

Rehabilitation Protocol for Anterior Cruciate Ligament (ACL) Reconstruction

These guidelines are designed to assist healthcare providers in managing the recovery process following ACL reconstruction surgery. The protocol is both time-sensitive, depending on tissue healing, and based on specific criteria. Treatment should be tailored to each individual, taking into account examination findings and clinical judgment. The expected timelines for recovery milestones outlined in this guideline may vary depending on the surgeon's preferences, any additional procedures performed, and the presence of complications. Clinicians seeking guidance on post-operative patient progression should consult with the referring orthopedic surgeon.

The interventions outlined in this protocol do not constitute an exhaustive list of exercises. Therapeutic approaches should be tailored and adjusted based on the patient's progress and at the discretion of the healthcare provider.

Considerations for Different Graft Types

The timelines for weight-bearing and rehabilitation differ for allografts and hamstring autografts. Specific instructions for each type are detailed below. It is important to note that the early return to sports activities may be delayed.

Concomitant Injury Considerations

When managing ACL reconstruction alongside other injuries, such as a meniscus repair, a more conservative approach should be taken regarding range of motion, weight-bearing, and rehabilitation progression.

Post-Operative Care

If you experience a fever, intense calf pain, excessive drainage from the incision, uncontrolled pain, or any other concerning symptoms, it is important to contact your orthopedic surgeon promptly.

PHASE I: IMMEDIATE POST-OP (WEEKS 0-2 AFTER SURGERY)

<p>Rehabilitation Goals</p>	<ul style="list-style-type: none"> • Protect graft • Reduce swelling, minimize pain • Restore patellar mobility • Restore full extension, gradually improve flexion • Minimize arthrogenic muscle inhibition, re-establish quad control, regain full active extension • Patient education <ul style="list-style-type: none"> ◦ Keep your knee straight and elevated when sitting or laying down. Do not rest with a towel placed under the knee ◦ Do not actively kick your knee out straight; support your surgical side when performing transfers (i.e. sitting to laying down) ◦ Do not pivot on your surgical side
<p>Weight Bearing</p>	<p><i>Walking</i></p> <ul style="list-style-type: none"> • Initially brace locked, crutches (per MD recommendation) • May start walking without crutches as long as there is no increased pain, effusion, and proper gait <ul style="list-style-type: none"> ◦ Allograft and hamstring autograft continue partial weight bearing with crutches for 6 weeks unless otherwise instructed by MD • May unlock brace once able to perform straight leg raise without lag • May discontinue use of brace after 6 wks per MD and once adequate quad control is achieved • When climbing stairs, lead with the non-surgical side when going up the stairs, and lead with the crutches and surgical side when going down the stairson is acceptable)

PHASE I: IMMEDIATE POST-OP CONTINUED
(WEEKS 0-2 AFTER SURGERY)

<p>Interventions</p>	<p><i>Swelling Management</i></p> <ul style="list-style-type: none"> • Ice, compression, elevation (check with MD re: cold therapy) • Retrograde massage • Ankle pumps <p><i>Range of motion/Mobility</i></p> <ul style="list-style-type: none"> • Patellar mobilizations: superior/inferior and medial/lateral <ul style="list-style-type: none"> ◦ **Patellar mobilizations are heavily emphasized in the early post-operative phase following patella tendon autograft** • Seated assisted knee flexion extension and heel slides with towel • Low intensity, long duration extension stretches: prone hang, heel prop • Standing gastroc stretch and soleus stretch • Supine active hamstring stretch and supine passive hamstring stretch <p><i>Strengthening</i></p> <ul style="list-style-type: none"> • Calf raises • Quad sets • NMES high intensity (2500 Hz, 75 bursts) supine knee extended 10 sec/50 sec, 10 contractions, 2x/wk during sessions—use of clinical stimulator during session, consider home units distributed immediate post op • Straight leg raise <ul style="list-style-type: none"> ◦ **Do not perform straight leg raise if you have a knee extension lag • Hip abduction • Multi-angle isometrics 90 and 60 deg knee extension
<p>Criteria to Progress</p>	<ul style="list-style-type: none"> • Knee extension ROM 0 deg • Quad contraction with superior patella glide and full active extension • Able to perform straight leg raise without lag

PHASE II: INTERMEDIATE POST-OP
(WEEKS 3-5 AFTER SURGERY)

<p>Rehabilitation Goals</p>	<ul style="list-style-type: none"> • Protect healing graft • Return to full weightbearing with normalized gait pattern • Progress quad strength and lower extremity control • Good mechanics without pain during sit to stand, squats, and stair climb
<p>Additional Interventions <i>*Continue with Phase I interventions</i></p>	<p><i>Range of motion/Mobility</i></p> <ul style="list-style-type: none"> • Stationary bicycle • Gentle stretching all muscle groups: prone quad stretch, standing quad stretch, kneeling hip flexor stretch <p><i>Strengthening</i></p> <ul style="list-style-type: none"> • Standing hamstring curls • Step ups and step ups with march • Partial squat exercise • Ball squats, wall slides, mini squats from 0-60 deg • Lumbopelvic strengthening: bridge & unilateral bridge, sidelying hip external rotation-clamshell, bridges on physioball, bridge on physioball with roll-in, bridge on physioball alternating, hip hike <p><i>Balance/proprioception</i></p> <ul style="list-style-type: none"> • Single leg standing balance (knee slightly flexed) static progressed to dynamic and level progressed to unsteady surface • Lateral step-overs • Joint position re-training until Phase III
<p>Criteria to Progress</p>	<ul style="list-style-type: none"> • No swelling (Modified Stroke Test) • Flexion ROM within 10 deg contra lateral side • Extension ROM equal to contra lateral side

