

Anterior cruciate ligament deficient (ACLD) knee



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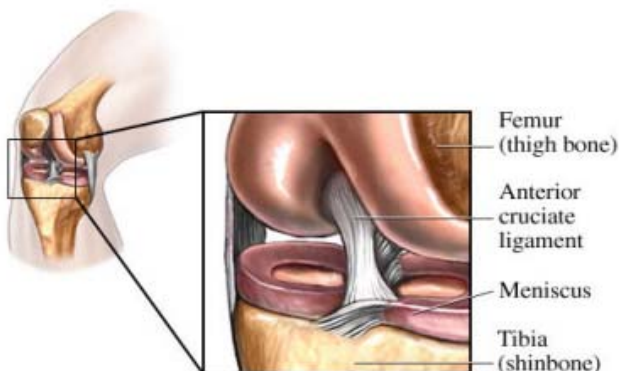
How does my knee work?

The knee joint is made up of the femur (thigh bone), the tibia (shin bone) and the patella (knee cap).

The knee also has ligaments that help to stabilise the joint. These include two collateral ligaments (either side of your knee) and your ACL and PCL (anterior cruciate and posterior cruciate ligaments), which cross each other inside your knee joint.

The ACL is a broad thick band, which stops the tibia sliding forwards in relation to the femur. It starts at the bottom of the femur, passes down, and forwards to attach to the top of the tibia. As the ACL is situated inside of the knee joint, when you rupture your ACL it causes bleeding. This is why your knee quickly swells after the rupture.

Muscles also play a vital role in supporting the knee. These include the quadriceps (front thigh muscles), hamstrings (back thigh muscles) and gastrocnemius (calf muscle).



Pictured above: the different parts of the knee joint
Courtesy of www.orthofit.com

How has my injury happened?

An ACLD knee is the result of an ACL rupture. ACL ruptures can happen in two ways:

Non-contact injuries - these can occur when the knee has to slow down and rotate very suddenly. For example, changing direction when running, pivoting or landing from a jump. Excessive bending or straightening of the knee can also cause damage to your ACL.

Contact injuries - these occur when there has been a direct blow to the outside of the knee or lower leg.

When you have an ACLD knee you may experience symptoms of instability or giving way. Your normal activities may be affected, including participating in sports.

What are the options to manage an ACLD knee?

Surgical management of an ACLD knee:

This would involve ACL reconstruction (ACLR) surgery using a patella tendon graft or hamstring graft. Post-surgical recovery may take 12 months or more with support from physiotherapy to achieve your personal goals of rehabilitation.

At the time of surgery, it is important that there is normal range of movement of the knee. The quadriceps muscles (at the front of the thigh), the hamstring muscles (at the back of the thigh) and the gluteal

muscles (make up the buttocks) need to be as strong as possible at the time of surgery. Being committed to a regular pre-surgical rehabilitation programme can help lead to a swifter return to sport.

Non-surgical management of an ACLD knee:

This may involve physiotherapy. This can help to reduce pain and dysfunction and help to achieve your personal goals.

Management decision of an ACLD knee

The management of your ACLD knee will depend on the functioning of your knee and your personal goals.

People participating in sports or work related activities that require a lot of change of direction, pivoting and jumping may require ACL reconstruction surgery to be able to return to these activities. However, despite an ACLD knee, it is possible to be a 'coper' and resume high-level activities through regular and progressive rehabilitation. If you have suffered a cartilage injury alongside your ACL injury, this could increase the likelihood of surgery.

Depending on your lifestyle, conservative management of an ACLD knee could be the best option. Rehabilitation after ACL reconstruction surgery requires a long term commitment which some people may find difficult to complete. If your personal goals do not include returning to high-level activities then you may not require surgical management.

If a conservative management approach is decided on, but you have ongoing instability of the knee or are unable to achieve your personal goals through consistent rehabilitation, you may be a 'non-coper' and be considered for ACL reconstructive surgery at a later stage.

