

# ACL Injury



**The ACL** (anterior cruciate ligament) is in the middle of the joint and passes from the centre front of the tibia, upwards and backwards to attach to the outer side of the intercondylar notch.

It is responsible for controlling forward glide of the tibia in relation to the femur, this movement is known as 'anterior tibial translation'. The ACL also works in conjunction with the other ligaments (the posterior cruciate ligament and the collateral ligaments) to restrict rotation (or twisting) of the knee.

## How does injury occur?

Firstly, let's point out that the ACL is a very strong structure. It takes approx 1700N of force to break the ACL and usually, during everyday activity, the maximum force we put through the ligament is approximately 450N. Obviously when we start to take part in certain sports or if we have an accident then those force levels can increase significantly.

A large percentage of ACL injuries occur whilst playing contact sports such as football and rugby however, surprisingly, most happen in a non-contact situation. Commonly there is sudden deceleration followed by a change of direction (a footballer sprints to the ball, slows quickly and twists as he kicks the ball). Twisting injuries are also common in skiing and often occur while stationary or moving relatively slowly - rupture of the ACL can occur particularly if bindings fail to release.

Finally, sports which involve high impact landing can increase risk of injury. Any fault or disruption to landing technique or timing can lead to high twisting forces passing through the joint.

## Diagnosis

It has been suggested that approximately 35% of ACL injuries are missed on initial diagnosis. Assessment of an acutely painful and swollen knee is not always easy; a good history is extremely helpful. Your doctor will ask you to describe exactly how the injury occurred, whether you could stand and continue with your activity and he will also want to know about swelling, particularly how quickly it occurred.

## Clinical assessment:

If you have given a good history your clinician will probably already have an idea what has happened before he examines you. He will always look at your

opposite leg as well to make comparisons.

Palpation (feeling) the knee allows an assessment of swelling and inflammation – an inflamed knee may be very hot and tender as well as swollen.

The examiner will ask you to bend and straighten the knee as far as you can, he may then add some overpressure at the limits of your movement to check the full range. Any block to movement or pain will be significant.

Typically your doctor or physiotherapist will test for cruciate ligament damage by assessing how far the tibia will glide forwards and backwards on the femur. Usually he will test both legs and compare them – this is because there is a natural difference in normal movement between different people, the examiner will use your uninjured leg to represent what is normal for you.

Testing for the ACL is done with your knee bent approximately 20-30° from the horizontal. This is called the 'Lachman test' and is very sensitive and specific for the ACL.



Testing for the PCL (posterior cruciate ligament) is done with the knee bent at 90° and is called the 'Drawer test'.



There is another test which is very reliable for ACL injury called the 'lateral pivot shift' test. This involves applying a sideways pressure on the joint while rotating and bending it however, it can be difficult to perform in an acute situation or if you are very tense. It is more likely to be tried when examining a more chronic injury, or if assessing a joint under anaesthetic. The examiner will also check your collateral ligaments, your menisci (cartilages) and the joint between your kneecap and femur.



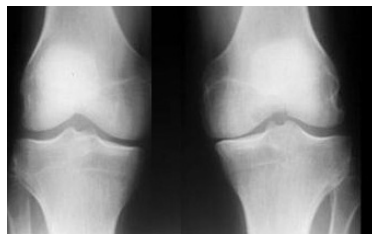
Remember, if the joint is very swollen at the time of examination it is not always easy to obtain reliable results, hence your accurate description of the mechanism of injury and the period immediately after is invaluable.

### Other investigations:

Further diagnostic tests may be

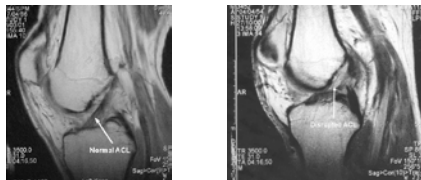
indicated to confirm a questionable diagnosis or to check if any other structures have also been injured – this could affect the treatment required.

**A Standard X'ray:** this will only show bone but it may be important to rule out any fractures (breaks) and also to see how the bones are positioned in relation to each other. Sometimes a 'stress X'ray' is done to assess the integrity of the collateral ligaments – the X'ray is taken while sideways pressure is applied to the knee.



Normal views Stress views

**An MRI Scan:** this will show all the structures in the knee and enables a reliable diagnosis to be made.



**The KT2000** is the most commonly used arthrometer to assess the ACL. The machine gives an objective measure of how much Anterior tibial translation the ACL allows, again comparing with the uninjured side.