PHASE III: LATE POST-OP
(WEEKS 6-8 AFTER SURGERY)

<p>Rehabilitation Goals</p>	<ul style="list-style-type: none"> • Continue to protect graft site • Maintain full ROM • Safely progress strengthening • Promote proper movement patterns • Avoid post exercise pain/swelling • Avoid activities that produce pain at graft donor site
<p>Additional Interventions *Continue with Phase I-II Interventions</p>	<p><i>Range of motion/Mobility</i></p> <ul style="list-style-type: none"> • Rotational tibial mobilizations if limited ROM <p><i>Cardio</i></p> <ul style="list-style-type: none"> • 8 weeks: Elliptical, stair climber, flutter kick swimming, pool jogging <p><i>Strengthening</i></p> <ul style="list-style-type: none"> • Gym equipment: leg press machine, seated hamstring curl machine and hamstring curl machine, hip abductor and adductor machine, hip extension machine, roman chair, seated calf machine <ul style="list-style-type: none"> ◦ Hamstring autograft can begin resisted hamstring strengthening at 12 weeks • Progress intensity (strength) and duration (endurance) of exercises <p>**The following exercises to focus on proper control with emphasis on good proximal stability</p> <ul style="list-style-type: none"> • Squat to chair • Lateral lunges • Romanian deadlift • Single leg progression: partial weight bearing single leg press, slide board lunges: retro and lateral, step ups and step ups with march, lateral step-ups, step downs, single leg squats, single leg wall slides • Knee Exercises for additional exercises and descriptions • Seated Leg Extension (avoid anterior knee pain): 90-45 degrees with resistance <p><i>Balance/proprioception</i></p> <ul style="list-style-type: none"> • Progress single limb balance including perturbation training
<p>Criteria to Progress</p>	<ul style="list-style-type: none"> • No effusion/swelling/pain after exercise • Normal gait • ROM equal to contra lateral side • Symmetrical Joint position sense (<5-degree margin of error)

PHASE IV: TRANSITIONAL
(WEEKS 9-12 AFTER SURGERY)

<p>Rehabilitation Goals</p>	<ul style="list-style-type: none"> • Maintain full ROM • Safely progress strengthening • Promote proper movement patterns • Avoid post exercise pain/swelling • Avoid activities that produce pain at graft donor site
<p>Additional Interventions *Continue with Phase II-III Interventions</p>	<ul style="list-style-type: none"> • Begin sub-max sport specific training in the sagittal plane • Bilateral PWB plyometrics progressed to FWB plyometrics
<p>Criteria to Progress</p>	<ul style="list-style-type: none"> • No episodes of instability • Maintain quad strength • 10 repetitions single leg squat proper form through at least 60 deg knee flexion • Drop vertical jump with good control • KOOS-sports questionnaire >70% • Functional Assessment <ul style="list-style-type: none"> ◦ Quadriceps index >80%; HHD or isokinetic testing 60d/s ◦ Hamstrings ≥80%; HHD or isokinetic testing 60 d/s ◦ Glut med, glut max index ≥80% HHD

PHASE V: EARLY RETURN TO SPORT
(MONTHS 3-5 AFTER SURGERY)

<p>Rehabilitation Goals</p>	<ul style="list-style-type: none"> • Safely progress strengthening • Safely initiate sport specific training program • Promote proper movement patterns • Avoid post exercise pain/swelling • Avoid activities that produce pain at graft donor site
<p>Additional Interventions *Continue with Phase II-IV interventions</p>	<ul style="list-style-type: none"> • Interval running program <ul style="list-style-type: none"> ◦ Return to Running Program • Progress to plyometric and agility program (with functional brace if prescribed) <ul style="list-style-type: none"> ◦ Agility and Plyometric Program
<p>Criteria to Progress</p>	<ul style="list-style-type: none"> • Clearance from MD and ALL milestone criteria below have been met • Completion jog/run program without pain/effusion / swelling • Functional Assessment <ul style="list-style-type: none"> ◦ Quad/HS/glut index $\geq 90\%$; HHD mean or isokinetic testing @ 60d/s ◦ Hamstring/Quad ratio $\geq 66\%$ ◦ Hop Testing $\geq 90\%$

PHASE VI: UNRESTRICTED RETURN TO SPORT
(MONTHS 6+ AFTER SURGERY)

<p>Rehabilitation Goals</p>	<ul style="list-style-type: none"> • Continue strengthening and proprioceptive exercises • Symmetrical performance with sport specific drills • Safely progress to full sport
<p>Additional Intervention *Continue with Phase II-V interventions</p>	<ul style="list-style-type: none"> • Multi-plane sport specific plyometrics program • Multi-plane sport specific agility program • Include hard cutting and pivoting depending on the individuals' goals (~7 mo) • Non-contact practice > Full practice > Full play (~9 mo)
<p>Criteria to Progress</p>	<ul style="list-style-type: none"> • Functional Assessment <ul style="list-style-type: none"> ◦ Quad/HS/glut index > 95%; HHD mean or isokinetic testing @ 60d/s ◦ Hamstring/Quad ratio > 66% ◦ Hop Testing > 95% compared to contra lateral side, demonstrating good landing mechanics • KOOS-sports questionnaire > 90% • International Knee Committee Subjective Knee Evaluation > 93 • ACL-RSI

For further assistance or to schedule an appointment, please contact **iOrtho - The Orthopedic Institute** at **833-464-6784** or visit our website at **iorthomd.com** to text/email us. Our team is dedicated to providing personalized care and guidance throughout your rehabilitation journey.