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ACL Reconstruction

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Introduction

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.

Function

The ACL is the major stabilizing ligaments in the knee. It prevents the tibia (Shin bone) moving abnormally on the femur (thigh bone). When this abnormal movement occurs it is referred to as instability and the patient is aware this abnormal movement.

Often other structures such as the meniscus, the articular cartilage (lining the joint) or other ligaments can also be damaged at the same time as a cruciate injury & these may need to be addressed at the time of surgery.

History of Injury

- Most injuries are sports related involving a twisting injury to the knee
- It can occurs with a sudden change of direction, a direct blow e.g., a tackle, landing awkwardly
- Often there is a popping sound when the ligament ruptures
- Swelling usually occurs within hours
- There is often the feeling of the knee popping out of joint
- It is rare to be able to continue playing sport with the initial injury

Once the initial injury settles down the main symptom is instability or giving away of the knee. This usually occurs with running activities but can occur on simple walking or other activities of daily living.

Diagnosis

The diagnoses can often be made on the history alone.

Examination reveals instability of the knee, if adequately relaxed or not too painful.

An MRI (Magnetic Resonance Imaging) can be helpful if there is doubt as well as to look for damage to other structures within the knee.

At times the final diagnoses can only be made under anaesthetic or with an Arthroscopy.

Treatment

Initial

- Rest
- Ice
- Elevation

- Bandage

Long term

Not everyone needs surgery. Some people can compensate for the injured ligament with strengthening exercises or a brace.

It is strongly advised to give up sports involving twisting activities, if you have an ACL injury.

- Episodes of instability can cause further damage to important structures within the knee that may result in early arthritis

Indications for surgery

Young patients wishing to maintain an active lifestyle.

Sports involving twisting activities e.g., Soccer, netball, football Giving way with activities of daily living.

People with dangerous occupations e.g., Policemen, firemen, roofers, scaffolders.

It is advisable to have physiotherapy prior to surgery to regain motion and strengthen the muscles as much as possible.

Surgery

Surgical techniques have improved significantly over the last decade, complications are reduced and recovery much quicker than in the past.

The surgery is performed arthroscopically. The ruptured ligament is removed and then tunnels (holes) in the bone are drilled to accept the new graft. This graft which replaces your old ACL is taken either from the hamstring tendon or the patella tendon. There are advantages & disadvantages of each with the final decision based on surgeons preference.

The graft is prepared to take the form of a new tendon and passed through the drill holes in the bone.

The new tendon is then fixed into the bone with various devices to hold it into place while the ligament heals into the bone (usually 6 months).

The rest of the knee can be clearly visualized at the same time and any other damage is dealt with e.g., meniscal tears.

The wounds then closed often with a drain and a dressing applied.

Post-operation

Surgery is performed as a day only procedure or an overnight stay.

You will have pain medication by tablet or in a drip (Intravenous).

Any drains will be removed from the knee.

A splint is sometimes used for comfort.

You will be seen by a physiotherapist who will teach you to use crutches and show you some simple exercises to do at home.

Leave any waterproof dressings on your knee until your post-op review.

You can put all your weight on your leg.

Avoid anti-inflammatories or aspirin for 10 days.

Put ice on the knee for 20 minutes at a time, as frequently as possible.

Post-op review will usually be at 7-10 days.

Physiotherapy can begin after a few days or can be arranged at your first post-op visit.

If you have any redness around the wound or increasing pain in the knee or you have temperature or feel unwell, you should contact your surgeon as soon as possible.

Rehabilitation

Physiotherapy is an integral part of the treatment and is recommended to start as early as possible. Preoperative physiotherapy is helpful to better prepare the knee for surgery. The early aim is to regain range of motion, reduce swelling and achieve full weight bearing.

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

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

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

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. Prior to making the decision of have this operation. It is important you understand these so you can make an informed decision on the advantages and disadvantages of surgery.

These can be Medical (Anaesthetic) complications and surgical complications

Medical (Anaesthetic) complications

Medical complications include those of the anaesthetic and your general well being. Almost any medical condition can occur so this list is not complete. Complications include

Allergic reactions to medications

Blood loss requiring transfusion with its low risk of disease transmission Heart attacks, strokes, kidney failure, pneumonia, bladder infections. Complications from nerve blocks such as infection or nerve damage. Serious medical problems can lead to ongoing health concerns, prolonged hospitalization. The following is a list of surgical complications. These are all rare but can occur. Most are treatable and do not lead to long term problems.

Infection

Approximately 1 in 200. Treatment involves either oral or antibiotics through the drip,

or rarely further surgery to wash the infection out.

Deep vein thrombosis

These are clots in the veins of the leg. If they occur you may need blood thinning medication in the form of injections or tablets. Very rarely they can travel to the lung (Pulmonary Embolus) which can cause breathing difficulties or even death.

Excessive swelling & Bruising

This is due to bleeding in the soft tissues and will settle with time.

Joint stiffness

Can result from scar tissue within the joint, and is minimized by advances in surgical technique and rapid rehabilitation. Full range of movements cannot always be guaranteed.

Graft failure

The graft can fail the same as a normal cruciate ligament does. Failure rate is approximately 5%. If the graft stretches or ruptures it can still be revised if required by using tendons from the other leg.

Damage to nerves or vessels

These are small nerves under the skin which cannot be avoided and cutting then leads to areas of numbness in the leg. This normally reduces in size over time and does not cause any functional problems with the knee. Very rarely there can be damage to more important nerves or vessels causing weakness in the leg.

Hardware problems

All grafts need to be fixed to the bone using various devices (hardware) such as screws or staples. These can cause irritation of the wound and may require removal once the graft has grown into the bone.

Donor site problems

Donor site means where the graft is taken from. In general either the hamstrings or patella tendon are used. These can be pain or swelling in these areas which usually resolves over time.

Residual pain

Can occur especially if there is damage to other structures inside the knee.

Reflex Sympathetic Dystrophy

An extremely rare condition that is not entirely understood, which can cause unexplained and excessive pain.

Summary

Anterior Cruciate Ligament reconstruction is a common and very successful procedure. In the hands of experienced surgeons who perform a lot of these procedures 95% of people have a successful result. It is generally recommended in the patient wishing to return to an active lifestyle especially those wishing to play sports involving running and twisting.

The above information hopefully has educated you on the choices available to you, the procedure and the risks involved. If you have any further questions you should consult with your surgeon.