The difference in movement between the two sides, with the same degree of force application, is the significant measure.



## Early Treatment

Damage to the 'soft tissues' (ligaments, muscles, tendons, joint capsule etc) will cause inflammation, this is your body's natural response to injury and is the first phase of the healing process.

The inflammatory phase should start to settle approximately 5 days from injury however, this can be prolonged by inappropriate management. This phase prepares the area for healing but sometimes the body's response is excessive, leading to increased pain, heat, swelling and loss of movement. Correct management will ensure that this phase is not extended.

Regardless of how quickly an accurate diagnosis is made, early treatment to reduce swelling and inflammation and regain movement is imperative.

The principles of (P)RICE should be followed from the time of injury.

## PRICE

### Protection

Protection prevents further injury which would increase the inflammatory response and delay healing. Protection may mean using a walking aid or splint to limit weight bearing and prevent giving way.

### Rest

Relative rest is a more appropriate term to use – it is certainly important to completely rest the injured knee for the first 24 hours but limited activity is then possible by using crutches to relieve weight.

Gentle pain-free movement will prevent the knee becoming stiff and improve the alignment and ultimate strength of any healing tissue. A fine line exists between enough activity and too much activity, both of which can be detrimental to the healing process. Total inactivity can lead to a delay in healing, adhesion formation, muscle weakness and reduced sensory awareness (this is called 'proprioception' and is important for balance and coordination).

Too much activity can cause stress to healing structures and an increased and prolonged inflammatory phase.

As a general guide, movements should be kept within a pain-free range and repeated 'little and often'. Do not be tempted to add resistance in the form of weights at this stage.

## Ice

Ice or cold therapy is effective in reducing excessive inflammation following injury. It should be applied as soon as possible - within 1 hour preferably. It is more effective at preventing swelling than reducing it once it has developed.

Applied immediately, ice will also help to decrease soft tissue damage, pain and muscle spasm.

Application:

BEWARE - Frost-bite can occur if the skin temperature drops to -3.9C or below. If you use a bag of frozen peas (a two pound bag is the right size and moulds nicely to the shape of the knee)

wrap it in a **damp** towel before you apply it to the skin. Gel packs can reach very low temperatures in the freezer, so again be sure to protect the skin with a layer of **damp** towel.

Apply ice for a maximum of 15-20 minutes, every two hours. Continue until the tendency to swell stops - this is usually 12 - 72 hours after injury.

## Compression

Compression should be applied to the injured area as soon as possible to reduce internal bleeding and control swelling formation. If ice has been applied then the compression should be administered immediately after the ice. Compression should be applied from below the injury site (just above the ankle), across it and continue for some way above (mid thigh). It will remain effective until swelling has dispersed.

## Elevation

Immediately following injury, ie. while ice is in situ, elevate your leg so that the knee is higher than your heart; this will limit the development of swelling.

Depending where you are when you become injured, it may be impractical to elevate the leg to this height - if this is the case then at least try to put your leg up on a chair so that it is horizontal. Keep the leg elevated as much as possible, certainly in the first 24 hours.

## Summary

- Apply ice - 2lb bag of peas or a gel pack wrapped in a **damp** towel.

- Elevate the leg 15-25 cm above heart level.
- Leave for 15 -20 minutes - remove ice - maintain elevation.
- Apply compression.
- Reapply ice up to 2 hourly.
- Use a stick or crutches for any unavoidable moving about.

During this phase simple exercises to maintain pain-free range of movement and some muscle function are useful. It is important to be able to straighten the knee fully as well as bend it.

Here are some simple exercises you can practise while resting.



Gently bend your knee up & down



Brace the muscle on the front of the thigh (Quads) to straighten the knee and hold for 10 secs. Relax and repeat approx 10X hourly.



An extension stretch – rest heel & allow knee to stretch back fully straight – do this for 5 minutes every hour, if possible.

As inflammation settles down exercises can be progressed. It is important at this stage to gradually increase movement in the joint and to begin graduated strengthening exercises – be careful not to push too hard or you may make the knee swell again. You should gradually wean off the crutches (if you have been using them), but only when you can walk safely and without a limp.

***Please note:***

*All exercises are intended as examples. If you are unsure how to perform them or if they are unsuitable for you personally, please do not hesitate to contact us.*

For further information and advice please contact us