



## Rehab Protocol for ACL Reconstruction

### PHASE I (surgery to 2 weeks after surgery)

Appointments	<ul style="list-style-type: none"> <li>Rehabilitation appointments begin 3-5 days post-operatively and then approximately 1-2 times per week</li> </ul>
Rehabilitation Goals	<ul style="list-style-type: none"> <li>Protection of the post-surgical knee and graft</li> <li>Restore normal knee extension</li> <li>Eliminate effusion (swelling)</li> <li>Restore leg control</li> </ul>
Precautions	<ul style="list-style-type: none"> <li>Bilateral (two) axillary crutches</li> <li>Ambulation WBAT with crutches</li> <li>Brace locked in extension for ambulation and sleeping</li> <li>Range of Motion (ROM): Goal of 0-90° within 1 week, moving toward full flexion after the first 4 weeks. The goal in the first phase is to achieve hyperextension equal to the other side, unless excessive hypermobility exists. Generally, 5° of hyperextension should be a maximum.</li> </ul>
Suggested Therapeutic Exercise	<ul style="list-style-type: none"> <li>Quad sets, isometric knee extension at multiple angles in allowed range of motion and as tolerated at patellofemoral (PF) joint</li> <li>Isometric and OKC hamstring strengthening in pain free ROM</li> <li>Hip 4-way SLR (straight leg raise)</li> <li>Ankle and foot stretching and strengthening in non-weight bearing</li> <li>Scar and soft tissue massage, patella mobilizations</li> <li>NMES (neuromuscular electrical stimulation) for quadriceps atrophy, strengthening as needed</li> <li>HVPC (high volt pulsed current) for effusion (swelling) reduction as needed</li> <li>Cryotherapy 6-8 times per day for 15 to 20 minutes each</li> </ul>

Cardiovascular Exercise	<ul style="list-style-type: none"> <li>• Upper body circuit training or upper body ergometer</li> </ul>
Progression Criteria	<ul style="list-style-type: none"> <li>• Hip flexion SLR without knee extension lag</li> <li>• Full knee extension</li> <li>• Knee flexion to 90°</li> <li>• Minimal joint effusion</li> </ul>

**PHASE II (2 weeks after surgery, when Phase I criteria met)**

Appointments	<ul style="list-style-type: none"> <li>• Rehabilitation appointments are 1-2 times per week</li> </ul>
Rehabilitation Goals	<ul style="list-style-type: none"> <li>• Normalize gait</li> <li>• Full ROM</li> <li>• Avoid overstressing the fixation site</li> <li>• Closed chain leg control for non-impact movement control</li> <li>• Adherence to HEP</li> </ul>
Precautions	<ul style="list-style-type: none"> <li>• Full weight bearing with crutches</li> <li>• Avoid over-loading the fixation site by utilizing low amplitude low velocity movements</li> <li>• No active inflammation or reactive swelling</li> <li>• Brace: wean from brace locked to brace unlocked as patient establishes leg control, pain control and safe gait mechanics.</li> </ul>
Suggested Therapeutic Exercise	<ul style="list-style-type: none"> <li>• Non-impact balance and proprioceptive drills</li> <li>• Stationary bike if 115-120 degrees flexion</li> <li>• Gait drills</li> <li>• Hip and core strengthening</li> <li>• Stretching for patient-specific muscle imbalances</li> <li>• Quadriceps strengthening, making sure that closed chain exercises occur between 0° and 60° of knee flexion</li> <li>• Scar and soft tissue massage, patella mobilizations</li> <li>• SLS (single limb stance), BAPS, unstable surfaces</li> <li>• Joint repositioning</li> </ul>

	<ul style="list-style-type: none"> <li>• NMES for quadriceps atrophy, strengthening as needed</li> <li>• HVPC for effusion reduction as needed</li> <li>• Cryotherapy 6-8 times per day for 15 to 20 minutes each</li> </ul>
Cardiovascular Exercise	<ul style="list-style-type: none"> <li>• Non-impact endurance training: stationary bike, Nordic track, swimming, deep water running or cross trainer</li> </ul>
Progression Criteria	<ul style="list-style-type: none"> <li>• Full ROM</li> <li>• No effusion</li> <li>• No pain</li> <li>• Good eccentric control of involved knee</li> <li>• Isometric quad strength 75% of non-involved side at 60° flexion</li> <li>• Hamstring to quad ratio at least 66%</li> <li>• Isokinetic hamstring strength 100% of non-involved side</li> </ul>

**PHASE III (6 weeks after surgery, when Phase II criteria met)**

Appointments	<ul style="list-style-type: none"> <li>• Rehabilitation appointments are 1 to 2 times per week</li> </ul>
Rehabilitation Goals	<ul style="list-style-type: none"> <li>• Maintain full ROM</li> <li>• Hopping without pain, swelling or giving-way</li> <li>• Adherence to HE</li> </ul>
Precautions	<ul style="list-style-type: none"> <li>• Full weight bearing with crutches</li> <li>• Avoid over-loading the fixation site by utilizing low amplitude low velocity movements</li> <li>• No active inflammation or reactive swelling</li> <li>• ROM Brace discontinued</li> <li>• ACL Brace for ambulation, activities</li> </ul>
Suggested Therapeutic Exercise	<ul style="list-style-type: none"> <li>• Progress ROM and flexibility to full if limited</li> <li>• CKC multi-plane activities within pain-free ROM</li> <li>• OKC knee extension 90 to 40 with 1# weight increase per week</li> <li>• Hip and core strengthening</li> <li>• SLS, BAPS, unstable surfaces</li> </ul>

