

Chapter 1 : The Knee Resource | (ACL) Anterior Cruciate Ligament Rupture

The anterior cruciate ligament (ACL) is one of a pair of cruciate ligaments (the other being the posterior cruciate ligament) in the human calendrierdelascience.com two ligaments are also called cruciform ligaments, as they are arranged in a crossed formation.

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after anterior cruciate ligament reconstruction necessary? A 2-year follow-up of 78 consecutive patients rehabilitated with or without a brace. *J Bone Joint Surg Am*. Equal effectiveness of electrical and volitional strength training for quadriceps femoris muscles after anterior cruciate ligament surgery. Rehabilitation results following anterior cruciate ligament reconstruction using a hard brace compared to a fluid-filled soft brace. Effects of continuous passive motion on anterior laxity following ACL reconstruction with autogenous patellar tendon grafts. The effects of immediate continuous passive motion on pain during the inflammatory phase of soft tissue healing following anterior cruciate ligament reconstruction. The role of the rehabilitation brace in restoring knee extension after anterior cruciate ligament reconstruction: Efficacy of stairclimber versus cycle ergometry in postoperative anterior cruciate ligament rehabilitation. *Clin J Sport Med*. Closed kinetic chain alone compared to combined open and closed kinetic chain exercises for quadriceps strengthening after anterior cruciate ligament reconstruction with respect to return to sports: A comparative study of whole body vibration training and conventional training on knee proprioception and postural stability after anterior cruciate ligament reconstruction. *Br J Sports Med*. Bracing versus nonbracing in rehabilitation after anterior cruciate ligament reconstruction: Effects of distally fixated versus nondistally fixated leg extensor resistance training on knee pain in the early period after anterior cruciate ligament reconstruction. Effects of open versus closed kinetic chain training on knee laxity in the early period after anterior cruciate ligament reconstruction. No benefit of bracing on the early outcome after anterior cruciate ligament reconstruction. Neuromuscular electrical stimulation after anterior cruciate ligament surgery. Effects of two electrical stimulation frequencies in thigh muscle after knee surgery. *Int J Sports Med*. A randomized study of two physiotherapeutic approaches after knee ligament reconstruction. Continuous passive motion after arthroscopically assisted anterior cruciate ligament reconstruction: Risberg MA, Holm I. The long-term effect of 2 postoperative rehabilitation programs after anterior cruciate ligament reconstruction: Neuromuscular training versus strength training during first 6 months after anterior cruciate ligament reconstruction: The effect of knee bracing after anterior cruciate ligament reconstruction: The efficacy of continuous passive motion in the rehabilitation of anterior cruciate ligament reconstructions. The effect of neuromuscular electrical stimulation during closed kinetic chain exercise on lower extremity performance following anterior cruciate ligament reconstruction. *Sports Med Train Rehab*. A prospective outcome study of rehabilitation programs and anterior cruciate ligament reconstruction. Do early quadriceps exercises affect the outcome of ACL reconstruction?

Chapter 2 : ACL injury - Symptoms and causes - Mayo Clinic

One of the most common ways people hurt their knees is by injuring their ACL (anterior cruciate ligament). This is one of the bands of tissue that holds the bones together within your calendrierdelascience.com also.

