

ACL Rehab Guidelines

Patient _____

Date _____

Involved side ☐ L ☐ R

Isolated ACL Reconstruction (without meniscus repair or other ligamentous repair)

This protocol details general guidelines for ACL rehab with some key exercises/goals in each phase. It should not replace a clinician's professional judgment or assessment of individual patient needs. If you are an outside therapist and have questions, please contact us.

Wake Forest Baptist Health, CompRehab Plaza, Sports/Outpatient Physical Therapy Phone: (336) 716-8110

Clinic/Gym Exercise Program — PHASE I

Weeks 0–2 Post-Op · 2–3 x per week

Goals

- Work toward full knee extension
- Active Range of Motion Knee Flexion > 90 deg by 2 weeks
- Good quadriceps contraction

Warm up

Bike

Proprioception training

Double and Single Leg Balance

Avoid hyperextension. Avoid trunk/pelvis/LE compensations. Quads engaged. Static and Dynamic.

Gait training

Look for phases of gait

Good heel strike, loading, push-off. Full terminal knee extension without hyperextension

Weight Shifting

To facilitate progressive weight-bearing without compensation

Strength training

Quad Sets

Use biofeedback and/or NMES (Neuromuscular Electrical Stimulation)

Terminal Knee Extension

Focus on regaining good terminal knee extension. WB and NWB. Quad Sets. Prone quad sets. Standing TKE.

Proximal Strengthening

Sidelying/supine hip abd/add, prone hip ext, isometrics

Leg Press

<= 30deg knee flexion

Prone knee flexion

Active motion only, avoid pain. * Not with hamstring graft.

B Heel Raises

Straight Leg Raise

Assisted at first. Do not start until able to perform good quad set. May modify position (ie standing/sitting).

Mini Squats

0–30deg

Manual therapy

Patellar mobilizations

As needed

Stretching

Heel Slides

Active, Active Assisted, Passive

Others as needed

CLINICAL NOTES

Early emphasis should be on regaining full knee extension and improving quad contraction/quad control.

Brace locked in extension until patient demonstrated multiple SLR without quad lag, good control with weight-shifting exercises, and able to perform single leg stance for at least 5 sec.

No resisted hamstring strengthening or hamstring isometrics (with hamstring autograft).

No active or resisted OKC Knee Extension before week 2.

ACL Rehab Guidelines

Clinic/Gym Exercise Program — PHASE II

Weeks 2–4 Post-Op · 2–3 x per week

Goals

- Full passive knee extension
- Active Range of Motion Knee Flexion > 110 deg
- Good Straight Leg Raises (no quad/extensor lag)
- Good MINI Squat 0–45 deg without compensation or weight shift
- Walk without brace or crutches

Warm up

Bike

Proprioception / balance

Double and Single Leg Balance Avoid hyperextension. Avoid trunk/pelvis/LE compensations. Quads engaged. Static and Dynamic. Progress difficulty.

Gait training

Look for phases of gait Good heel strike, loading, push-off. Full terminal knee extension without hyperextension

Strength training

Regain full active TKE	Quad Sets w/ heel towel roll, SAQ, Stand TKE, prone quad sets, etc.
Squats	Shallow depth. May use unstable surface such as rocker board. Equal/symmetrical WB, good mechanics, good quad control. Mirror and cues. Avoid knee-forward posture.
Step Exercises	Avoid compensations (trunk/pelvis/LE). No more than 2–4 inches initially. Forward Step-Ups, Lateral Step-Ups
Proximal Strengthening	Sidelying/supine hip abd/add, prone hip ext, isometrics
Leg Press	Single Leg, Partial ROM
Seated Leg Extension	Start with AROM only; 30–40deg block (from full ext) with resistance
B Heel Raises	
Bridges	Look for pelvis symmetry/equal height
Hamstrings	Prone, Standing, Seated (no leg curl machine yet). Caution with resistance with Hamstring graft for first 6 weeks

Manual therapy

Scar / patella / soft tissue Gentle scar mobilization, patellar mobilization, soft tissue mobilization as indicated

Stretching

Knee Flexion / Heel Slides	Active, Active Assisted, Passive
Others as needed	

CLINICAL NOTES

A strong emphasis should be placed on quad control and looking for quad avoidance.
 Work on technique and avoiding trunk/pelvis/LE compensations.
 Caution with quadriceps strengthening and watch for anterior knee pain.
 NO knee flexion resistance with hamstring graft.
 Use modalities, including vasopneumatic compression, as indicated, to decrease edema and pain.

