport activity ▪ Hop Test > 85% limb symmetry
PRECAUTIONS	▪ Note importance of gradual return to participation with load and volume monitoring ▪ under guidance of physical therapist, MD, athletic trainer and coach ▪ Avoid premature or too rapid full return to sport
TREATMENT RECOMMENDATIONS	▪ Gradually increase volume and load to mimic load necessary for return to activity ▪ Progress movement patterns specific to patient's desired sport or activity ▪ Progression of agility work ▪ Increase cardiovascular load to match that of desired activity ▪ Collaborate with ATC, performance coach/strength and conditioning coach,

TREATMENT RECOMMENDATIONS (CONT.)	skills coach and/or personal trainer to monitor load and volume as return to participation ▪ Consult with referring MD on timing return to sport including any recommended ▪ limitations
EMPHASIZE	▪ Return to participation ▪ Collaboration with Sports Performance experts
MINIMUM CRITERIA FOR ADVANCEMENT TO NEXT PHASE	▪ Quantitative assessments ≥ 90% of contralateral lower extremity ▪ Movement patterns, functional strength, flexibility, motion, endurance, power, ▪ Deceleration and accuracy to meet demands of sport

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APPENDIX I: MODIFICATIONS FOR CONCOMITANT SURGERIES

ACLR with Osteochondral Allograft

Weight Bearing Guidelines as Follows:

- Weeks 0-2 PWB
- Weeks 3-4 WBAT
- Weeks 5-6 Progressive WBAT

ACLR with Meniscal Repair

- Restrict Knee Flexion past 100° until week 4, then progress as tolerated

ACLR with Radial or Root Repair

Weight Bearing Guidelines as Follows:

- Weeks 0-2 PWB
- Weeks 3-4 WBAT
- Weeks 5-6 progressive WBAT

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Appendix II: Phase 2 – Gait and Assistive Device

Begin ambulation WBAT with brace locked in full extension with assistive device at all times.

- Encourage slow progression of weight bearing to avoid increased symptoms.
- WBAT should consider pain, quadriceps control and edema both
- during gait and after.
- Any increase in symptoms should indicate a reduction of WB during gait or standing activities or decrease in overall volume of WB activities.

Beginning in phase 2 of rehab (week 3), patient may be evaluated for ambulation with unlocked brace.

- Brace may be unlocked for gait when full passive and active knee extension is achieved as demonstrated by a straight leg raise without quad lag for 15 repetitions.
- Brace should not be unlocked unless patient can demonstrate appropriate heel strike and quadriceps control during gait.
- May consider only partially unlocking brace (e.g. if patient has 95° flexion, consider unlocking brace to 90°).
- If flexion ROM deficits persist, brace may need to be unlocked to facilitate return to full ROM while decreasing weight bearing.

Brace will be d/c'ed at the discretion of the physician.

Wean from assistive device once symmetrical gait pattern, full extension and full WB during stance phase.

- Begin with no assistive device around home with progression complete discharge of assistive device.

Appendix III: Phase 4 – Example of Running Progression

Not to be initiated until MD clearance to begin Phase 4

Week	Run	Rest/Walk	Repetitions
1	30 seconds	30 seconds	3
2	1 minute	1 minute	3
3	2 minutes	1 minute	2
4	4 minutes	2 minutes	1
5	4 minutes	2 minutes	2
6	8 minutes	N/A	1

Appendix IV: Phase 4 – Example of Plyometric Progression

Not to be initiated until MD clearance to begin Phase 4

Week 1	Onto Box
Week 2	In place and Jumping Rope
Week 3	Drop Jumps
Week 4	Broad Jumps
Week 5	Side to side hops
Week 6	Hop to opposite