Anterior cruciate ligament reconstruction

The anterior cruciate ligament (ACL) is one of four ligaments in the knee which connect the femur bone to the tibia. It is located in the centre of the knee, together with the posterior cruciate ligament (PCL). ACL functions to prevent the tibia from shifting forward under the femur and it controls rotation of the knee joint. The ACL also sends signals to the muscles and the brain, allowing them to determine the position of the knee in space and this, in turn, allows the muscles to selectively contract in order to rapidly stabilise the knee.

The ACL may be injured in two ways. The first is a rotational injury of the knee with the foot fixed, such as during a rugby tackle. The second mechanism is a excessive extension of the knee, which stretches the ligament. Often injuries may occur due to combinations of the two.

Most patients feel a pop inside the knee at the time of injury and the knee swells immediately and does not allow the patient to continue with their sporting activity. The diagnosis should be made on a clinical basis, and may be confirmed with an MRI scan (useful because it can also determine the presence of other associated injuries) and/or instability testing with a machine (KT 1000).

Not every patient with an ACL injury requires a reconstruction. If ACL is sprained or stretched (grade 1 or 2 injuries), knee stability may recover sufficiently for normal functioning during activities of daily living and limited sports. ACL reconstruction is mostly indicated in patients with grade 3 injuries (complete tears), who are experiencing instability episodes (the knee giving way) during either activities of daily living or during sports. Another indication is a high performance sportsman, who wishes to return to the same level of sporting function, which he/she was able to function at prior to the ACL injury.

It has not been proven that an ACL injury, which is treated conservatively (without surgery), results in the early development of osteoarthritis of the knee.

An immediate ACL reconstruction is almost never indicated, unless the patient requires an arthroscopy for other reasons, such as a locked knee with a bucket handle tear of the meniscus. The surgeon may then consider reconstructing anterior cruciate ligament, although this may still be deferred to a later date. It is certain that an ACL reconstruction in a acutely swollen, stiff knee has worse outcome is, often resulting in severe stiffness, which is difficult to treat.
If surgery is indicated, the patient is initially placed on an intensive physiotherapy program. The aim is to restore comfortable normal range of motion to the knee and to re-establish quadriceps and hamstring strength to an equivalent level with the uninjured side. This usually takes around six weeks.

Once this has been achieved and the swelling has gone, a decision regarding the best tendon graft is made. ACL repair is almost never indicated and usually has poor results. Options for ACL reconstruction graft include a hamstring graft, a patellar tendon graft, a quadriceps tendon graft and a tendon from a cadaver (allograft).

The hamstring tendon graft is taken from the semitendinosus and gracilis muscles of the knee with the injury and usually consists of a quadrupled graft, which is held with an endobutton in the femur and an interference screw in the tibia. The hamstring graft results in minimal post-operative donor site pain and no tendinitis. The hamstring tendon graft provides excellent strengths with minimal morbidity.

A patellar tendon graft is taken from the kneecap tendon under the kneecap and has bone plugs from the kneecap as well as from the tibia attached. Advantages of this type of graft is that rehabilitation may be more rapid with respect to ingrowth into the bone plugs. Unfortunately, problems with knee stiffness, anterior knee pain and tendinitis are often reported.

The quadriceps tendon graft is taken from the tendon above the knee with a bone plug coming from the kneecap. The bone plug is usually fixed into the tibial tunnel with an interference screw and soft tissue fixation is used on the femoral side. The advantage of this graft is that rehabilitation may be faster with respect to bony ingrowth into the tibia and that donor site pain and other complications are less than with a patellar tendon graft.

Cadaver tendons are used as a last resort in patients with either multi-ligament injuries or patients with previously failed ACL reconstructions, who are undergoing revision surgery. The advantages are no donor site problems and short operative time as well as availability of larger crafts. The downside is that there is a cost factor involved, healing may not be optimal, resulting in an increase in graft rupture. There is also a theoretical risk of disease transmission and immune reactions.

