

**POSTOPERATIVE REHABILITATION PROTOCOL FOLLOWING ACL RECONSTRUCTION**

STAGE	AIMS	GOALS	TREATMENT GUIDELINES
<b>Prehabilitation</b>	<ul style="list-style-type: none"> <li>Prepare the patient for surgery</li> </ul>	<ul style="list-style-type: none"> <li>Full ROM</li> <li>Painfree mobile joint</li> <li>Teach simple post op exercises</li> </ul>	<ul style="list-style-type: none"> <li>Operate on pain free mobile joints – minimizes complications and speeds recovery</li> <li>May take many months</li> <li>Do not be pressured by patient into early surgery.</li> <li>Preprogramming post operative rehabilitation is beneficial at every level</li> <li>Patients are better able to manage postoperative exercises if they have learnt them before surgery</li> </ul>
<b>Stage I Acute Recovery Day 1 to Day 14</b>	<ul style="list-style-type: none"> <li>Post-operative pain relief and management of soft tissue trauma.</li> <li>Progress off crutches and normal gait.</li> </ul>	<ul style="list-style-type: none"> <li>Wound healing.</li> <li>Manage the graft donor site morbidity, i.e. pain and swelling.</li> <li>Decrease joint swelling.</li> <li>Restore full extension (including hyperextension)</li> <li>Establish muscle control.</li> </ul>	<ul style="list-style-type: none"> <li>Decrease swelling &amp; pain with ice, elevation, co-contractions and pressure pump.</li> <li>Partial weight bearing to full weight bearing as pain allows.</li> <li>Aim for a full range of motion using active and passive techniques.</li> <li>Patella mobilisations to maintain patella mobility.</li> <li>Gait retraining with full extension at heel strike.</li> <li>Return of co-ordinated muscle function encouraged with biofeedback. Active quadriceps strengthening is begun as a static co-contraction with hamstrings emphasising VMO control at various angles of knee flexion and progressed into weight bearing positions.</li> <li>Gentle hamstring stretching to minimise adhesions in autograft.</li> <li>Active hamstring strengthening begins with static weight bearing co-contractions and progresses to active free hamstring contractions by day 14.</li> <li>Resisted hamstring strengthening should be avoided for at least 6 weeks.</li> </ul>
<b>Stage II Hamstring and Quadriceps Control 2 - 6 Weeks</b>	<ul style="list-style-type: none"> <li>To return the patient to normal daily function.</li> <li>Prepare the patient for Stage III.</li> </ul>	<ul style="list-style-type: none"> <li>Develop good muscle control and early proprioceptive skills.</li> <li>If not done sooner, restore a normal gait.</li> <li>Reduce any persistent or recurrent effusion.</li> </ul>	<ul style="list-style-type: none"> <li>Progress co-contractions for muscle control by increasing the repetitions, length of contraction and more dynamic positions, e.g. two leg quarter squats, lunges, stepping, elastic cords.</li> <li>Gym equipment can be introduced gradually such as exercise bike, stepper, leg press, mini trampoline, cross trainer.</li> <li>If swelling is persistent, continue with pressure pump and ice</li> <li>Hamstring strengthening progresses with the increased complexity and repetitions of co-contractions. Open chain hamstring exercises are commenced although often they are painful.</li> <li>Care must be taken as hamstring straining may occur.</li> <li>Low resistance, high repetition weights aim to increase hamstring endurance.</li> <li>Continue with intensive stretching exercises.</li> <li><u>Week 6</u></li> <li>Eccentric hamstring strengthening is progressed as pain allows. Hamstring curl equipment can be introduced.</li> <li>Consider beyond the knee joint for any deficits, e.g. gluteal control, tight hamstrings, ITB, gastrocs and soleus, etc.</li> </ul>
<b>Stage III Proprioception 6 - 12 weeks</b>	<ul style="list-style-type: none"> <li>Improve neuromuscular control and proprioception.</li> </ul>	<ul style="list-style-type: none"> <li>Continue to improve total leg strength.</li> <li>Improve endurance capacity of muscles.</li> <li>Improve confidence.</li> </ul>	<ul style="list-style-type: none"> <li>Progress co-contractions to more dynamic movements, e.g. step lunges, half squats.</li> <li>Proprioceptive work more dynamic, e.g. lateral stepping, slide board etc.</li> <li>Can begin jogging in straight lines on the flat.</li> <li>Progress resistance on gym equipment such as leg press and hamstring curls. Hamstring strengthening programme aims for a progression in both power and speed of contraction.</li> <li>Start cycling on normal bicycle.</li> <li>Consider pelvic and ankle control plus cardiovascular fitness.</li> <li>Solo sports such as cycling, jogging and swimming are usually permitted with little or no restrictions during this stage.</li> <li>Open chain exercises commence (if no patellofemoral symptoms) 40-90° progressing to 10-90° by 12 weeks.</li> </ul>

