

# DR. AZIZ BHIMANI

Hip and Knee Surgeon

For all appointments and enquiries please call (02) 4229 9116



**Disclaimer:** This document is an educational resource only and should not be used to make a decision on ACL injury treatment or about arthritis management. All decisions about ACL injury treatment or about arthritis management must be made in conjunction with your surgeon or a licensed healthcare provider.

## Anterior Cruciate Ligament (ACL) Injuries

One of the most common knee injuries is an anterior cruciate ligament sprain or tear.

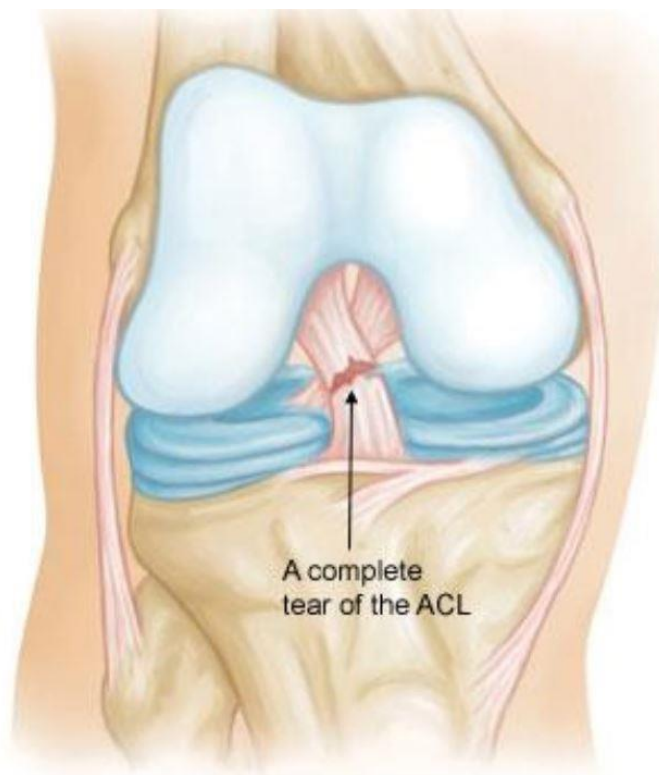
Athletes who participate in high demand sports like soccer, football, and basketball are more likely to injure their anterior cruciate ligaments.

The anterior cruciate ligament is one of the major stabilizing ligaments in the knee. It is a strong rope like structure located in the centre of the knee running from the femur to the tibia.

When this ligament tears unfortunately it doesn't heal and often leads to the feeling of instability in the knee.

ACL reconstruction is a commonly performed surgical procedure and with recent advances in arthroscopic surgery can now be performed with minimal incisions and low complication rates.

If you have injured your anterior cruciate ligament, you may require surgery to regain full function of your knee. This will depend on several factors, such as the severity of your injury and your activity level.



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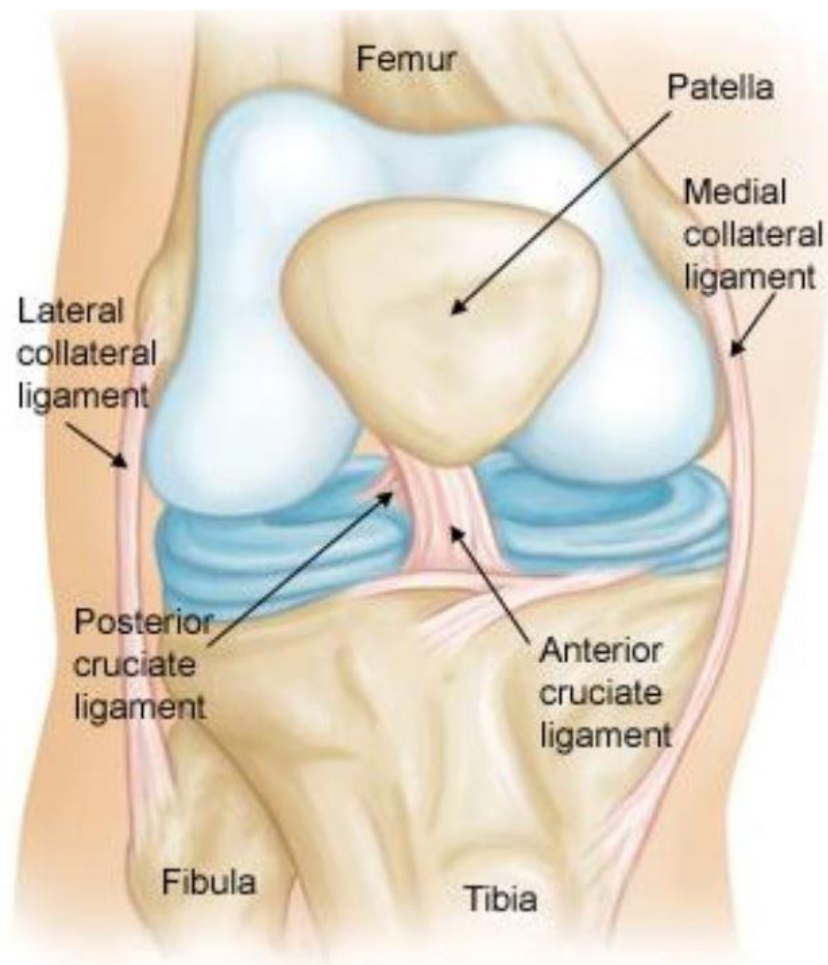
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## Anatomy