Findings after ACL reconstructive surgery

12-24 months after surgery:

- 81% of patients return to any kind of sport
- 65% return to their pre-injury level of sports
- 55% return to competitive level sport
- Risk of re-injury ranges from 6-25% (dependent on the sport returning to)

Barriers to returning to sport:

- Psychological / motivation
- Ongoing issues with the knee post-surgery (instability / function / control)
- Sometimes people just 'move on'

Exercise programme for an ACLD knee

This exercise programme has been designed to improve ACLD knee strength and function before ACL reconstruction surgery; and for patients that are being managed conservatively and are not looking to return to completing high-level activities.

These exercises should be performed on a minimum of two days each week.

1. Aerobic exercise

It is safe and essential to maintain cardiovascular fitness with an ACLD knee. Low impact exercise may reduce irritation to the knee.

Static bicycle or cross-trainer at moderate intensity for 5-30 minutes.



2. Range of movement

Before ACL reconstruction surgery, it is important that movement of the knee is optimised or if it is being conservatively managed. You may have some soreness during the exercise, but the knee should not have increased pain the following day. If that is the case, the exercises may have been too forceful and should be appropriately altered.

Volume: Aim to complete 1-3 sets of 10-20 repetitions.



- Lying on your back, bend and straighten your leg.



- Place a rolled towel under the heel. Fully straighten your knee by pushing the back of your knee down towards the bed. Hold for five seconds then relax.



- Bend your affected knee as much as possible. Cross over your unaffected leg and push your affected leg back towards you. Hold for five seconds then relax.

3. Resistance training

It is important to strengthen the surrounding muscles of the knee to improve outcomes after ACL reconstruction, or to provide support if the ACLD knee is being managed conservatively. It is crucial to equally exercise your quadriceps and hamstrings as they both have significant roles in the functioning of the knee.

Volume: Aim to complete 1-3 sets of 8-12 repetitions.

Rest Period: 1-2 minutes between sets.

Quadriceps exercise

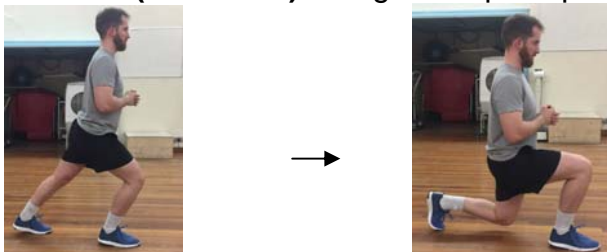
Phase 1 (easy): Static quads to inner range quads



Start point: In long sitting, tighten your quadriceps at the front of your thigh by pushing your knee down into the floor. Hold for five seconds, pulling your toes up towards you.

Goal: Increase the difficulty of this exercise by placing a small rolled up towel under your knee, so it is in a bent position. Repeat the exercise by lifting the heel off the ground and holding for five seconds.

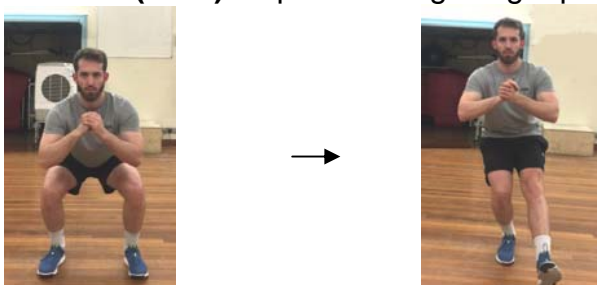
Phase 2 (moderate): Lunges to split squat lunge +/- weights



Start point: Stand with your affected leg about 50cm in front of your unaffected leg. Keep the heel of your affected leg on the ground, facing forwards. Lunge forwards bringing your weight over your affected knee. Add hand weights to increase difficulty.

Goal: Progress to a split squat lunge. Keep your weight distributed evenly between both legs, bending both knees to 90 degrees. Add hand weights to increase difficulty.