While proficiency for the use of all tendon graft exists at the Cape Joint Surgery, we prefer to use a hamstring graft if possible as we believe that this provides the patient with the best results in all.
Before your surgery

Before your surgery, you will have appointments with your orthopaedic surgeon of choice, where graft choice as well as the planned procedure and attendant risks and potential complications will be discussed with you. An appointment with a physiotherapist will subsequently be booked, so that any rehabilitation which may be required prior to the procedure may be initiated. If you are assessed as fit for surgery, the physiotherapist will have an initial consultation with you so that the post-operative physiotherapy regime can be discussed with you and plans for post-discharge consultations can be made. An appointment with the prosthetists will also be made if a post-operative extension brace is required, crutches can be adjusted for your use and you may be issued with a post-operative cooling unit. Under rare circumstances, where your associated medical problems present a significant anaesthetic risk, a appointment with a specialist physician may be required. This will take place prior to the surgery and the physician will manage your medical conditions while you are an in-patient post surgery.

The 24 hours before your surgery

You are required to be nil by mouth (nothing to eat or drink) from midnight prior to your day of surgery. Wash your leg with antibacterial soap and water the night before and on the morning before surgery. A triple-cleaning procedure with alcohol solutions will be carried out in the operating theatre. Do not shave your leg, a clipper will be used to remove any hair from the operative site just prior to the surgical procedure. Report to hospital admissions for admission to a ward at the time given to you by the orthopaedic surgical rooms. Bring wide, elasticated shorts with you to the hospital, which may be worn post surgery and will fit over the bandaged for surgery.

Surgery

You will be admitted to the ward and you will be moved to the operating theatre once the surgeon is ready to perform your procedure. Given the fact that surgical procedure duration is sometimes unpredictable and lists may be altered due to additions of emergency cases which cannot wait, starting time of your surgical procedure may be somewhat unpredictable.
The anaesthetist will take you from the holding area into the operating theatre, where you will be asked to move across onto the operating table. The anaesthetist will discuss your choice of anaesthetic with you. You will have already been asked to mark the correct leg for surgery. The surgeon will also check the consent form as well as any imaging studies and confirm the correct side verbally with you prior to induction of your anaesthetic.

Subsequently, you will be given your anaesthetic of choice (either a spinal anaesthetic or a general anaesthetic) as well as a regional nerve block, which will provide excellent pain relief for some hours after the surgery as well as decreasing the amount of sedating anaesthetic agents required, so that you may begin physiotherapy as soon as possible after surgery. You also given prophylactic intravenous antibiotics at the time of anaesthetic induction. Once the anaesthetic is being given, any hair will be removed from the operative site and a triple-cleaning of the area with a alcohol based solution will take place. Subsequent to this, a draping process takes place and the tourniquet, which has been placed around the upper thigh is inflated.

The surgical procedure begins with an arthroscopy (keyhole surgery) of the knee through to small incision is either side of the patella tendon. In the complete disruption of the anterior cruciate ligament is confirmed and any associated injuries, such as meniscal tears or cartilage injuries are addressed accordingly. Certain meniscal tears may be repaired (this depends on age of the patient and the location and type of the tear), others require partial excision of the meniscus around the tear to re-establish a stable edge. Cartilage injuries are usually treated with shaving back to a stable rim and microfracture (small diameter punctures of the exposed subchondral bone, which encourage re-formation of fibrocartilage).

The stump remnant of the ACL is then shaved back to its origin and insertion. The next step is harvesting of the graft and, once the rafters been prepared and measured, the appropriate bony tunnels in the tibia and femur can be drilled. The graft is then passed through these tunnels and fixed to the bone with either a endobutton or a interference screw or a combination of the two. Subsequently, the joint is washed out arthroscopically and the wounds are closed. Draines are never usually left in the knee. A adhesive occlusive dressing and a bulky compression bandage are applied, the tourniquet is let down and you moved off the bed and taken to the recovery room, where you will wake up from the anaesthetic.
Day case surgery

ACL reconstruction can be performed as a day case procedure. This depends on the patient’s associated knee injuries as well as a general medical status and fitness for anaesthetic. It is important to understand that patients who are booked as day cases may require an overnight stay in the unlikely event that their procedures are delayed or if the surgery turns out to be prolonged. Day case surgery patients are discharged on crutches on the same day, provided the pain is well controlled and the patient is well enough to go home.