Three bones meet to form your knee joint: your thighbone (femur), shinbone (tibia), and kneecap (patella). Your kneecap sits in front of the joint to provide some protection.

Bones are connected to other bones by ligaments. There are four primary ligaments in your knee. They act like strong ropes to hold the bones together and keep your knee stable.



Normal knee anatomy. The knee is made up of four main things: bones, cartilage, ligaments, and tendons.

## Collateral Ligaments

These are found on the sides of your knee. The medial collateral ligament is on the inside and the lateral collateral ligament is on the outside. They control the sideways motion of your knee and brace it against unusual movement.

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## Cruciate Ligaments

These are found inside your knee joint. They cross each other to form an "X" with the anterior cruciate ligament in front and the posterior cruciate ligament in back. The cruciate ligaments control the back and forth motion of your knee.

The anterior cruciate ligament runs diagonally in the middle of the knee. It prevents the tibia from sliding out in front of the femur, as well as provides rotational stability to the knee.

## Description

About half of all injuries to the anterior cruciate ligament occur along with damage to other structures in the knee, such as articular cartilage, meniscus, or other ligaments.

Injured ligaments are considered "sprains" and are graded on a severity scale.

**Grade 1 Sprains:** The ligament is mildly damaged in a Grade 1 Sprain. It has been slightly stretched, but is still able to help keep the knee joint stable.

**Grade 2 Sprains:** A Grade 2 Sprain stretches the ligament to the point where it becomes loose. This is often referred to as a partial tear of the ligament.

**Grade 3 Sprains:** This type of sprain is most commonly referred to as a complete tear of the ligament. The ligament has been split into two pieces, and the knee joint is unstable.

Partial tears of the anterior cruciate ligament are rare; most ACL injuries are complete or near complete tears.

## Cause

The anterior cruciate ligament can be injured in several ways:

- Changing direction rapidly
- Stopping suddenly
- Slowing down while running
- Landing from a jump incorrectly
- Direct contact or collision, such as a football tackle

## Symptoms

When you injure your anterior cruciate ligament, you might hear a "popping" noise and you may feel your knee give out from under you. Other typical symptoms include:

- Pain with swelling: Within 24 hours, your knee will swell. If ignored, the swelling and pain may resolve on its own. However, if you attempt to return to sports, your knee will probably be unstable and you risk causing further damage to the cushioning cartilage (meniscus) of your knee.
- Loss of full range of motion
- Tenderness along the joint line

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- Discomfort while walking

### Physical Examination and Patient History

During your first visit, Dr Bhimani will talk to you about your symptoms and medical history.

During the physical examination, Dr Bhimani will check all the structures of your injured knee, and compare them to your non-injured knee. Most ligament injuries can be diagnosed with a thorough physical examination of the knee.

### Imaging Tests

Other tests which may help Dr Bhimani confirm your diagnosis includes:

X-rays: Although they will not show any injury to your anterior cruciate ligament, x-rays can show whether the injury is associated with a broken bone.