	<ul style="list-style-type: none"> <li>• Joint repositioning</li> <li>• Perturbation training (balance against resistance)</li> <li>• Frontal (forward) and sagittal (side) plane double-leg plyometrics, plyometric leg press</li> </ul>
Cardiovascular Exercise	<ul style="list-style-type: none"> <li>• UBE, stationary bike, treadmill ambulation</li> </ul>
Progression Criteria	<ul style="list-style-type: none"> <li>• Dynamic neuromuscular control with multi-plane activities without pain or swelling</li> <li>• Isokinetic quad strength 90% of non-involved side tested at 300°/sec</li> </ul>

#### PHASE IV (12 weeks after surgery, when Phase III criteria met)

Appointments	<ul style="list-style-type: none"> <li>• Rehabilitation appointments as needed. Usually 1 time every 1-2 weeks.</li> </ul>
Rehabilitation Goals	<ul style="list-style-type: none"> <li>• Normal running gait without side to side differences or compensations.</li> <li>• Normal double leg landing control without side to side differences or compensations for sub-maximal squat jump.</li> <li>• Adherence to HEP</li> </ul>
Precautions	<ul style="list-style-type: none"> <li>• No active reactive swelling or joint pain that lasts more than 12 hours.</li> </ul>
Suggested Therapeutic Exercise	<ul style="list-style-type: none"> <li>• Proceed to treadmill running gradually progressing toward running for 10-15 mins at a pace of 6-8 mins per mile and 3-5% grade. Steadily advancing to outdoor running</li> <li>• Low amplitude low velocity agility drills: forward and backward skipping, side shuffle, skater's quick stepping, carioca, cross overs, backward jog, forward jog</li> <li>• Running patterns at 50 to 75% speed</li> <li>• Initial sports specific drill patterns at 50 - 75% effort</li> <li>• Closed chain strengthening for quadriceps and glutes - progressing from double leg strengthening to single leg strengthening;</li> </ul>

	<p>lunge progressions and single leg squat progressions</p> <ul style="list-style-type: none"> <li>• Single leg balance exercises and progressions, progressing from stationary to deceleration in to holding posture and position</li> <li>• At ~12-14 weeks initiate low amplitude landing mechanics: med ball squat catches, shallow jump landings, chop and drop stops, etc.</li> <li>• Hip strengthening - especially oriented at neuromuscular control in prevention of hip adduction at landing and stance</li> <li>• Core strength and stabilization - especially orientated at preventing frontal plane trunk lean during landing and single leg stance</li> </ul>
Cardiovascular Exercise	<ul style="list-style-type: none"> <li>• Stationary bike with moderate resistance</li> <li>• Deep water running and swimming</li> <li>• Elliptical trainer at moderate intensity</li> </ul>
Progression Criteria	<ul style="list-style-type: none"> <li>• Normal jogging gait</li> <li>• Good single leg balance</li> <li>• Less than 25% deficit on Biodex strength test</li> <li>• No reactive swelling after exercise or activity</li> </ul>

**PHASE V (16-20 weeks after surgery, when Phase IV criteria met)**

Appointments	<ul style="list-style-type: none"> <li>• Rehabilitation appointments are once every 2-4 week</li> </ul>
Rehabilitation Goals	<ul style="list-style-type: none"> <li>• Normal multi-planar high vel without side to side differences or compensations.</li> <li>• Normal double leg landing control without side to side differences or compensations.</li> <li>• Adherence to HEP</li> </ul>
Precautions	<ul style="list-style-type: none"> <li>• No active reactive swelling or joint pain that lasts more than 12 hours.</li> </ul>
Suggested Therapeutic Exercise	<ul style="list-style-type: none"> <li>• Progressive agility drills: forward and backward skipping, side shuffle, skater's quick stepping, carioca, cross overs, backward jog, forward jog</li> </ul>

	<ul style="list-style-type: none"> <li>• Landing mechanics - progressing from higher amplitude double leg to single leg landing drills. Start uni-planar and gradually progress to multi-planar</li> <li>• Movement control exercise beginning with low velocity, single plane activities and progressing to higher velocity, multi-plane activities</li> <li>• Unanticipated movement control drills, including cutting and pivoting</li> <li>• Agility ladder drills</li> <li>• Strength and control drills related to sport specific movements.</li> <li>• Sport/work specific balance and proprioceptive drills</li> <li>• Hip strengthening - especially oriented at neuromuscular control in prevention of hip adduction at landing and stance</li> <li>• Core strength and stabilization - especially orientated at preventing frontal plane trunk lean during landing and single leg stance</li> <li>• Stretching for patient specific muscle imbalances</li> </ul>
Cardiovascular Exercise	<ul style="list-style-type: none"> <li>• Progressive running program. Design to use sport specific energy systems</li> </ul>
Progression Criteria	<ul style="list-style-type: none"> <li>• Patient may return to sport after receiving clearance from the orthopedic surgeon and the physical therapist/athletic trainer. Progressive testing will be completed. The patient should have less than 15% difference in Biodex strength test, force plate jump and vertical hop tests, and functional horizontal hop tests.</li> </ul>