24 hours post surgery

You will be placed into a extension brace (depends on whether there are other injuries in the knee) when not undergoing rapid rehabilitation physiotherapy. Your bulky compression dressing will be removed and replaced with a double TubiGrip (stocking type circumferential bandage) for the purposes of swelling control. At the same time, your postsurgical dressing will be changed to a waterproof dressing to allow you to shower and wash around the surgical area. A cooling device may be used on your knee post surgery. Physiotherapy involves early range of motion exercises as well as weight-bearing mobilisation as soon as your regional block has worn off. Discharge from hospital takes place once your pain is controlled on oral painkilling medications and once the physiotherapist agrees that you are ready for outpatient management.

Management at home post surgery

You will be required to keep your surgical area dry. If the dressing begins to lift off or the padding underneath the plastic becomes soaked, you should replace it with a dry dressing. Similarly, if bleeding all other fluid drainage occurs from the wound, you should contact your surgeon immediately. The main concern is post-operative infection, signs of this include redness around the incision site, increased knee pain and pus drainage from the wound. It is unusual to develop systemic signs such as a raised emperature from a localised wound infection.
Swelling control should be performed judiciously. Your TubiGrip should remain on for the first two weeks post surgery. You may begin by icing the knee almost continually for the first 48 hours post surgery. For the subsequent week you should use ice or a cooling unit 4 to 6 times per day for what 45 min. Subsequent icing will depend on how well your swelling is controlled and advice may be obtained from the treating physiotherapist in this regard. Patients who have undergone hamstring graft harvesting may find it useful to alternate icepack placement over the front and the back of the knee.

Another potential complication, which would have been discussed with you by your surgeon deep-vein thrombosis, which involves a clot forming in the knee pains of the lower leg. This usually presents with increasing swelling and pain in the calf or thigh. If any of these conditions develop, you should contact your treating surgeon. The best measure to prevent deep-vein clot formation are frequent walking and compliance with your exercise program. The reason for this is because the active use of muscles of the lower leg pumps blood through the veins and prevent clot formation.

Return to work will vary from one person to the next. If you have a desk job, you may want to remain off work for at least 7 to 10 days. If you do manual labour, specific recommendations for light duty by the physiotherapist together with the work assessment unit may be required prior to your return to work.

Physiotherapy rehabilitation will begin when you an impatient post surgery and will continue intensively for the subsequent 4 to 8 months. Your compliance with the rehabilitation program will be the main determinant of your return to strength and work/sporting function. For high-level sportspeople, specific physiotherapy regimes may be indicated prior to return to full competition. Return to sports which require frequent changes of direction at high speeds, such as rugby, cricket and hockey may take up to 6 months. The rapid rehabilitation regime does not place a timeframe on return to sport, rather the various steps in rehabilitation which required for full function at the specific sports are ticked off as the patient reaches the milestones and then moves on to the next level.

During the first phase of rehabilitation, goals are to increase your range of motion and strength had returned to walking with crutches. It is important to control pain and minimise swelling during this phase because excessive pain and swelling can inhibit your ability to generate muscular force in your leg.
You should therefore take adequate analgesia, keep compression around the surgical site, ice the surgical site and elevate the leg. Scar tissue massage/mobilisation and patellar mobilisations may also be used to decrease pain.

As pain and swelling decrease, you will begin more specific strength training exercises and proprioception exercises in phase 2.

The primary goal of phase 3 is to eliminate strength differences between the two legs. This is done by means of frequent, strenuous strength training exercises (up to 4 times a week) with specific emphasis on strengthening the operated leg. Straight running and impact exercises (jumping) will also be initiated.

Phase 4 is termed athletic enhancement. Sports specific movement drills (such as cutting and changing direction at speed as well as contact drills) are initiated and exercises from previous phases will be revisited with more intensity, speed and more repetitions. Conditioning drawers for muscular endurance is initiated as well as cardiovascular conditioning. A decision regarding your return to sport is made in conjunction with the treating physiotherapist.

The chances of re-tearing your ACL post surgery is 5 to 15%. In order to minimise the chances of this taken place, continued proprioception training and strengthening is advised.

You may return to driving when you feel comfortable and when your reaction time has adequately recovered and when you stop taking sedating pain medication. Please be aware that the onus is on you to determine this and neither the treating surgeon or physiotherapist can be held responsible for any consequences of patients driving a car too early.