


\*\*\*NOTE: When feasible prior to surgery, it is recommended that patients have at least 0-120° ROM, no effusion and ≥ 80% of quad and hamstring strength as compared to the unaffected limb.\*\*\*

<p><b>Anterior Cruciate Ligament Reconstruction (ACLR)</b>- Isolated, no meniscal repair</p>	<div style="text-align: right;">  </div> <p>Rehab Protocol Aaron Vandenbos, MD</p>
<p><b>PHASE 1: Generally 0-2 Weeks Post-Op</b></p>	
<p><b>GOALS:</b></p>	<ol style="list-style-type: none"> <li>1) Protect surgical graft</li> <li>2) Normal gait and stair ambulation</li> <li>3) ROM: full knee extension and ≥ 110° knee flexion</li> <li>4) Good quadriceps control (achieve ≥ 20 SLRs with no lag)</li> <li>5) Minimize pain and swelling</li> </ol>
<p><b>PRECAUTIONS:</b></p>	<ul style="list-style-type: none"> <li>- Wear brace <b>AT ALL TIMES</b> (even while sleeping)</li> <li>- <b>NO OPEN KINETIC CHAIN</b> strengthening exercises</li> <li>- <b>NO RUNNING</b></li> </ul>
<p><b>CRUTCHES:</b></p>	<ul style="list-style-type: none"> <li>- WBAT</li> <li>- D/C when sufficient quad control and normal gait are both achieved</li> </ul>
<p><b>BRACE:</b></p>	<ul style="list-style-type: none"> <li>- Remains locked at 0° for WB activity <u>only until</u> patient is able to do 20 SLRs without an extension lag             <ul style="list-style-type: none"> <li>• If able to, then open brace to current ROM</li> </ul> </li> </ul> <p><u>NOTE:</u> Knee ROM would be limited the first 6 weeks post-op for an ACLR with meniscal repair</p>
<p><b>WOUND:</b></p>	<ul style="list-style-type: none"> <li>- Post-op dressing remains intact until post-op day #2 (~48 hours after surgery)</li> <li>- Shower after post-op day #2 (no need to cover the incision site)</li> <li>- <b>DO NOT SUBMERGE</b> knee in water until 4 weeks post-op and incisions have fully healed</li> <li>- Suture/staple removal @ 10-14 days post-op per Ortho</li> </ul>
<p><b>CRYOTHERAPY:</b></p>	<ul style="list-style-type: none"> <li>- Cold with compression/elevation as needed (ice with compression wrap)</li> </ul>
<p><b>REHABILITATION:</b></p>	<ul style="list-style-type: none"> <li>- Begin scar massage after incision has healed and scar is formed</li> <li>- Perform the following rehabilitation exercises; progress as tolerated</li> </ul>
<p>~ Days 1-7</p>	<ul style="list-style-type: none"> <li>- Calf pumps with theraband</li> <li>- Heel slides (assisted as needed)</li> <li>- Quad sets (use e-stim until patient is able to do 10 SLRs w/o extension lag)</li> <li>- Supine passive extension with towel under heel</li> <li>- Prone hangs as needed</li> <li>- Gentle HS stretching</li> <li>- UBE</li> </ul>
<p>~ Days 8-14</p>	<ul style="list-style-type: none"> <li>- Patellar mobilizations after suture/staple removal</li> <li>- THEREX for restoration of quad function and hip/core strengthening</li> <li>- Stationary bike for ROM; progress to biking for conditioning</li> <li>- Ankle ROM and proprioceptive training</li> <li>- Progressive ankle strengthening</li> <li>- Mini squats 0-45° or as tolerated</li> <li>- Multi-angle hip and thigh isometrics until able to perform isotonic</li> </ul>

	- Gait training as needed until normalized gait
<b>FOLLOW-UP:</b>	- Supervised rehab: 2-3x per week - PT re-eval: weekly - Ortho re-eval: ~2 to 4 weeks post-op

