

Anterior Cruciate Ligament (ACL) Reconstruction: Rehabilitation

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Introduction

The ACL is one of the most important ligaments in the knee. It prevents anterior translation and excessive rotation of the tibia relative to the femur. If the ACL is disrupted it allows the tibia to partially dislocate, causing repeated episodes of instability. Untreated, and allowed to persist, this instability may result in secondary damage to the menisci (cartilages) and also articular (joint) surfaces leading to early degenerative joint disease or osteoarthritis. Therefore, the goals of ACL reconstruction are to restore normal knee function and eliminate episodes of instability thereby minimising future degenerative joint disease.

ACL reconstruction is recommended for most active individuals, but non-operative treatment may be indicated for those individuals who are willing to modify their activities.

The optimal rehabilitation programme must take into account many factors including:

1. Graft types, strength and fixation
2. Individual patient factors, such as rate of healing and compliance with the rehabilitation programme.

Graft Types: Strength and Fixation

There are various choices regarding graft type available. Most surgeons in the UK use either:

- four-strand hamstring graft, or
- middle third of the patellar tendon with bone plugs attached to either end.

Both have sufficient strength to substitute for the original ACL.

Alternatives may include an allograft i.e. a piece of tissue from another (deceased) person, or part of the quadriceps tendon. Historically, synthetic material has been used.

Fixation systems vary, but most types available on the market today in the UK are described as easily exceeding the required strength. However, all fixation systems must be regarded as being temporary, as their role is intended to stabilise either end of the graft for the time it takes for natural healing to occur and the attachments to become incorporated into the natural host tissue. This process can be variable

although most authorities would accept that bone to bone healing, for instance with a bone plug at either end of the middle third of the patellar tendon, gives a faster more predictable healing than soft tissue-to-bone healing.

The rate of incorporation, or vascularisation, and maturation of the intraarticular portion (the part which crosses the knee) of the graft is another important consideration. Graft strength is strongest at the time of reconstruction, but then the strength reduces over the following two to three months before revascularisation occurs. Thereafter the graft strength slowly increases as it becomes repopulated with normal living tissue from the host bone. It takes up to 9 months for the graft to strengthen enough to allow return to competitive sport.

Rehabilitation Factors

Prolonged immobilisation of a joint is harmful. Ligament attachments to bone are compromised by disuse and immobilisation. The joint surfaces and cartilage tissue are also sensitive to immobility. Therefore immediate and early motion is required postoperatively, but this should be done in a controlled safe manner to avoid straining either the graft or the fixation.

The healing process varies among patients. Those patients who have generalised ligament laxity or hyper-mobility of other joints may need to be protected longer and employ a less aggressive rehabilitation programme. Conversely, those patients who tend to produce excessive amounts of scar tissue may be at greater risk of developing arthrofibrosis (joint scarring) and so will require a more accelerated and aggressive rehabilitation protocol. Patients also have different wishes and requirements and obviously a professional athlete will require a different protocol than someone who merely wishes to continue with normal day-to-day activities.


It follows that whilst the general principles of a rehabilitation programme will be common to all patients, there will be significant differences in their detailed recovery programme dependent on the various factors detailed above.


The following document is a detailed rehabilitation diary designed to document and record an exercise programme to be used following ACL surgery. It is intended to be performed under the supervision of a physiotherapist. It has been divided into the various phases following surgery. Not all patients will require all the exercises.


Post-Op 0–2 weeks following surgery


Aims of this Phase Reduce pain & swelling
 Regain full extension / flexion to 90 degrees (if pain allows)
 Wound healing / suture removal
 Improve gait pattern – increase weight bearing.
 Maintain muscle function


Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
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Passive extension 	morning							
	midday							
	afternoon							
	evening							


Assisted flex 	morning							
	midday							
	afternoon							
	evening							

Static quads 	morning							
	midday							
	afternoon							
	evening							

SLR 	morning							
	midday							
	afternoon							
	evening							

Inner range quads 	morning							
	midday							
	afternoon							
	evening							

Single leg stand 	morning							
	midday							
	afternoon							
	evening							


Knee flexion 	morning							
	midday							
	afternoon							
	evening							


balance 	morning							
	midday							
	afternoon							
	evening							


Post-Op 2 – 6 weeks following surgery


Aims of this Phase Little or no pain
 Eliminate swelling
 Full extension, flexion to 120 degrees
 Discard crutches / normal gait
 Regain muscle control / balance


Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
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1 leg calf raise 	morning						
	midday						
	afternoon						
	evening						


1 leg mini-squat 	morning						
	midday						
	afternoon						
	evening						


Calf raise 	morning						
	midday						
	afternoon						
	evening						

Core gluts 	morning						
	midday						
	afternoon						
	evening						


Core stability 	morning						
	midday						
	afternoon						
	evening						


Double leg jump 	morning						
	midday						
	afternoon						
	evening						


Forward step up 	morning						
	midday						
	afternoon						
	evening						


Heel lifts 	morning						
	midday						
	afternoon						
	evening						


Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
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Heel slides 	morning							
	midday							
	afternoon							
	evening							


Intermed balance 	morning							
	midday							
	afternoon							
	evening							


Knee fallout 	morning							
	midday							
	afternoon							
	evening							


Mini squat 	morning							
	midday							
	afternoon							
	evening							

Resisted hip abduction 	morning							
	midday							
	afternoon							
	evening							


Resisted hip extension 	morning							
	midday							
	afternoon							
	evening							


Side step up 	morning							
	midday							
	afternoon							
	evening							


Static bike 	morning							
	midday							
	afternoon							
	evening							


Step down 	morning							
	midday							
	afternoon							
	evening							

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
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Stepper 	morning							
	midday							
	afternoon							
	evening							

Trans abs 	morning							
	midday							
	afternoon							
	evening							

VMO squat 	morning							
	midday							
	afternoon							
	evening							


Hams curl 	morning							
	midday							
	afternoon							
	evening							


Post-Op 6 – 10 weeks following surgery


Aims of this Phase Normal walking
 Return to driving
 Return to work (light physical)
 Improve muscle strength & balance
 Full ROM


Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
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Advanced gluts 	morning							
	midday							
	afternoon							
	evening							


Calf stretch 	morning							
	midday							
	afternoon							
	evening							


Core squat 	morning							
	midday							
	afternoon							
	evening							

Hams stretch 	morning							
	midday							
	afternoon							
	evening							


Hams curl 	morning							
	midday							
	afternoon							
	evening							

Jump turns 	morning							
	midday							
	afternoon							
	evening							

Lunge 	morning							
	midday							
	afternoon							
	evening							

Quads stretch 	morning							
	midday							
	afternoon							
	evening							

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
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	morning							
	midday							
	afternoon							
	evening							

	morning							
	midday							
	afternoon							
	evening							

	morning							
	midday							
	afternoon							
	evening							

Any questions or concerns can be addressed to your Physiotherapist or:

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