Phase 3 (hard): Squats to single leg squats +/- weights



Start point: Stand with your feet shoulder width apart. Your toes should be pointed slightly outward. Looking straight ahead, bend both knees slowly keeping your weight distributed evenly. Count for four seconds going down, coming back up for two seconds. Add hand weights to increase difficulty.

Goal: Increase the difficulty of this exercise by completing the squat only on the affected leg. Add hand weights to increase difficulty.

Hamstrings exercise

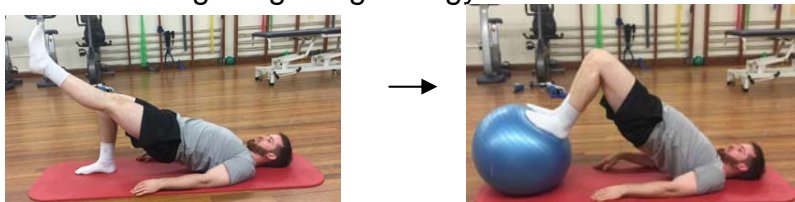
Phase 1: Prone hamstring curl to standing hamstring curl +/- weights



Start point: Lying on your front, bend your knee and lift your foot towards your buttocks and slowly return to the starting position. Increase difficulty by using an ankle weight.

Goal: Increase the difficulty of this exercise by standing with your knees together. Bend your affected knee and lift your foot off the floor. Hold for five seconds. Increase difficulty by using an ankle weight.

Phase 2: Single leg bridges to gym ball curls

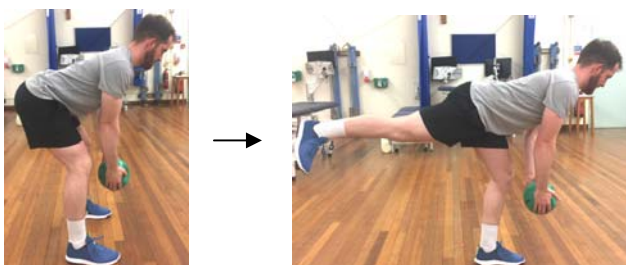


Start point: Lying on the floor with your feet flat and knees bent. Raise the unaffected leg off the ground, so it is extended in the air. Push through the heel, tighten

your abdominals, squeeze your buttocks and raise your hips to create a straight line from your knees to your shoulders. Hold for five seconds.

Goal: Increase the difficulty of this exercise by completing the bridge on a gym ball with both feet resting on the ball. Bend both knees to move the ball towards you and then return to the start. Increase difficulty by only completing on the affected leg.

Phase 3: Double leg Romanian deadlift to single leg Romanian deadlift



Start point: Hold a weight / bar at hip level. Shoulders should be back and your knees slightly bent. Slowly lower the weight, keeping it close to your body. Bring your pelvis backwards and your head looking forward. Lower until you can feel your hamstrings tightening. Return the starting position by driving the hips forward to stand up tall.

Goal: Increase the difficulty of this exercise by completing the exercise only on the affected leg. Extend the unaffected leg behind you, keeping it in line with your spine.

Gluteals exercise

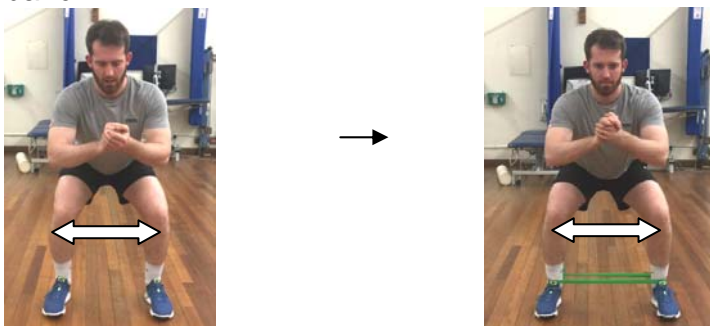
Phase 1: Side lying hip elevation to side lying hip elevation with resistance band



Start point: Lying on your unaffected side, knees straight and feet together. Lift your top leg up off your bottom leg approximately 30cm without rotation of your pelvis. Hold for five seconds. Slowly lower. Increase difficulty by using resistance band.

