

**POST-OPERATIVE POSTERIOR CRUCIATE LIGAMENT (PCL) RECONSTRUCTION PROTOCOL
or COMBINED PCL and ACL RECONSTRUCTION
Mr Mathias Nagy, Specialist Knee Surgeon
Scarborough & Bridlington**

POST-OPERATIVE PROTOCOL FOR:

- **POSTERIOR CRUCIATE LIGAMENT (PCL) RECONSTRUCTION**
- **COMBINED POSTERIOR CRUCIATE AND ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION (PCL+ACL)**

Ensure patient achieves milestone prior to progression.

No return to contact sports prior to 9 months post-op.

Return to gentle non-contact, non-competitive sports at physiotherapist's discretion but must be over 8 months post-op.

PHASE 1: Post reconstructive surgery. Day 1 to day 14.

Goal	Treatment	Milestones to Progress
Graft protection	<ul style="list-style-type: none"> • Cricket pad splint to be worn at all times when mobilizing and for sleeping • Use of crutches TOUCH WB ONLY 	<ul style="list-style-type: none"> • Ensure patient has attended first post-operative clinic review (at 2 weeks post-op)
Minimise swelling and pain	<ul style="list-style-type: none"> • Use of ice or Game Ready if available • Elevate leg • Ensure adequate pain relief 	
Prevent post-operative complications	<ul style="list-style-type: none"> • Circulatory exercises • Patella mobilizations 	
Maintain muscle strength	<ul style="list-style-type: none"> • Regular static quads • SLR if able 	

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PHASE 2: 2 weeks to 6 weeks

Goal	Treatment	Milestone to Progress
Graft protection	<ul style="list-style-type: none"> Hinged knee brace (ROM 0° - 90°) to be worn at all times when mobilizing. Cricket pad split to be worn in bed Use of crutches, PARTIAL WB ONLY 	<ul style="list-style-type: none"> Minimal effusion Full or nearing full extension 90° knee flexion SLR with no lag (10 reps) Normal, symmetrical gait pattern with crutches Ensure patient has attended their 6 week clinic review
Minimise swelling and pain	<ul style="list-style-type: none"> Use of ice or Game Ready Ensure adequate pain relief Elevate leg 	
Regain full range of extension	<ul style="list-style-type: none"> Active extension exercises: static quads Passive stretching Initially avoid hyperextension 	
Increase knee flexion as pain allows	<ul style="list-style-type: none"> Passive flexion exercises in prone (no active ROM, do not engage hamstrings) Passive flexion over edge of bed Patella mobilisations 	
Improve quads control and muscle strength	<ul style="list-style-type: none"> Static quads, SLRs. Ensure patient can SLR with no lag Co-contraction quads and hams Active OKC Qs (60° to full extension) NO OKC QS IF COMBINED PCL & ACL Early gluteal strengthening Early core stability strengthening 	
Ensure flexibility	<ul style="list-style-type: none"> Hamstrings stretches in supine Calf stretches 	
Restoration of normal gait pattern	<ul style="list-style-type: none"> Gait re-education with elbow crutches PWB 	
Attention to donor leg if graft harvested from contralateral side	<ul style="list-style-type: none"> Restore full range of motion ASAP Commence muscle strengthening Commence muscle stretching 	

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PHASE 3: 6 weeks to 12 weeks

Goal	Treatment	Milestone to Progress
Graft protection	<ul style="list-style-type: none"> • Hinged knee brace (no restriction to ROM) to be worn at all times when mobilizing. Remove brace at 8 weeks post-op 	<ul style="list-style-type: none"> • Minimal/no activity related effusion • Full range of extension • Normal gait pattern without crutches • Full range of flexion • Single leg stand eyes shut at least 5 seconds • Bilateral squat, thighs parallel to floor with even, symmetrical weight bearing
Minimise swelling and pain (ensure no swelling before progression) Prevent anterior knee pain	<ul style="list-style-type: none"> • Continue as above, as necessary • Patella mobilisations 	
Regain/maintain full range of extension/hyperextension (compare to non-operative knee)	<ul style="list-style-type: none"> • Extension exercises as above • Heel props, prone hangs • Passive stretching 	
Restoration of normal gait pattern	<ul style="list-style-type: none"> • Commence FWB, wean off crutches • Treadmill walking 	
Regain full range of flexion	<ul style="list-style-type: none"> • Active flexion exercises with overpressure • Progress to quads stretch • Passive stretching as required • Hydrotherapy as required 	
Improve quads, hamstring and general lower limb strength	<ul style="list-style-type: none"> • CKC – wall slide squats (start at 60° flexion and progress), squats, leg press (start at 60° flexion and progress), single leg squats etc. NO LUNGES • Progress OKC Qs – add resistance NO OKC QS IF COMBINED PCL & ACL • Bridging on gym ball or feet on sofa (less than 30° flexion), progress to normal bridge (further knee flexion) • Calf raises, hip extensions, hip abd/add, glut med/max 	
Increase aerobic capacity	<ul style="list-style-type: none"> • Exs bike • Treadmill walking (incline) • Step ups • Cross trainer • Rower 	

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Improve proprioception	<ul style="list-style-type: none"> • Single leg stand eyes open/eyes closed • Wobble board • Sitfit • Trampette 	
Neuromuscular control	<ul style="list-style-type: none"> • Core stability work • Knee alignment/prevent hip IR/knee valgus – squats, step ups (ensure good hip/knee/ankle alignment) 	

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PHASE 4: Upon achievement of phase 3 milestones and no sooner than 12 weeks post-op.