<b>PHASE 2: Generally 2-6 Weeks Post-Op</b>	
<b>GOALS:</b>	1) Full knee ROM 2) Minimal or no effusion 3) > 80% quadriceps and HS strength compared to the uninvolved limb 4) Functional strength and control in daily activities
<b>PRECAUTIONS:</b>	- <b>DO NOT SUBMERGE</b> knee in water until 4 weeks post-op and incisions have fully healed - <b>NO RUNNING</b>
<b>BRACE:</b>	- Wear brace at Ortho's discretion - May be removed during rehab at therapist's discretion
<b>REHABILITATION:</b>	- Continue Phase 1 exercises as needed - Progress to the following exercises and increase intensity gradually when patient is ready (i.e. no increase in knee pain or effusion since the previous exercise session) - Recommend exercises begin with lighter intensity and higher reps with progression to higher intensity and lower reps
~ Weeks 2-6	- Stationary biking for conditioning; may add elliptical and/or rower gradually - Beginner level pool exercises primarily in the sagittal plane (i.e. no breaststroke or whip kick motion) - General LE stretching (i.e. calf, HS, quads, hip flexors, and hip abductors/adductors) - Progressive strengthening <ul style="list-style-type: none"> <li>• Thigh musculature with emphasis on knee extension; progress with loading and ROM</li> <li>• Hip extension, abduction, and adduction</li> <li>• Plantarflexion</li> <li>• Core musculature</li> <li>• <u>DO NOT</u> neglect the patient's overall fitness condition</li> </ul>
<b>NEUROMUSCULAR TRAINING:</b>	- THEREX on an unstable surface (i.e. foam pad), SL exercises, and exercises with reduced visual input
<b>FOLLOW-UP:</b>	- Supervised rehab: 2-3x per week - PT re-eval: every 3-4 weeks - Ortho re-eval: ~12 weeks post-op

<b>PHASE 3: Generally 6-12 Weeks Post-Op</b>	
<b>GOALS:</b>	1) Maintain full knee ROM 2) Minimal or no effusion 3) Progress strengthening and neuromuscular retraining 4) DL hop in place without pain using good form
<b>PRECAUTIONS:</b>	- <b>NO RUNNING</b>
<b>REHABILITATION:</b>	- Continue Phase 2 exercises as needed - Progress to the following exercises and increase intensity gradually when patient is ready (i.e. no increase in knee pain or effusion since the previous exercise session) - Continue bike, elliptical, rower, and/or stair machine for conditioning purposes

~ Weeks 6-9	<ul style="list-style-type: none"> <li>- Continue beginner level pool exercises primarily in the sagittal plane (i.e. no breaststroke or whip kick motion)</li> <li>- General LE stretching (i.e. calf, HS, quads, hip flexors, and hip abductors/adductors)</li> <li>- Progressive strengthening</li> <li>- Progressive neuromuscular training and balance exercises</li> </ul>
~ Weeks 9-12	<ul style="list-style-type: none"> <li>- Progressive pool program as tolerated</li> <li>- Progressive functional training <ul style="list-style-type: none"> <li>• 2-legged plyometrics (i.e. shuttle jumps and jump roping)</li> <li>• Progress DL to SL</li> </ul> </li> <li>- Progressive LE and core strengthening</li> <li>- Progressive neuromuscular training and balance exercises</li> </ul>
<b>TESTING:</b>	- SL squat to $\geq 60^\circ$ for max reps and $\geq 80\%$ of non-surgical limb
<b>FOLLOW-UP:</b>	<ul style="list-style-type: none"> <li>- Supervised rehab: 2-3x per week</li> <li>- PT re-eval: monthly</li> <li>- Ortho re-eval: ~12 weeks post-op</li> </ul>

