

REHABILITATION PROTOCOL Criteria-Based Postoperative ACL Reconstruction Rehabilitation Protocol

Phase I (Days 1–7)

WEIGHTBEARING STATUS

- 1- Two crutches, weightbearing as tolerated.

Exercises

- 1- Heel slides/wall slides/sitting assisted knee flexion
- 2- Ankle pumps
- 3- Isometric quad sets in full extension with and without neuromuscular electrical stimulation (NMES) or biofeedback
- 4- Hamstring sets (not for hamstring autograft)
- 5- Gluteal sets
- 6- Straight leg raise (SLR) flexion, abduction, extension with brace locked in full extension
- 7- Prone hangs or heel propped in supine for passive knee extension
- 8- Weight shifting in standing for weightbearing tolerance (anteroposterior and side to side)
- 9- Continuous passive motion (CPM) 6 hours/day, increasing 5–10 degrees/day
- 10- Gait training with crutches and brace, level ground and stairs
- 11- Cryotherapy to reduce edema

MANUAL THERAPY

- 1- Patellar mobilizations
- 2- Soft tissue mobilizations to hamstrings for spasm control

GOALS

- 1- Active range of motion (AROM) 0–90 degrees within 10 days
- 2- Good, active quadriceps contraction
- 3- full weightbearing (FWB) with crutches and brace if meniscus repair.
- 4- Edema control
- 5- Graft protection
- 6- Wound healing

Criteria to Progress to Phase II

- 1- SLR with or without lag in brace
- 2- Clean and dry wound
- 3- Progressing range of motion (ROM)
- 4- Able to bear weight on involved limb

Phase II (Days 8–14)

WEIGHTBEARING STATUS

- 1- Weightbearing as tolerated
- 2- Two crutches to single crutch
- 3- Brace unlocked 0-90 degrees

EXERCISES

- 1- Stationary bike for ROM (from rocking to full revolutions)
- 2- Isometric quad sets in full extension and at 90 degrees with and without NMES or biofeedback
- 3- Single-leg stance in brace
- 4- Balance board anteroposterior in bilateral stance
- 5- Continue ROM exercises
- 6- Gait training: single-leg walk (pawing) on treadmill, step-over cones forward
- 7- Begin partial weight mini-squats (0–30 deg) on total gym/shuttle
- 8- Heel raises
- 9- Continue SLR, all four directions
- 10- Terminal knee extension in standing with band
- 11- Prone knee bridges
- 12- Active standing hamstring curls (do not perform for postoperative hamstring autograft reconstruction)

MANUAL THERAPY

- 1- Continue patellar mobs as indicated
- 2- Continue hamstring mobs as indicated

GOALS

- 1- AROM 0–120 degrees within 3 weeks
- 2- SLR without quad lag
- 3- Normal gait pattern with single crutch and unlocked brace

CRITERIA TO PROGRESS TO PHASE III

- 1- AROM 0–90 degrees
- 2- SLR with minimal quad lag
- 3- Normal gait with least restrictive assistive device
- 4- Single-leg stance on involved limb with hand-assist

Phase III (Weeks 2–4)

WEIGHTBEARING STATUS

- 1- FWB, normal gait without assistive device or brace by 3 weeks

EXERCISES

- 2- Stationary bike with gradual progressive resistance for endurance
- 3- Isometric quad sets in full extension and at 90 to 60 degrees flexion with and without NMES or biofeedback until equal quad contraction bilaterally
- 4- Closed kinetic chain squat/leg press 0 to 60 degrees, gradual progressive resistance
- 5- Balance board bilateral in multiple planes
- 6- Single-leg balance eyes open/closed, variable surfaces
- 7- Sport cord or treadmill walking forward and backward
- 8- Standing SLRs, each LE and with resistance

MANUAL THERAPY

- 1- Continue patellar mobilizations as indicated
- 2- Initiate scar mobilizations as needed
- 3- Manual extension or flexion ROM as needed

GOALS

- 1- Full AROM, equal to nonsurgical knee
- 2- Normal gait without assistive device
- 3- Independent activities of daily living (downstairs may still be difficult)

CRITERIA FOR PROGRESSION TO PHASE IV

- 1- Equal bilateral knee AROM
- 2- Normal gait without assistive device
- 3- Understanding of precautions regarding state of graft
- 4- Single-leg standing without assistance

Phase IV (Weeks 4–8)

PRECAUTIONS

REMOVE BRACE IF JOINT LINE NON-TENDER 6 WEEKS AFTER REPAIR

- 1- State of graft at its weakest during this postoperative period. No impact activities such as running, jumping, pivoting, or cutting, and no deep squatting (limits remain 0–60 degrees)
- 2- Pay attention to scar mobility; use manual soft tissue mobilizations as indicated

EXERCISES

- 1- Stationary bike: increase resistance and some light intervals
- 2- Squats/leg press: bilateral to unilateral (0–60 degrees) with progressive resistance

