ANTERIOR CRUCIATE LIGAMENT ACCELERATED REHABILITATION GUIDELINES



0

MD, MCH, FRCSI (TR&ORTH)

www.mrmv.ie

EVERY YEAR ABOUT 3% OF AMATEUR ATHLETES AND UP TO 15% OF ELITE ATHLETES INJURE THEIR ACL.

Females are 2-8 times more likely to injure their ACL than their male counterparts. ACL injuries are the second most common injury in GAA and it is the injury that causes the greatest number of days absent from play in rugby.

Although ACL reconstruction surgery has a high probability of returning the knee joint to near normal stability and function, the end result for the patient depends largely upon a satisfactory rehabilitation and the presence of other damage within the joint. It has been previously reported that 80% of people will return to some form of sport, 65% will return to the same sporting level, and 55% only will return to competitive sports within 1-2 years following ACL reconstruction.

For patients who are at a high risk for re-injury (i.e. young athletes and athletes returning at a high level) Mr. Vioreanu performs an extra-articular lateral iliotibial band tenodesis alongside the standard ACL reconstruction. The principle of the lateral tenodesis is to provide additional stability and support to the reconstructed ACL graft to withstand loading during pivoting and cutting movements. Recent literature suggests a significant reduction in re-rupture rates by using this additional procedure.

Surgery is only the first step of the athlete's ACL recovery journey. The rest of the recovery involves an accelerated rehabilitation programme. This programme will start before surgery under the supervision of a local physiotherapist and will progress through various stages of training over the year following surgery. The expectation to return to sport is around 9 months after the surgery providing the athlete is passed ready and fit by their physiotherapist. In Sports Surgery Clinic we routinely perform 3D testing in our biomechanical laboratory, at 6 & 9 months postoperatively, to assess the athlete's readiness to return to sport and potential areas of weakness to be improved on before the planned return to sport.

To ensure the best chance of success (i.e. returning to sport with no reinjury it is imperative that all of our athletes, guided by their physiotherapists adhere to these accelerated rehabilitation guidelines.

Bláithín Brady,

Knee Rehabilitation Specialist



Physio

Knee Rehabilitation Specialist (Bláithín Brady)

The patient will be guided through their ACL Rehabilitation journey by their own Physiotherapist and perhaps Strength & Conditioning Coach. Mr Vioreanu encourages direct communication between Physio – S&C Coach – Knee Rehabilitation Specialist (Bláithín Brady) – Surgeon to ensure safe and efficient return to sport.



~	-
_	

PREPARING FOR SURGERY

Prehabilitation is defined as preparing an individual to withstand a stressful event through enhancement of functional capacity.



GOALS:

- 1. Minimise swelling and pain
- 2. Restore range of movement (ROM)
- 3. Increase quadriceps and hamstring strength
- 4. Improve proprioception
- 5. Familiarise athlete with rehabilitation guidelines

PHYSIOTHERAPY AND PATIENT GUIDELINES:

- Stop any sports or activities involving running, jumping or pivoting on the knee.
- Apply ice often to reduce the swelling (20 minutes at a time often throughout the day).
- Encourage the use of an exercise bike as soon as athlete can tolerate it.
- When comfortable progress to swimming, rowing machine and cross trainer.
- Initiate ROM exercises.
- Implement a light, structured strength and conditioning (S&C) programme focusing on isolated and functional strength, proprioception and gentle aerobic exercise.
- Initiate open and closed chain quadriceps and hamstring strength, as patient can tolerate, progressing repetitions and weights slowly to ensure no added stress is put on the knee.
- Ideally the patient will perform 3-4 prehabilitation sessions a week prior to surgery.

- This program will ideally be carried out for 6 weeks prior to surgery or until the patients has a pain free, full ROM knee.
- Prehabilitation, once the knee is healthy, is an ideal time for patients to become familiar with the specific exercises which will be prescribed post surgery to ensure good technique is performed.
- Generally, see your physiotherapist 2-3 times, if needed, during the 6 weeks prior to surgery.
- Ensure patient is aware of the demands of the rehabilitation post surgery and has access to an equipped gym to ensure optimal recovery.
- Ensure physiotherapist is familiar with this accelerated rehabilitation programme.
- Be guided by Knee pain and swelling for adjusting the intensity and length of the sessions during this phase.

If you have any questions contact our Knee Rehabilitation Specialist, Ms Bláithín Brady, who will discuss them in more detail with you.