<p><b>Stage IV</b> <b>Sport Specific</b> <b>12 weeks to 5 months</b></p>	<ul style="list-style-type: none"> <li>▪ Prepare to return to sport.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Incorporate more sport specific activities.</li> <li>▪ Introduce agility and reaction time into proprioceptive work.</li> <li>▪ Increase total leg strength.</li> <li>▪ Develop patient confidence.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Progressing of strength work, e.g. half squats with resistance, leg press &amp; curls, wall squats, step work on progressively higher steps, stepper &amp; rowing machine.</li> <li>▪ Proprioceptive work should include plyometric (hopping and jumping) activities and emphasise a good landing technique. Incorporate lateral movements.</li> <li>▪ Agility work may include shuttle runs, ball skills, sideways running, skipping, etc.</li> <li>▪ Low impact and step aerobics classes help with proprioception and confidence.</li> <li>▪ Pool work can include using flippers.</li> <li>▪ Sport specific activities will vary for the individual, e.g. Tennis - lateral step lunges, forward and backwards running drills; Skiing - slide board, lateral box stepping and jumping, zigzag hopping; Volleyball or Basketball - vertical jumps.</li> </ul>
<p><b>Stage V</b> <b>Return To Sport</b> <b>5 - 6 Months</b></p>		<ul style="list-style-type: none"> <li>▪ Return to sport safely and with confidence.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Continue progression of plyometrics and sport specific drills.</li> <li>▪ Return to training and participating in skill exercises.</li> <li>▪ Continue to improve power and endurance.</li> <li>▪ Advice may be needed as to the need for modifications to be able to return to sport, e.g. Football - start back training in running shoes or short sprigs. Will usually return to lower grades initially; Skiing - stay on groomed slopes and avoid moguls and off piste initially. Racers may initially lower their DIN setting on the bindings.</li> <li>▪ Train in PEP program for warm up to reduce further ACL injury <ol style="list-style-type: none"> <li>1. <i>Warm-up (50 yards each):</i> <ul style="list-style-type: none"> <li>• Jog line to line of soccer field (cone to cone)</li> <li>• Shuttle run (side to side)</li> <li>• Backward running</li> </ul> </li> <li>2. <i>Stretching (30 s × 2 reps each):</i> <ul style="list-style-type: none"> <li>• Calf stretch</li> <li>• Quadricep stretch</li> <li>• Figure 4 hamstring stretch</li> <li>• Inner thigh stretch</li> <li>• Hip flexor stretch</li> </ul> </li> <li>3. <i>Strengthening:</i> <ul style="list-style-type: none"> <li>• Walking lunges (20yards×2sets)</li> <li>• Russian hamstring (3sets×10reps)</li> <li>• Single toe-raises (30repsoneachside)</li> </ul> </li> <li>4. <i>Plyometrics (20 reps each):</i> <ul style="list-style-type: none"> <li>• Lateral hops over 2 to 6 inch cone</li> <li>• Forward/backward hops over 2 to 6 inch cone</li> <li>• Single leg hops over 2 to 6 inch cone</li> <li>• Vertical jumps with headers</li> <li>• Scissors jump</li> </ul> </li> <li>5. <i>Agilities:</i> <ul style="list-style-type: none"> <li>• Shuttle run with forward/backward running (40 yards)</li> <li>• Diagonal runs (40 yards)</li> <li>• Bounding run (45–50yards)</li> </ul> </li> </ol> <p>Ref: Gilchrist et al AJSM 2008</p> <li>▪ Supplementary information and exercises can also be seen on the FIFA website: <a href="http://f-marc.com/11plus/home/">http://f-marc.com/11plus/home/</a></li> </li></ul> <p><b>NB</b> Patients under 21 years and patients with mildly increased laxity have shown to be at increased risk of re-injury post ACL reconstructive surgery (Pinczewski et al AJSM 2007). For these patients I advise refraining from full competitive sports for the full 12 months.</p>