ACL Rehab Guidelines

Clinic/Gym Exercise Program — PHASE III

Weeks 5–8 Post-Op · 2–3 x per week

Goals

- Full Active Knee Extension
- Active Range of Motion Knee flexion <10% deficit vs. uninvolved
- Normal Gait Pattern with good terminal knee extension
- Able to perform > 6 inch step-up and >4 inch step down with good control, minimal/no pain

Warm up

Bike	
Elliptical, Stairmaster	Consider at 6–8 weeks post-op, start with low intensity/duration

Proprioception / balance

Double and Single Leg Balance	Avoid hyperextension, trunk/pelvis/LE compensations. Quads engaged. Static and Dynamic. Progress difficulty: Foam, BOSU, Minitramp, Rocker Board, etc.
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Gait training

Normalize gait pattern

Strength training

Squats	>= 45deg. May use unstable surface such as rocker board. Equal/symmetrical WB, good mechanics, good quad control. Mirror and cues.
Leg Press	Single Leg
Step Exercises	Forward Step-Ups, Lateral Step-Ups, Step Downs
Seated Leg Extension	30–40deg block (from full extension) with resistance
Hamstrings	Caution with resistance with Hamstring graft. Prone Leg Curls, Double Leg Swiss Ball Hamstrings
B Heel Raises	Emphasize progression of repetitions, emphasize high reps
Bridges	Single leg progression when LE and core control demonstrated
Lunges	Weeks 6–8. Start with partial range, stationary. Progress to walking.

Stretching

Knee Flexion / Heel Slides	Active, Active Assisted, Passive
Others	Quadriceps, Hamstrings, Calves, and Others as needed

CLINICAL NOTES

A strong emphasis should be placed on quad control and looking for quad avoidance.
 Work on technique and avoiding trunk/pelvis/LE compensations.
 Do not neglect working on good strength and control with terminal knee extension in weight bearing.
 With proper healing of incisions, may utilize aquatic therapy as indicated.
 Caution with quadriceps strengthening and watch for anterior knee pain.
 Caution with knee flexion resistance with hamstring graft.
 Use modalities, including vasopneumatic compression, as indicated, to decrease edema and pain.

ACL Rehab Guidelines

Clinic/Gym Exercise Program — PHASE IV

Weeks 9–12 Post-Op · 2–3 x per week

Goals

- Full Active Knee Extension
- Full active assisted knee flexion
- Quadriceps strength < 25–30% deficit vs. uninvolved
- Able to perform single leg squat, 10 reps, 40deg knee flex, with good biomechanics/balance

Warm up

Bike, Elliptical, Stairmaster	Increase duration/intensity to improve endurance. Encourage endurance training outside of the clinic: bike, elliptical, swimming, etc.
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Proprioception / balance

Double and Single Leg Balance	Avoid hyperextension, trunk/pelvis/LE compensations. Quads engaged. Static and Dynamic. Progress difficulty: Foam, BOSU, Minitramp, Rocker Board, etc.
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Gait training

Normalize gait pattern

Strength training

Squats	<= 100deg knee flex. May use unstable surface. Equal/symmetrical WB, good mechanics, good quad control.
Leg Press	Single Leg: 100–0 deg knee flexion
Step Exercises	Forward Step-Ups, Lateral Step-Ups, Step Downs
Seated Leg Extension	30–40 deg block (from full knee ext) with resistance
Hamstrings	Prone Leg Curls, Double Leg Swiss Ball Hamstrings
Single leg Heel Raises	Emphasize progression to high reps
Bridges	Single leg progression when LE and core control demonstrated
Lunges	Walking Lunges, Split Squats
Sidestepping with theraband	Avoid hip/pelvis compensations
Core and Proximal Strengthening	As indicated
Pre-Agility / Pre-Plyometric	No jumping. Small controlled movements. Drop lands: heel raise then quickly drop to squat. Progress to small 2-legged hops, then 6 in drop lands.