Magnetic resonance imaging (MRI) scan: This study creates better images of soft tissues like the anterior cruciate ligament. However, an MRI is usually not required to make the diagnosis of a torn ACL.

### Treatment

Treatment for an ACL tear will vary depending upon the patient's individual needs. For example, the young athlete involved in agility sports will most likely require surgery to safely return to sports. The less active, usually older, individual may be able to return to a quieter lifestyle without surgery.

### Nonsurgical Treatment

A torn ACL will not heal without surgery. But nonsurgical treatment may be effective for patients who are elderly or have a very low activity level. If the overall stability of the knee is intact, Dr Bhimani may recommend simple, nonsurgical options.

- Bracing: Dr Bhimani may recommend a brace to protect your knee from instability. To further protect your knee, you may be given crutches to keep you from putting weight on your leg.
- Physical therapy: As the swelling goes down, a careful rehabilitation program is started. Specific exercises will restore function to your knee and strengthen the leg muscles that support it.

### Surgical Treatment

Rebuilding the ligament: Most ACL tears cannot be sutured (stitched) back together, so to surgically repair the ACL and restore knee stability the ligament must be reconstructed. Dr Bhimani will replace your torn ligament with a tissue graft. This graft acts as scaffolding for a new ligament to grow on.

Grafts can be obtained from several sources. Often they are taken from the patellar tendon, which runs between the kneecap and the shinbone. Hamstring tendons at the back of the thigh are a common source of grafts. Sometimes a quadriceps tendon, which runs from the kneecap into the thigh, is used. Finally, cadaver graft (allograft) can be used.

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There are advantages and disadvantages to all graft sources. You should discuss graft choices with Dr Bhimani to help determine which is best for you.

Because the regrowth takes time, it may be six months or more before an athlete can return to sports after surgery.

### Procedure

Surgery to rebuild an anterior cruciate ligament is done with an arthroscope using small incisions. Arthroscopic surgery is less invasive. The benefits of less invasive techniques include less pain from surgery, less time spent in the hospital, and quicker recovery times.

### Rehabilitation

Whether your treatment involves surgery or not rehabilitation plays a vital role in getting you back to your daily activities. A physical therapy program will help you regain knee strength and motion.

If you have surgery, physical therapy first focuses on returning motion to the joint and surrounding muscles. This is followed by a strengthening program designed to protect the new ligament. This strengthening gradually increases the stress across the ligament. The final phase of rehabilitation is aimed at a functional return.

The remaining rehabilitation will be supervised by a physiotherapist and will involve activities such as exercise bike riding, swimming, proprioceptive exercises and muscle strengthening. Cycling can begin at 2 months, jogging can generally begin at around 3 months. The graft is strong enough to allow sport at around 6 months however other factors come into play such as confidence, fitness and adequate fitness and training.

Professional sportsmen often return at 6 months but recreational athletes may take 10 -12 months depending on motivation and time put into rehabilitation.

The rehabilitation and overall success of the procedure can be affected by associated injuries to the knee such as damage to meniscus, articular cartilage or other ligaments.

The following is a more detailed rehabilitation protocol useful for patients and physiotherapists. It is a guide only and must be adjusted on an individual basis taking into account pain, other pathology, work and other social factors.

#### Acute (0 – 2 Weeks)

##### Goals

- Wound healing
- Reduce swelling
- Regain full extension
- Full weight bearing
- Wean off crutches
- Promote muscle control

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### *Treatment Guidelines*

- Pain and swelling reduction with ice, intermittent pressure pump, soft tissue massage and exercise
- Patella mobilisation
- Active range of motion knee exercises, calf and hamstring stretching, contraction (non-weight bearing progressing to standing), muscle control and full weight bearing. Aim for full extension by 2 weeks. Full flexion will take longer and generally will come with gradual stretching. Care needs to be taken with hamstring co contraction as this may result in hamstring strains if too vigorous. Light hamstring loading continues into the next stage with progression of general rehabilitation. Resisted hamstring loading should be avoided for approximately 6 weeks
- Gait retraining encouraging extension at heel strike

### **Stage 2- Quadriceps Control (2-6 Weeks)**

#### *Goals*

- Full active range of motion
- Normal gait with reasonable weight tolerance
- Minimal pain and effusion
- Develop muscular control for controlled pain free single leg lunge
- Avoid hamstring strain
- Develop early proprioceptive awareness