The ACL is a key structure in the knee joint, as it resists anterior tibial translation and rotational loads. Attachments Origin Arises from the posteromedial corner of medial aspect of lateral femoral condyle in the intercondylar notch [1]. This femoral attachment of ACL is on posterior part of medial surface of lateral condyle well posterior to longitudinal axis of the femoral shaft. Orientation It runs inferiorly, medially and anteriorly. Insertion Anterior to the intercondyloid eminence of the tibia, being blended with the anterior horn of the medial meniscus. The tibial attachment is in a fossa in front of and lateral to anterior spine, a rather wide area from 11 mm in width to 17 mm in AP direction [1]. For more detail on the anatomy of the ACL, please see this page: The receptors of the nerve fibers mentioned are as follows: Ruffini receptors which are sensitive to stretching and are located at the surface of the ligament, predominantly on the femoral portion where the deformations are the greatest. Thus, they may have a modulatory effect in normal tissue homeostasis or in late remodeling of grafts. Deformations within the ligament influence the output of muscle spindles through the fusimotor system. The ACL reflex is an essential part of normal knee function and is involved in the updating of muscle programs. From the synovial sheath blood vessels penetrate the ligament in a horizontal direction and anastomose with a longitudinally orientated intraligamentous vascular network. The anteromedial bundle is tight in flexion and the posterolateral bundle is tight in extension. With the knee extended, resistance to anterior translation of the tibia, Lachmans Test , is by the bulky posterolateral bundle. With the knee flexed, resistance to anterior translation of the tibia, the Anterior Drawer Test , is by the anterior medial bundle. For more detail on the ACL bundles, please see this page: It also prevents excessive tibial medial and lateral rotation, as well as varus and valgus stresses. To a lesser degree, the ACL checks extension and hyperextension. Together with the posterior cruciate ligament PCL , the ACL guides the instantaneous center of rotation of the knee, therefore controlling joint kinematics. While the anteromedial bundle is the primary restraint against anterior tibial translation, the posterolateral bundle tends to stabilize the knee near full extension, particularly against rotatory loads [17]. Presentations This presentation, created by Terdsak Rojsurakitti, Doctor at Managed Care, discusses anatomy, mechanism of injury, surgical options and rehabilitation of ACL tears. Larson, and William Clancy. Am J Sports Med November vol. Nerve supply of the human knee and its functional importance. Am J Sports Med, 10 6 , Innervation of the anterior cruciate ligament. Int Orthop, 14 3 , Mechanoreceptors in joint function. J Bone Joint Surg Am, 80 9 , Possible mechanism of quadriceps femoris weakness in patients with ruptured anterior cruciate ligament. Med Sci Sports Exerc, 34 9 , Med Sci Sports Exerc, 35 11 , Knee Ligament Anatomy Animation. Anatomy of the anterior cruciate ligament. Clin Orthop Relat Res , Vascular anatomy of the human cruciate ligaments and surrounding structures. Clin Anat, 10 3 , Microvasculature of the cruciate ligaments and its response to injury. An experimental study in dogs. J Bone Joint Surg Am, 61 8 , Structure and vascularization of the cruciate ligaments of the human knee joint. Anat Embryol Berl , 3 , Cellular shape and pressure may mediate mechanical control of tissue composition in tendons. J Orthop Res, 11 4 , Knee Surg Sports Traumatol Arthrosc. Epub Oct Functional anatomy of the anterior cruciate ligament. Fibre bundle actions related to ligament replacements and injuries.

Chapter 3 : Anterior Cruciate Ligament (ACL) - Physiopedia

An anterior cruciate ligament injury is the over-stretching or tearing of the anterior cruciate ligament (ACL) in the knee. A tear may be partial or complete.