RETURN TO COMFORT

1-4 WEEKS

CRITERIA TO PROGRESS

- 1. Minimal Pain & Swelling
- 2. Good ROM (0-125 passively)
- 3. No Quads lag with SLR test

Contraction of the second seco

GOALS:

- 1. Minimal or no pain (EA* more pain expected)
- 2. Minimise Swelling (EA* increased lateral swelling)
- 3. Full extension (0-5 degrees)
- 4. Good flexion (minimum 125 degrees)
- 5. Good muscle control

*EA – Extra-articular tenodesis surgery.

PHYSIOTHERAPY AND PATIENT GUIDELINES:

- Fully weight bearing (FWB) & No Bracing (van Melick et al., 2016).
- Apply ice often through the acute phase (20 minutes every hour in the first few days).
- Ensure patient is taking their prescribed NSAID's & Analgesic medication.
- Start cycling on exercise bike: day 3 or when comfortable raised seat & no resistance.
- Initiate passive ROM as tolerated and manual therapy as required.
- Patella mobilisations to maintain patella mobility.
- Gait retraining with full extension at heel strike.
- Isometric strengthening of quadriceps (Isberg et al., 2006).
- 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.

- Gentle hamstring mobilising to minimise adhesions.
- Active hamstring strengthening begins with static weight bearing co-contractions and progresses to active free hamstring contractions by day 14.
- Resisted hamstring strengthening should be avoided for at least 6-8 weeks.
- Hip, Lumbar and Abdominal strengthening.
- Generally, see your physiotherapist 1-2 times a week for the first 4 weeks dependent on what your physiotherapist sees fit.

Often patients feel a 'pop' behind the knee or a strain in their hamstring at 4-6 weeks after surgery. This is due to the weakness of the hamstring tendon. It is expected and sets the rehabilitation back only by a few days.

Patients who had an extra-articular tenodesis in addition to their ACLR will experience more pain and swelling and for them, this phase will be slightly delayed.

If you have any questions contact our Knee Rehabilitation Specialist, Ms Bláithín Brady, who will discuss them in more detail with you.

RETURN TO FUNCTION

1-6 MONTHS

CRITERIA TO PROGRESS

- 1. Restore full ROM
- 2. Reduce any persistent effusion
- 3. Normalise gait
- 4. Restore single leg strength and proprioception
- 5. Increase confidence in lower limb
- 6. Improve endurance capacity
- 7: Complete functional tests

PHYSIOTHERAPY GUIDELINES:

- S&C programme focusing on variable parameters, ranging from an endurance programme of low load/high repetitions to a strength orientated phase of high load/low repetitions.
- Strengthening exercises need to be velocity, ROM and contraction specific to address particular deficits.
- Assess and ensure good movement patterns are performed for each exercise.
- Progress proprioceptive training to include wobble board and BOSU ball exercises.
- Closed Kinetic Chain Quads strength from 2 weeks onwards (van Melick et al., 2016)
- Eccentric Quads exercises from Week 3 (Gokeler et al., 2014).



GOALS:

- 1. Restore full ROM
- 2. Normalise gait
- 3. Restore single leg strength and proprioception
- 4. Increase confidence in lower limb
- 5. Improve endurance capacity of muscles
- 6. Reduce any persistent effusion

- Open Kinetic Chain Quads strength from 45-90 degrees at 3/4 weeks and progress to 10-90 degrees at 6 weeks. OKC through full ROM from Week 12.
- Eccentric Hamstring strength can start at Week 6 (van Melick et al., 2016). Hamstring curl equipment can be introduced to do this if needed.
- No concentric hamstring strength until 10-12 weeks.
- Progress use of gym equipment such as leg press, hack squat machine, deadlift bar, leg extension, hamstring curl, free weights, cable machine, steps as you see fit.
- 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, resistance band work.

PHYSIOTHERAPY GUIDELINES (CONTINUED):

- Consider and address beyond the knee joint for any deficits, e.g. gluteal control, tight hamstrings, ITB symptoms, gastroc and soleus weakness or overload etc.
- Progress co-contractions to more specific and dynamic movements, e.g. step lunges, single leg squats, single leg bridge work etc.
- From 3-4 months proprioceptive work can be more dynamic, e.g. lateral stepping, slide board etc.
- From 3 months patient can begin jogging in straight lines on the flat.
- Consider pelvic and ankle control plus cardiovascular fitness.