Goal	Treatment	Milestone to progress
Control activity related swelling and pain	<ul style="list-style-type: none"> • Use of cryotherapy post exercise if knee swells with increased activity 	<ul style="list-style-type: none"> • Minimal/no activity related effusion • Full ROM • Normal gait and stair pattern – good alignment and control • 10 x single leg squats to 60° with good biomechanical alignment and control (i.e. no valgus and good hip/knee/ankle alignment)
Regain/maintain full range of movement	<ul style="list-style-type: none"> • Continue stretches 	
Normalise gait and stair pattern	<ul style="list-style-type: none"> • Treadmill walking – forward/backward/incline 	
Improve quads, hamstring, and general lower limb strength	<ul style="list-style-type: none"> • Continue CKC – double & single leg press, squats, single leg squats, commence lunges, increase weight • OKC Qs – increase load • Commence OKC Hamstring curls – double & single leg, increase weight gradually • Gluteals, calf, adductors 	
Increase aerobic capacity	<ul style="list-style-type: none"> • Exs bike • Treadmill walking • Step ups • Cross trainer • Rower • Pool walking/running 	
Improve proprioception	<ul style="list-style-type: none"> • Single leg stand eyes closed • Wobble board • Sitfit • BOSU • Trampoline 	
Neuromuscular control	<ul style="list-style-type: none"> • Core stability work • Knee alignment/prevent valgus as above – add trunk rotation 	
Commence bilateral load acceptance/ early plyometrics	<ul style="list-style-type: none"> • Bilateral drop jumps • Jumps with symmetrical squat landing • Progress to straight line jogging when good load acceptance 	

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PHASE 5: Upon achievement of phase 4 milestones.

Goal	Treatment	Milestone to progress
No swelling or pain	<ul style="list-style-type: none"> Continue as above if necessary 	<ul style="list-style-type: none"> Normal straight line running pattern Single leg press >75% body weight Single leg stand eyes shut >80% unaffected leg Hop tests >85% LSI: single hop, triple hop, cross over hop, 6m timed hop, side to side hop
Normal straight line running pattern without pain and in full control	<ul style="list-style-type: none"> Progress from jogging to running Increase speed/distance Change surface/incline Forward running/backward running 	
Increase muscle strength and endurance	<ul style="list-style-type: none"> Increase load on strengthening exs (60-80% 1RM) Single leg press – push for >75% x body weight Commence open chain quads if not already performing and gradually increase resistance 	
Improve proprioception	<ul style="list-style-type: none"> Increase dynamic proprioception 	
Progress bilateral load acceptance/commence unilateral load acceptance/plyometrics	<ul style="list-style-type: none"> Tuck jumps with stable landing Squat jumps, forward/ back/ rotational Bilateral plyometric static and multi-plane exs Single leg hop with controlled landing Forward, side hops/ drops from step with controlled single leg landing Unilateral plyometric static and multi plane activities 	

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PHASE 6: SPORTS SPECIFIC. Upon achievement of phase 5 milestones.

Goal	Treatment	Milestone to progress
Increase muscle strength and endurance	<ul style="list-style-type: none"> • Increase load on resistance work 	<ul style="list-style-type: none"> • Symptom free sports specific training • Hop tests >90% LSI : single hop, triple hop, cross over hop, 6m timed hop, side to side hop • Single leg stand eyes shut, equal to unaffected side
Progress unilateral load acceptance and work to fatigue	<ul style="list-style-type: none"> • As above – increase speed/intensity to fatigue 	
Commence sports specific running agility drills	<ul style="list-style-type: none"> • Sprinting • Cutting and pivoting • Acceleration/deceleration 	
Commence sports specific skills	<ul style="list-style-type: none"> • Ball skills • Dribbling • Boxing • Kicking • Sports specific activity with controlled opposition e.g. one on one practice drills 	
Neuromuscular control following fatigue	<ul style="list-style-type: none"> • Ensure ability to control alignment under random practice and after fatigue 	
Return to non-contract sports (only when nearing 8 months post-op)	<ul style="list-style-type: none"> • Golf/gentle racquet sports 	

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**PHASE 7: FULL UNRESTRICTED SPORTS TRAINING. Upon achievement of phase 6 milestones.
MUST BE AT LEAST 9 MONTHS POST-OP**

Goal	Treatment
Symptom free training	<ul style="list-style-type: none">• Full, unrestricted training
ROM and muscular flexibility equal to other side	<ul style="list-style-type: none">• Continue stretching
Good results of all functional testing	<ul style="list-style-type: none">• Functional tests prior to returning to contact sports
Return to full unrestricted, confident activity	<ul style="list-style-type: none">• Progress to uncontrolled practice situations and competition

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