ACL injury is most likely to occur in the following situations: Changing direction rapidly also known as "cutting" Landing from a jump awkwardly Coming to a sudden stop when running A direct contact or collision to the knee i. Female predominance[edit] Female athletes are two to eight times more likely to strain their ACL in sports that involve cutting and jumping as compared to men who play the same particular sports. Female athletes are more likely to jump and land with their knees relatively straight and collapsing in towards each other, while most of their bodyweight falls on a single foot and their upper body tilts to one side. These include the ligament dominance, quadriceps dominance, leg dominance, and trunk dominance theories. The ligament dominance theory suggests that when females athletes land after a jump, their muscles do not sufficiently absorb the impact of the ground. As a result, the ligaments of the knee must absorb the force, leading to a higher risk of injury. Leg dominance describes the observation that women tend to place more weight on one leg than another. Changes in sex hormone levels, specifically elevated levels of estrogen and relaxin in females during the menstrual cycle, have been hypothesized as causing predisposition of ACL ruptures. This is because they may increase joint laxity and extensibility of the soft tissues surrounding the knee joint. This wider pelvis requires the femur to angle toward the knees. This angle towards the knee is referred to as the Q angle. The average Q angle for men is 14 degrees and the average for women is 17 degrees. Steps can be taken to reduce this Q angle, such as using orthotics. ACL, muscular stiffness, and strength[edit] During puberty, sex hormones also affect the remodeled shape of soft tissues throughout the body. The tissue remodeling results in female ACLs that are smaller and will fail i. Force applied to a less stiff knee is more likely to result in ACL tears. Because of the elevated contraction of the quadriceps femoris muscle during physical activity, an increased strain is placed onto the ACL due to the "tibial translation anteriorly". These bones are held together by ligaments, which are strong bands of tissue that keep the joint stable while an individual is walking, running, jumping, etc. There are two types of ligaments in the knee: The collateral ligaments include the medial collateral ligament along the inside of the knee and the lateral or fibular collateral ligament along the outside of the knee. These two ligaments function to limit sideways movement of the knee. The anterior cruciate ligament prevents the tibia from sliding out in front of the femur and provides rotational stability. When a doctor suspects ACL injury in a person who reports a popping sound in the knee followed by swelling, pain, and instability of the knee joint, they can perform several tests to evaluate the damage to the knee. These tests include the pivot-shift test , anterior drawer test , and Lachman test. The pivot-shift test involves flexing the knee while holding onto the ankle and slightly rotating the tibia inwards. The Lachman test is recognized by most authorities as the most reliable and sensitive of the three. T1 left, right PDW. Though clinical examination in experienced hands can be accurate, the diagnosis is usually confirmed by magnetic resonance imaging , which provides images of the soft tissues like ligaments and cartilage around the knee. Grade 2 sprains occur when the ligament is stretched to the point that it becomes loose; this is also referred to as a partial tear. Grade 3 sprains occur when the ligament is completely torn into two pieces, and the knee joint is no longer stable. This is the most common type of ACL injury. Around half of ACL injuries occur in conjunction with injury to other structures in the knee, including the other ligaments, menisci, or cartilage on the surface of the bones. The International Olympic Committee, after a comprehensive review of preventive strategies, has stated that injury prevention programs have a measurable effect on reducing injuries. In athletes or individuals with additional knee injuries such as damage to the cartilage, menisci or other ligaments, surgery is usually advised. However, if the knee remains stable enough to allow for walking and the individual does not plan to participate in high level of activity, doctors will recommend bracing and physical therapy rather than surgery. This process helps decrease the swelling and reduce the pain. A brace may be used to protect the knee from instability, and crutches may be used to prevent weightbearing while the knee is healing. As swelling goes down, physical therapy will begin to restore function to the knee

and strengthen the surrounding muscles hamstring and quads so that the muscles can compensate for the torn ligament and stabilize the knee. Grafts can be taken from the patellar tendon, hamstring tendon, quadriceps tendon from either the patient " autograft " or a cadaver " allograft ". The graft serves as scaffolding upon which new ligament tissue will grow. If an individual with an ACL injury undergoes surgery, the rehabilitation process will first focus on slowly increasing the range of motion of the joint, then on strengthening the surrounding muscles to protect the new ligament and stabilize the knee. Finally, functional training specific to the activities required for certain sports is begun. It may take six or more months before an athlete can return to sport after surgery, as it is vital to regain a sense of balance and control over the knee in order to prevent a second injury. Factors that increase risk of arthritis include severity of the initial injury, injury to other structures in the knee, and level of activity following treatment. This risk has been recorded as being nearly 1 out of every 4 young athletes. The most common procedures performed during ACL reconstruction are partial meniscectomy and chondroplasty. This risk increases with certain types of sports. Among high school girls, the sport with the highest risk of ACL tear is soccer, followed by basketball and lacrosse. The highest risk sport for boys was basketball, followed by lacrosse and soccer. Young athletes who have early surgical reconstruction of their torn ACL are more likely to return to their previous level of athletic ability when compared to those who underwent delayed surgery or nonoperative treatment. They are also less likely to experience instability in their knee if they undergo early surgery.

Chapter 4 : Anterior cruciate ligament - Wikipedia

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. If you have injured your anterior cruciate ligament, you may require.