Goal: Increase the difficulty of this exercise by using a resistance band.

Phase 2: Crab walking to crab walking with resistance band



Start point: Stand in a mini squat position with your feet shoulder width apart and walk sideways 5m maintaining the flexed knee position. Repeat in the other direction.

Goal: Increase the difficulty of this exercise by using a resistance band placed around the ankles and by increasing your step length.

Phase 3: Forward step-ups to step-ups with weights



Start point: Place the foot of your affected leg on a step. Extend the knee and hip to step up onto the step. Follow through with the unaffected leg bringing your hip up to 90 degrees. Hold for three seconds and then step back down with the unaffected leg, slowly lowering through the affected knee.

Goal: Increase the difficulty of this exercise by using hand weights or a weighted bar and/or increase the height of the step.

4. Balance and proprioceptive training

Balance is the ability for the body to achieve a state of equilibrium/equal weight distribution.

Proprioception is an awareness of the position of your body and its limbs in space. Both of these are reduced following an ACL injury.



Easy: Start by standing in front of a chair. Stand on the affected leg keeping the shoulders and pelvis in line. Reduce support as able. Aim to complete 3 sets of 30-60 seconds.



Moderate: Once able to stand on your affected leg unaided for 30 seconds progress to balancing on an unstable surface. This could be completed on a pillow, wobble cushion or a bosu ball. Aim to complete 3 sets of 30-60 seconds.



Hard: To progress further, stand on your affected leg and imagine you are in the middle of a clock face. Complete a controlled single leg squat extending your unaffected leg outwards in each direction that would correspond to the numbers on a clock face. Aim to go around the clock three times clockwise and anti-clockwise.

Useful tips

- From your current level of function, choose two exercises from each category. This will form a comprehensive training diary to commence.
- Ensure good technique when completing your exercise programme. Exercise progression should only occur if the quality of the exercise being completed is high and is no longer challenging.
- To maximise compliance it is advisable to use the exercise training diary (page 17-23). This will allow you to track your progress.

Exercise training diary

	Date:		Date:	
	Exercise Chosen	Time / Sets & Reps	Exercise Chosen	Time / Sets & Reps
Aerobic				
Range of movement (1)				
Range of movement (2)				
Quads strengthening (1)				
Quads strengthening (2)				
Hamstring strengthening (1)				
Hamstring strengthening (2)				
Gluteal strengthening (1)				
Gluteal strengthening (2)				
Balance (1)				
Balance (2)				

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Quads strengthening (2)				
Hamstring strengthening (1)				
Hamstring strengthening (2)				
Gluteal strengthening (1)				
Gluteal strengthening (2)				
Balance (1)				
Balance (2)				

Contact details

If you have any questions or concerns, please contact the physiotherapy department on **020 7188 5094** (Monday to Friday, 8am to 5.30pm).

Out of hours, please contact your GP or NHS 111.

For more information leaflets on conditions, procedures, treatments and services offered at our hospitals, please visit www.guysandstthomas.nhs.uk/leaflets

Your comments and concerns

For advice, support or to raise a concern, contact our Patient Advice and Liaison Service (PALS). To make a complaint, contact the complaints department.

t: 020 7188 8801 (PALS) **e:** pals@gstt.nhs.uk

t: 020 7188 3514 (complaints)

e: complaints2@gstt.nhs.uk

Language and accessible support services

If you need an interpreter or information about your care in a different language or format, please get in touch:

t: 020 7188 8815 **e:** languagesupport@gstt.nhs.uk

NHS Choices

Provides online information and guidance on all aspects of health and healthcare, to help you make choices about your health.

w: www.nhs.uk

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