PATIENT EDUCATION:

- Adherence to rehabilitation 3-4 times a week dependent on advice from your physiotherapist is key for recovery.
- It is advised that you join a gym if you are not already a member to have access to gym equipment.
- Rowing, swimming and using the cross trainer are usually permitted with little or no restrictions during this stage.
- If swelling is persistent, continue with pressure pump and ice after work out sessions.

- Continue with some mobility work, foam rolling and recovery work in the pool to aid recovery.
- You can cycle on a normal bike at Weeks 5/6.
- Avoid exposing yourself to an 'unlucky' reinjury event by restricting the exercises to only guided / planned work-out sessions.
- Generally, see your physiotherapist once a week for the first 6-8 weeks then every two weeks for 3-4 sessions and then once a month until discharge unless your physiotherapist advises otherwise.

FUNCTIONAL TESTS*

- 1. Single leg squat test (functional alignment test)
- 2. Quadriceps and Hamstring isolated strength <10% difference between limbs
- 3. Squat 1 RM 1.25/1.5 BW
- 4. Single leg press 1RM 1.25/1.5 BW
- 5. Single leg bridge <10% difference between legs
- 6. Single leg calf raises <10% difference between legs
- 7. Single leg rise test <10% difference between legs

*These tests are assessed by the Physiotherapist. They are just a guide but useful to adhere to.

If you have any questions contact our Knee Rehabilitation Specialist, Ms Bláithín Brady, who will discuss them in more detail with you.



RETURN TO FITNESS

4-9 MONTHS



GOALS:

- Incorporate running, agility and landing drills
- 2. Increase total lower limb strength
- 3. Increase athlete's confidence
- 4. Ascertain excellent proprioception and reactive skills
- 5. Improve cardiovascular fitness

CRITERIA TO PROGRESS

- 1. Ideally be within 10% of baseline measures (pre op or relative to similar cohort-dependent on available data)
- 2. Quadriceps and Hamstring isolated strength: <10% or no difference between legs
- 3. Be psychologically ready and eager to RTS
- 4. Be adept with Injury Prevention Programme
- 5. Complete functional tests

PHYSIOTHERAPY GUIDELINES:

- Increase the speed (acceleration and deceleration) of the straight line running.
- Begin agility drills such as slalom running, shuttle runs, and ladder/hurdle drills, ball skills, sideways running, skipping, etc at 4-5 months.
- Focus on sports specific, single leg strength ensuring equal and improved strength in both limbs.
- Implement high level, sports specific proprioceptive training.
- Reinforce plyometric training with a focus on good landing techniques (Increased knee flexion, decreased valgus rotation).
- Initiate Injury Prevention Programme during warm-up (PEP, FIFA 11 +, GAA 15).

- Ensure athlete is reassured regarding their progress through rehabilitation.
- Jumping and hopping exercises usually start with drills such as scissor jumps and single hops and progress to box jumps and single leg landings with perturbations.
- Reinforce nordic hamstring exercises
- Proprioceptive work should include hopping and jumping activities and emphasise a good landing technique.
- Sports specific fitness drills incorporating speed, distance, turns, landing, ball/hurl/ hockey work and endurance.
- Incorporate more difficult lateral and posterior movements.

ATHLETE EDUCATION:

- Adhere to rehab sessions: 3-4 times a week (ideally 4-5 times a week if including strength and running drills) dependent on advice from your physiotherapist.
- It is important that you perform the correct technique when carrying out your rehabilitation exercises. Compensation patterns can develop so ensure you are supervised by an S&C coach or your physiotherapist if you are unsure of technique.
- It is imperative that you become adept with participating in an Injury Prevention Programme 3 times a week. This can be part of your warm-up, before your running sessions.
- More intense cardiovascular exercise may be included involving the rowing machine, cycling, running and swimming with little or no restrictions during this stage.

- Recovery is key. Ensure you are taking adequate breaks from training, eating well, staying hydrated and psychologically preparing yourself for a gradual return to sport.
- Continue with some mobility work, foam rolling and recovery work in the pool to aid recovery.
- It is beneficial for the athlete to perform the 3D testing in the SSC biomechanical laboratory, at 6 and 9 months postoperatively, to assess their readiness to return to sport and potential areas of weakness to be improved on before the planned return to sport.
- Generally, see your physiotherapist once a month until discharge at this stage unless your physiotherapist advises otherwise.