The knee is prone to a number of injuries as any football player will tell you. One of the most common knee injuries in dogs is a ruptured cruciate ligament. Knee anatomy The knee is a joint that is formed by three bones: Femur the long bone extending down from the hip ; Tibia the bone between the knee and ankle ; and Patella the kneecap. These bones are joined together by a number of ligaments, which are tough fibrous bands of tissue. Two ligaments crisscross in the joint from the femur to the tibia and are called cruciate ligaments cruciate means cross. The one towards the front of the leg is called the anterior cruciate ligament and the one crossing behind it is the posterior cruciate ligament. These ligaments prevent the ends of the femur and tibia from moving back and forth across each other. A rupture of the anterior cruciate ligament ACL Drawer Movement When the anterior cruciate ligament ruptures is torn , the joint becomes unstable and the femur and tibia can move back and forth across each other. The anterior cruciate ligament is commonly torn when the dog twists on his hind leg. The twisting motion puts too much tension on the ligament and it tears. This often occurs if the dog slips on a slippery surface, makes a sudden turn while running, or is hit by a car. Obesity puts too much weight on the knee and overweight dogs tend to have more occurrences of ruptured cruciate ligaments. It appears that in most dogs with the problem, the ACL slowly degenerates and becomes weaker until it ruptures, without any sudden injury. Many dogs with a degenerating ACL will have the condition in both knees. In small breed dogs, a luxating patella may predispose them to a ruptured anterior cruciate ligament. Symptoms of a ruptured cruciate ligament Dogs who have ruptured their cruciate ligament will appear suddenly lame, and usually hold the foot of the affected leg off the ground. The knee may become swollen. In time, the dog may start to use the leg again, but often lameness returns. Dogs with a degenerating ACL may also show some pain, and there may be some swelling in the joint. Diagnosis of a ruptured cruciate ligament The diagnosis of a ruptured cruciate ligament is made through observing abnormal movement of the joint. A veterinarian will place one hand around the femur and one around the tibia in a precise manner. If an animal is in a lot of pain, or very nervous, the muscles near the knee may be so tense that they prevent the drawer movement from occurring. If a veterinarian suspects a ruptured cruciate ligament in a dog but cannot elicit the drawer sign, the dog may be heavily sedated to relax the muscles and then re-examined for the drawer sign. Many dogs with a ruptured cruciate ligament will have swelling on the inside aspect of the knee, and this is called a medial buttress. Radiographs are commonly performed to better assess the amount of arthritis that may be present. Treatment of a ruptured cruciate ligament If the ligament is completely torn, the dog especially a large dog is generally treated with surgery. There are several different methods used to repair the knee joint when an anterior ligament is torn. Some entail using synthetic suture material, or a portion of adjacent fibrous tissue to basically re-create the ligament. The suture or tissue is made to extend from the outside lower portion of the femur to the inside upper portion of the tibia. After the surgery, the dog must be strictly confined for 2 weeks. By day 10 after surgery, most dogs touch the toe of the affected leg to the ground and will start bearing minimal weight on the leg. Once the dog has reached this point, it is often very difficult to keep the dog quiet until complete healing has taken place. The dog generally has to be restricted to only leash walking for a minimum of more weeks; the exact amount of time depends upon the extent of the injury and the corrective procedure performed. This is extremely important to prevent the surgical correction from tearing. Another surgery that may be performed is the tibial plateau leveling osteotomy TPLO. In this procedure, a portion of the tibia is cut, moved, and reattached to a different portion of the tibia using plates and screws. By changing the conformation of the tibia, the joint is stabilized. This is a technically difficult surgery but it has shown to produce excellent results, often with less arthritis. This surgery is especially recommended for dogs over 50 pounds in weight. The recovery period is similar to that with the other surgical procedures. The third procedure that may be used is the tibial tuberosity advancement TTA. This is another surgery in