- 3- Lunges (0–60 degrees)
- 4- Stairs: concentric and eccentric (not to exceed 60 degrees of knee flexion)
- 5- Calf raises: bilateral to unilateral
- 6- Contrakicks (steamboats): progress from anteroposterior to side to side, then circles/random, Abduction contrakicks/steamboats.
- 7- Rotational stability exercises: static lunge with lateral pulley repetitions
- 8- Sport cord resisted walking all four directions
- 9- Treadmill walking all four directions
- 10- Balance board: multiple planes, bilateral stance
- 11- Ball toss to mini-tramp or wall in single-leg stance
- 12- Single-leg deadlifts wait for 6–8 weeks if hamstring autograft
- 13- Core strengthening: supine and prone bridging, standing with pulleys
- 14- Gait activities: cone obstacle courses at walking speeds in multiple planes

CRITERIA FOR PROGRESSION TO PHASE V

- 1- Bilateral squat to 60 degrees (no more) with equal weight distribution
- 2- Quiet knee (minimal pain and effusion and no giving way)
- 3- Quad girth within 1 to 2 cm of nonsurgical thigh at 10 cm proximal to superior patella
- 4- Single-leg balance on involved limb >30 seconds with minimal movement

Phase V (Weeks 8–12)

THINGS TO WATCH OUT FOR

- 1- Patellar tendinitis

EXERCISES

- 2- Squats/leg press: bilateral to unilateral (0–60 degrees) progressive resistance
- 3- Lunges (0–60 degrees)
- 4- Calf raises: bilateral to unilateral
- 5- Advance hamstring strengthening
- 6- Core strengthening

- 7- Combine strength and balance (e.g., ball toss to trampoline on balance board, mini-squat on balance board, Sport Cord cone weaves, contrakicks)
- 8- Advanced balance exercises (e.g., single-leg stance while reaching to cones on floor with hands or opposite foot, single-leg stance while pulling band laterally)
- 9- Lap swimming generally fine with exception of breaststroke; caution with deep squat push-off and no use of fins yet
- 10- Stationary bike intervals

GOALS

- 1- Equal quad girth (average gain of 1 cm per month after first month with good strength program)
- 2- Single-leg squat to 60 degrees with good form

CRITERIA FOR PROGRESSION TO PHASE VI

- 1- Nearly equal quad girth (within 1cm)
- 2- Single-leg squat to 60 degrees
- 3- Single-leg balance up to 60 seconds
- 4- Minimal, if any, edema with activity

Phase VI (Week 12–16)

THINGS TO WATCH OUT FOR/CORRECT

- 1- Landing during exercises at low knee flexion angles (too close to extension)
- 2- Landing during exercises with genu varum/valgum (watch for dynamic valgus of knee and correct)
- 3- Landing and jumping with uninvolved limb dominating effort

EXERCISES

- 1- Elliptical trainer: forward and backward
- 2- Perturbation training: balance board, roller board, roller board with platform
- 3- Shuttle jumping: bilateral to alternating to unilateral, emphasis on landing form

- 4- Mini-tramp bouncing: bilateral to alternating to unilateral, emphasis on landing form
- 5- Jogging in place with sport cord: pulling from variable directions
- 6- Movement speed increases for all exercises
- 7- Slide board exercises
- 8- Aqua jogging

CRITERIA TO PROGRESS TO PHASE VII

- 1- Single-leg squat, 20 repetitions to 60 degrees of knee flexion
- 2- Single-leg stance at least 60 seconds
- 3- Single-leg calf raise 30 repetitions
- 4- Good landing form with bilateral vertical and horizontal jumping
- 5- Hop testing: 80% of uninvolved limb performed prior to running

Phase VII (Weeks 16–24)

EXERCISES

- 1- Progressive running program
- 2- Hop testing and training
- 3- Vertical, horizontal jumping from double to single leg
- 4- Progressive plyometrics (e.g., box jumps, bounding, standing jumps, jumps in place, depth jumps, squat jumps, scissor jumps, jumping over barriers, skipping)
- 5- Speed and agility drills (e.g., T-test, line drills) (make these similar in movement to specific sport of athlete).
- 6- Cutting drills begin week 20
- 7- Progress to sport-specific drills week 20

For Revision ACL Reconstructions

Per specific physician recommendation, follow typically similar protocol until 12 weeks, then extend weeks 12 to 16 through to 5- to 6-month timeline, when patients can then begin running and progress to functional sports activities.

Single-leg hop for distance: 80% minimum compared to nonsurgical side for running, 90% minimum for return to sport

Single-leg triple hop for distance: 80% for running, 90% for return to sport

Triple crossover hop for distance: 80% for running, 90% for return to sport

Timed 10-m single-leg hop: 80% for running, 90% for return to sport

Timed vertical hop test: 60 seconds with good form and steady rhythm considered passing

Always begin with warmup on the stationary bike or elliptical for >10 minutes prior to initiation of running.

Patient should have no knee pain following run.

Week 1: Run: walk 30 seconds: 90 seconds every other day (10–15 minutes)

Week 2: Run: walk 60:60 (10–20 minutes)

Week 3: Run: walk 90:30 (15–20 minutes)

Week 4: Run: walk 90:30 3-4x/week (20–25 minutes)

Week 5: Run continuously 15–20 minutes 3–5x/week