#### *Treatment Guidelines*

- Use active, passive and hands on techniques to promote full range of motion
- Progress closed chain exercises (quarter squats and single leg lunge) as pain allows. The emphasis is on pain free loading, VMO and gluteal activation
- Introduce gym based exercise equipment including leg press and stationary cycle
- Water based exercises can begin once the wound has healed, including treading water, gentle swimming avoiding breaststroke
- Begin proprioceptive exercises including single standing leg balance on the ground and mini tramp. This can progress by introducing body movement whilst standing on one leg
- Bilateral and single calf raises and stretching
- Avoid isolated loading of the hamstrings due to ease of tear. Hamstrings will be progressively loaded through closed chain and gym based activity

### **Stage 3- Hamstring/Quadriceps Strengthening (6-12 Weeks)**

#### *Goals*

- Begin specific hamstring loading
- Increase total leg strength
- Promote good quadriceps control in lunge and hopping activity in preparation for running

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### *Treatment Guidelines*

- Focal hamstring loading begins and is progressed steadily throughout the next stages of rehabilitation
- Active prone knee flexion which can be quickly progressed to include a light weight and gradually increasing weights
- Bilateral bridging off a chair. This can be progressed by moving onto a single leg bridge and then single leg bridge with weight held across the abdomen
- Single straight leg dead lift initially active with increasing difficulty by adding dumbbells
- With respect to hamstring loading, they should never be pushed into pain and should be carefully progressed. Any subtle strain or tightness following exercises should be managed with a reduction in hamstring based exercises
- Gym based activity including leg presses, light squats and stationary bike which can be progressively increased in intensity as pain and control allow. It is important to monitor any effusions following exercise and if it is increasing then exercise should be toned down
- Once single leg lunge control is comparable to the other side hopping can be introduced. Hops can be made more difficult by including variations such as forward/back, side to side off a step and in a quadrant
- Running may begin towards the latter part of this stage
- Prior to running certain criteria must be met
- No anterior knee pain
- A pain free lunge and hop that is comparable to the other side
- The knee must have no effusion
- Before jogging start having brisk walks, ideally on a treadmill to monitor landing
- Action and any effusion. This should be done for several weeks before jogging properly
- Increased proprioceptive manoeuvres with standing leg balance and progressive hopping based activity
- Expand calf routine to include eccentric loading

### **Stage Four-Sport Specific (3-6 Months)**

#### *Goals*

- Improve leg strength
- Develop running endurance speed, change of direction
- Advanced proprioception
- Prepare for return to sport and recreational lifestyle

#### *Treatment Guidelines*

- Controlled sport specific activities should be included in the progression of running and gym loads. Increasing effusion post running that isn't easily managed with ice should result in a reduction in running loads
- Advanced proprioception to include controlled hopping and turning and balance correction
- Monitor potential problems associated with increasing loads
- No open chain resisted leg extension exercises unless authorised by your surgeon

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### Stage Five-Return to Sport (6 Months Plus)

#### Goals

- A safe return to sporting activities

#### Treatment Guidelines

- Full training for 1 month prior to active return to competitive sport
- Preparation for body contact sports. Begin with low intensity one on one contests and progress by increasing intensity and complexity in preparation for drills that one might be expected to do at training
- To improve running endurance leading up to a normal training session
- Full range, no effusion, good quadriceps control for lunge, hopping and hop and turn type activity. Circumference measures of thigh and calf to within 1 cm of other side

### Risks & Complications

Complications are not common but can occur, so it is important you understand these so you can make an informed decision on the advantages and disadvantages of surgery.

Complications include:

- Allergic reactions to medications
- Infection
- Deep vein thrombosis
- Excessive swelling & Bruising
- Joint stiffness
- Graft failure
- Damage to nerves or vessels
- Hardware problems
- Donor site problems
- Residual pain
- Reflex Sympathetic Dystrophy

The vast majority of Dr Bhimani's patients who undergo surgery for an anterior cruciate ligament issue experience favourable long-term outcomes including relief from pain and increased stability and function.

Dr Bhimani believes that surgery should only be considered once non-operative treatment has failed, and that the decision to have surgery should be a considered one. If you have any questions please speak with Dr Bhimani. If you are undecided, it is best to wait until you are sure this is the procedure for you.