FUNCTIONAL TESTS*

- 1. Single leg squat test- excellent
- 2. SEBT composite score > 95% of uninjured limb
- 3. 4 x Hop tests > 90% uninjured side (Fresh and Fatigued)
- 4. Agility T-test <11 secs (Fresh and Fatigued)
- 5. Landing Error Scoring System (LESS) 0-3 out of 18 (Fresh and Fatigued)

*These tests are assessed by the Physiotherapist. They are just a guide but useful to adhere to.

If you have any questions contact our Knee Rehabilitation Specialist, Ms Bláithín Brady, who will discuss them in more detail with you.



RETURN TO PERFORMANCE

9-12 MONTHS

CRITERIA TO PROGRESS

- 1. Complete some supervised running, agility and sports specific drills
- 2. Complete unrestricted training for 2-4 weeks and 2 rounds of lower level play
- 3. Restore complete confidence in returning to full competitive sport
- 4. Ensure athlete is adept with injury prevention programme

PHYSIOTHERAPY GUIDELINES:

- Continue progression of plyometric and sports specific drills
- Continue to improve power, fitness and endurance skillset
- Return to training and participate in skills exercises
- Warm up should include an injury prevention programme 3 times a week to prevent re-rupture (Webster, 2018)
- Participating in training with their chosen sport or team will increase confidence (Ardern et al., 2013)

GOALS:

to RTS

3. Ensure athlete is adept and

4. Ideally be within 10% of baseline

ATHLETE GUIDELINES:

- Adhere to rehabilitation 2-3 times a week dependent on advice from your physiotherapist.
- Regularly carry-out your Injury Prevention Programme - 3 times a week. This can be before your training sessions and ideally on the type of surface that you will be playing your chosen sport on.
- At this stage you should be confidently participating in your chosen sport and back in the middle of returning or already have returned to competitively playing/ participating.
- Recovery is key. Ensure you are taking adequate breaks from training, eating well, staying hydrated and psychologically being confident participating in your chosen sport.
- Continue with some mobility work, foam rolling and recovery work in the pool to aid recovery.
- Once athletes return to running with no pain then they sometimes adhere less to the rehabilitation protocol which can lead to the risk of re-injury. Be Smart!
- Attend your physiotherapist only if required at this stage.

MIHAI VIOREANU MD, MCH, FRCSI (TR&ORTH)



CONTINUOUS INJURY PREVENTION

12 MONTHS ONWARDS →

GOALS:

- 1. Prevent re-injury or injury to contralateral knee
- 2. Ensure athlete is adept with Injury Prevention Programme
- 3. Maintain strength and good habits

PHYSIOTHERAPY GUIDELINES:

- Continuous education re importance of Injury Prevention Programmes.
- Injury Prevention Programme should be completed 3 times a week as a warm up for their chosen sport (Webster, 2018).
- Strength maintenance programme in place twice a week for at least 3-6 months after return to sport. (Hewett et al., 2005; Sward et al., 2010).
- Consider these six principles when developing an injury prevention programme: age, biomechanics, compliance, dosage, feedback, and exercise. (Sugimoto et al. 2015).
- Make regular contact with the athlete to ensure that they are complying with the strength and injury prevention programs.

ATHLETE GUIDELINES:

- Complete your Injury Prevention Programme 3 times a week ideally on the type of surface that you will be playing your chosen sport on.
- Continue to perform plyometric exercises focusing on proper technique and body mechanics as they can help to reduce serious ligamentous injuries, specifically ACL injuries.
- Continue to perform proprioception and balance training as they can improve postural control and side to-side imbalances in lower extremity measures thus preventing ACL injuries.
- Recovery is key. Ensure you are taking adequate breaks from training, eating well, staying hydrated and psychologically being confident participating in your chosen sport.
- Continue with some mobility work, foam rolling and recovery work in the pool to aid recovery.



Sarah Cullen Executive Assistant sarah@mihaivioreanu.com



Mr Mihai Vioreanu MD, MCH, FRCSI (TH&ORTH) Consultant Orthopaedic Surgeon mihai@mihaivioreanu.com



Bláithín Brady BSc, MSc, MISCP, MCPSEM Clinical & Research Physiotherapist blaithin@mihaivioreanu.com

Office Contact:

Phone: 01 526 2340 Fax: 01 526 2341 Suite 16, Sports Surgery Clinic, Santry Demesne, Dublin 9, Ireland

Preferred and most efficient contact by email.







www.mrmv.ie