Biodex isokinetic training (if available)

Prerequisite	Tolerate pain-free isotonic prior to isokinetics
Workouts	Start with 180–300 deg/sec. 30 deg block until 12 wks.
Test	60, 180, 300 deg/sec at 12 wks

Stretching

Heel Slides	Active, Active Assisted, Passive
Others	Quadriceps, Hamstrings, Calves, and Others as needed
Prone child's pose	Prayer stretch / heel sit

CLINICAL NOTES

A strong emphasis should be placed on quad control and looking for quad avoidance.

Work on technique and avoiding trunk/pelvis/LE compensations.

With proper healing of incisions, may utilize aquatic therapy as indicated.

ACL Rehab Guidelines

Clinic/Gym Exercise Program — PHASE V: Pre-Sport Training

Months 4 to 6 post-op · 2–4 x / month

Goals

- Full Knee AROM
- Quadriceps and Hamstrings <15% deficit vs. uninjured with isokinetic test, especially 60deg/sec (or 10-rep max)
- Hop Tests < 15% deficit vs. uninjured
- Good control with sport specific drills, running, cutting, jumping
- Review expectations and correlate with patient status. 12–18 years old: 9–12 mo; 18+ years old: 6–12 mo.

Warm up

Bike, Elliptical, Stairmaster	Increase duration/intensity. Encourage endurance training outside of the clinic.
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Proprioception / balance

Higher level	Activity specific as indicated.
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Gait training

Normal gait pattern	
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Strength training

Continue as indicated	Full ROM resisted OKC knee extension as tolerated. May use eccentrics. Progress with activity / job / sport specific strengthening.
Home program	Do not stop strengthening when you start agility/sport specific drills. Emphasize home program.

Agility and plyometric training

Progression	Begin with slower, controlled movements. Good LE biomechanics and control of body weight over plant leg. Do not begin prematurely. Do not allow excess compensation. If unsure how to progress, ask the surgeon and/or an experienced PT.
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Biodex isokinetic training (if available)

Test	60, 180, 300 deg/sec
Goals	<15% deficit on involved knee. 66% hamstring/quadriceps ratio, peak torque, at 180 deg/sec

Functional testing · see Appendix A

Drills	Noyes Hop Tests, Drop Land on single leg, Cutting drills, Sport-specific drills
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Stretching

As indicated	
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CLINICAL NOTES

A very strong emphasis should be placed on a progressive, independent home program since the patient may be seen less frequently as this stage progresses. Jogging only after good, pain-free controlled CKC exercises, basic hopping drills, and isokinetic testing < 30% deficit vs. uninjured. Perform good single leg 6 in drop lands. Start with a walk/jog program.

Sport specific training should progress gradually and only with sufficient strength and control. Jumping should not begin until good control is demonstrated with step-ups, hopping drills, and drop lands from heel-raise position.

ACL Rehab Guidelines

Clinic/Gym Exercise Program — PHASE VI: Return to Sport

Months 6 to 12 post-op · 2–4 x / month

Goals

- Full Knee AROM
- Quadriceps and Hamstrings strength <10% deficit vs. uninvolved with isokinetic testing (or 10-rep max)
- Hop Tests < 10% deficit vs. uninvolved
- Good control with sport specific drills, running, cutting
- Review expectations and correlate with patient status; 12–18 years old: 9–12 mo, 18+ years old: 6–12 mo

Warm up

Bike, Elliptical, Stairmaster	Increase duration/intensity. Encourage endurance training outside of the clinic.
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Proprioception / balance

Higher level	Activity specific as indicated.
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Gait training

Normal gait pattern	
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Strength training