<b>PHASE 4: Generally 3-6 Months Post-Op</b>	
<b>GOALS:</b>	<ol style="list-style-type: none"> <li>1) Jog at own pace and distance without pain</li> <li>2) ~90% strength return for quadriceps and HS compared to uninvolved limb</li> <li>3) Hop test and Y-balance limb symmetry &gt; 90%</li> <li>4) Isokinetic testing limb symmetry &gt; 85%</li> <li>5) Meet occupation requirements at 6-9 months</li> </ol>
<b>PRECAUTIONS:</b>	- <b>NO PARTICIPATION</b> in sports or physically demanding military schools; at the discretion of the rehabilitation team
<b>REHABILITATION:</b>	<ul style="list-style-type: none"> <li>- Continue Phase 3 exercises as needed</li> <li>- Progress in duration and intensity of exercises (i.e. no increase in knee pain or effusion since the previous exercise session)</li> </ul>
~ Months 3-4	<ul style="list-style-type: none"> <li>- Progressive balance training as needed</li> <li>- Progressive LE and core strengthening</li> <li>- Progressive jogging program <ul style="list-style-type: none"> <li>• Begin on Alter-G if available</li> <li>• Criteria for run progression: pain-free hopping and ability to perform <math>\geq 90\%</math> of uninvolved limb max reps SL squats to <math>\geq 60^\circ</math> knee flexion</li> <li>• Increase time and/or distance no more than 10% - 20% per week</li> </ul> </li> <li>- Progressive functional, neuromuscular, plyometric, and agility training: <ul style="list-style-type: none"> <li>• Jumping, hopping, directional jogging, cariocas, shuffles, etc.</li> <li>• SL anterior and lateral jumps</li> <li>• Shuttle jumps progressing to box jumps</li> </ul> </li> </ul>
~ Months 5-6	<ul style="list-style-type: none"> <li>- Biodex isokinetic testing: until &gt; 90% symmetry</li> <li>- Hop test battery: until &gt; 90% symmetry in hop for distance, triple hop for distance, crossover hop, and 6-meter timed hop</li> <li>- Y-balance test: until &gt; 90% symmetry</li> <li>- Movement quality assessments: Landing Error Scoring System (LESS), Functional Movement Screen (FMS), etc.</li> </ul>
<b>FOLLOW-UP:</b>	<ul style="list-style-type: none"> <li>- Supervised rehab: 1-2x per week</li> <li>- PT re-eval: monthly</li> <li>- Ortho re-eval: ~6 months post-op</li> </ul>
<b>MISCELLANEOUS:</b>	- After 6 months post-op, Phase 4 exercises are continued and gradually increased in intensity and duration as tolerated

<b>PHASE 5 (RETURN TO SPORT): Generally 9 Months Post-Op</b>	
<b>GOALS:</b>	1) Sport-specific training without pain or swelling 2) Mitigate future injury risk 3) Hop test and Y-balance limb symmetry > 90% 4) Isokinetic testing limb symmetry > 90% 5) Full return to sports/athletics and military training without limitations
<b>PRECAUTIONS:</b>	- <b>NO PARTICIPATION</b> in sports or physically demanding military schools until cleared for return to sport by the rehabilitation team
<b>REHABILITATION:</b>	<ul style="list-style-type: none"> <li>- Continue Phase 4 exercises as needed</li> <li>- Progress in duration and intensity of exercise (i.e. no increase in knee pain or effusion since the previous exercise session)</li> </ul>
	<ul style="list-style-type: none"> <li>- Warm-up: 5-10 minutes on bike, elliptical, or stairmaster</li> <li>- General LE stretching (i.e. calf, HS, quads, hip flexors, and hip abductors/adductors)</li> <li>- Progressive LE and core strengthening</li> <li>- Progressive balance training as needed</li> <li>- Progressive jogging program               <ul style="list-style-type: none"> <li>• Increase time and/or distance no more than 10% - 20% per week</li> </ul> </li> <li>- Progressive agility and plyometric training</li> <li>- Incorporate drills/activities specific to patient's sport</li> </ul>
<b>RETURN TO SPORT (RTS) EVALUATION:</b>	<ul style="list-style-type: none"> <li>- Hop test battery: single hop, triple hop for distance, crossover hop, and 6-meter timed hop</li> <li>- Isokinetic strength (60o/sec)</li> <li>- Vertical jump</li> <li>- Deceleration shuttle test</li> </ul>
<b>RTS CRITERIA:</b>	<ul style="list-style-type: none"> <li>- No functional complaints</li> <li>- Confidence when running, cutting, and jumping at speed required for specific sport</li> <li>- Demonstration of sport-specific drills/activities</li> <li>- 90% contralateral values on hop tests</li> </ul>
<b>FOLLOW-UP:</b>	<ul style="list-style-type: none"> <li>- Supervised rehab: 1-2x per week as needed</li> <li>- PT re-eval: monthly</li> <li>- Ortho re-eval: ~9-12 months post-op</li> </ul>
<b>MISCELLANEOUS:</b>	- Progress activities for return to sport/collision sports or aggressive military training based on the patient's functional performance and endurance. This time period will be directed by the Ortho Surgeon and the Physical Therapist. This may require between 9-12 months before cleared without restrictions.

These guidelines were created as a framework for the post-operative rehabilitation program. They DO NOT substitute for any specific restrictions or requirements that are determined through the necessary shared decision-making and collaboration between the operating surgeon and treating rehabilitation team.