Do not neglect	Continue as indicated. Full ROM resisted OKC knee extension as tolerated. Progress with activity / job / sport specific strengthening.
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Agility and plyometric training

Progression	Begin with slower, controlled movements. Good LE biomechanics, alignment, and control of body weight over plant leg. Do not begin prematurely. Do not allow excess compensation.
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Biodex isokinetic training (if available)

Test	60, 180, 300 deg/sec
Goals	< 10% deficit at all speeds. 66% hamstring/quadriceps ratio, peak torque, at 180 deg/sec

Functional testing · see Appendix A

Drills	Noyes Hop Tests, Drop Land on single leg (good control 6–12 in), Cutting drills, Sport-specific drills
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Stretching

As indicated	
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CLINICAL NOTES

Phase VI Goals must be achieved for patient to receive clearance for return to sport.

A very strong emphasis should be placed on a progressive, independent home program since the patient may be seen less frequently as this stage progresses.

Isokinetic testing should show < 10% deficit vs. uninvolved side at all speeds, especially 60deg/sec.

Sport specific training should progress gradually and only with sufficient strength and control.

Specific focus on acceleration and deceleration drills for running.

ACL Rehab Guidelines

LOWER EXTREMITY TESTING — FINAL PHASE FUNCTIONAL GOALS

Single Leg Hop for distance

- Patient must stick the landing. Give 2 practice hops.
- Final score is average of 3 completed reps. No more than 6 attempts maximum.
- Measure in meters to 2 decimal places. Calculate LSI (leg symmetry index).

Timed 6 meter Hop

- Give patient 1 practice attempt on each leg at 75% speed.
- Final score is average of 3 reps. Calculate LSI (leg symmetry index).

Cross-over Triple Hop for distance

- Must stick landing on final hop and only single contact on initial 2 hops.
- Give patient 1 practice at 75% effort. Average of 3 completed reps. No more than 6 attempts.
- Measured in meters to 2 decimal places. Calculate LSI (leg symmetry index).

Timed Triple Lateral Hop Drill

- Give patient 1 practice attempt. Average of 3 completed reps. No more than 6 attempts.
- Calculate LSI (leg symmetry index).

Sport-specific hopping, jumping, and agility drills

- Observe and note: Symmetry; Quality of Movement (alignment and biomechanical control); Speed.

TESTING ORDER

If functional testing is performed on the same day as isokinetic testing, the isokinetic testing will be performed first.

This standardizes the procedure. Fatigue from isokinetic testing helps simulate fatigue the athlete will feel when jumping, running, and cutting.

ACL Rehab Guidelines

ISOKINETIC TESTING GUIDELINES

1. Warm-up on bike × 6 min

2. Perform warm-up exercises

Leg Press	Single leg, light to moderate weight, 1 set of 15 reps on each leg
Leg Extension	Single leg, light to moderate weight, 1 set of 15 reps on each leg
Leg Curls	Single leg, light to moderate weight, 1 set of 15 reps on each leg

3. Educate the patient

Educate patient on isokinetic test expectations, effort needed, and test protocol.

4. Perform isokinetic testing

- Uninvolved lower extremity tested first, followed by involved lower extremity
- Knee Extension/Flexion, Concentric/Concentric

60 deg/sec	5 reps, × 2
180 deg/sec	15 reps, × 1
300 deg/sec	25 reps, × 1

Set range of motion

- Extension: 30deg block until 12 wks post-op, then set to ~15deg block (“full”). Patient comfort/“full” active ext with positioning on machine.
- Flexion: usually 95–105deg, set to comfort with positioning on machine.
- ROM may be adjusted to avoid pain or for other reasons based on clinician's discretion.
- Allow a few practice reps at each speed to give them a feel for resistance and ROM.
- Be sure that patient uses the full range of motion on each leg.
- Give patient 30 sec rest time between each set.
- Keep test the same between legs (same rest time, same number of practice reps).

TESTING ORDER

If functional testing is performed on the same day as isokinetic testing, the isokinetic testing will be performed first. This standardizes the procedure and helps simulate fatigue the athlete will feel with jumping, running, and cutting.