which a different portion of the tibia is cut, and allowed to heal at a different angle to change the mechanical stresses on the joint. As with the TPLO, this surgery is more complex and it requires special equipment and training. In some instances, if the cruciate ligament is only partially torn, the animal is older, has medical conditions which could affect healing, or the owners will not be able to keep the dog quiet for a number of weeks after surgery, medical treatment is used. Swimming and low-impact exercise walking may be done on a controlled basis, as instructed by a veterinarian, to keep up muscle strength. If overweight, the dog should be placed on a reduced-calorie diet. Nonsteroidal anti-inflammatory drugs NSAIDS such as carprofen, etodolac, meloxicam, deracoxib, buffered aspirin, or other medications are often used to reduce inflammation in the joint and relieve pain. Do NOT give your cat aspirin unless prescribed by your veterinarian. Products containing glucosamine, chondroitin, perna mussel, polysulfated glycosaminoglycans, and other chondroprotective agents are often recommended, as well. If a dog with a ruptured cruciate is not treated, severe degenerative joint disease arthritis usually occurs. In addition, because the dog favors the affected leg, he will generally put more weight on the unaffected leg. It is not unusual for the dog to rupture the anterior cruciate ligament on that leg as well because of the increased stress on the leg. Depending on the amount of injury to the knee and length of time between the injury and correction of the problem, degenerative joint disease may occur as the pet ages. Was this article helpful? Let other pet parents know what you think Pet parents found this article helpful Filed under:

Chapter 5 : Anterior Cruciate Ligament | Definition of Anterior Cruciate Ligament by Merriam-Webster

The anterior cruciate ligament (ACL) is one of the key ligaments that help stabilize your knee joint. The ACL connects your thighbone (femur) to your shinbone (tibia). It's most commonly torn during sports that involve sudden stops and changes in direction — such as basketball, soccer, tennis and volleyball.

A tear may be partial or complete. Considerations The knee joint is located where the end of the thigh bone femur meets the top of the shin bone tibia. Four main ligaments connect these two bones: Medial collateral ligament MCL runs along the inside of the knee. It prevents the knee from bending in. Lateral collateral ligament LCL runs along the outside of the knee. It prevents the knee from bending out. Anterior cruciate ligament ACL is in the middle of the knee. It prevents the shin bone from sliding out in front of the thigh bone. It prevents the shin bone from sliding backwards under the femur. Women are more likely to have an ACL tear than men. Causes An ACL injury can occur if you: ACL injuries often occur with other injuries. These injuries form a gap between the torn edges, and do not heal on their own. Symptoms A "popping" sound at the time of injury Knee swelling within 6 hours of injury Pain, especially when you try to put weight on the injured leg Those who have only a mild injury may notice that the knee feels unstable or seems to "give way" when using it. Do not play sports or other activities until you have seen a provider and have been treated. Your provider may send you for an MRI of the knee. This can confirm the diagnosis. It may also show other knee injuries. First aid for an ACL injury may include: Raising your leg above the level of the heart Putting ice on the knee Pain relievers, such as nonsteroidal anti-inflammatory drugs such as ibuprofen You also may need: Crutches to walk until the swelling and pain get better Physical therapy to help improve joint motion and leg strength Surgery to rebuild the ACL Some people can live and function normally with a torn ACL. However, most people complain that their knee is unstable and may "give out" with physical activity. Unrepaired ACL tears can lead to further knee damage. You are also less likely to return to the same level of sports without the ACL. Use a splint to keep the knee straight until you see a doctor. Do NOT return to play or other activities until you have been treated. When to Contact a Medical Professional Call your provider right away if you have a serious knee injury. Get immediate medical attention if the foot is cool and blue after a knee injury. This means that the knee joint may be dislocated, and blood vessels to the foot may be injured. This is a medical emergency. Prevention Use proper techniques when playing sports or exercising. Some college sports programs teach athletes how to reduce stress placed on the ACL. The use of knee braces during vigorous athletic activity such as football is controversial. It has not been shown to reduce the number of knee injuries, and not specifically ACL injuries.

Chapter 6 : Anterior Cruciate Ligament Reconstruction Rehabilitation

The anterior cruciate ligament is one of the four ligaments in the knee that provides stabilization for the knee joint. Torn ACLs are a common knee injury. An ACL tear or sprain occurs with a sudden change in direction or pivot against a locked knee.

The ACL connects your thighbone femur to your shinbone tibia. ACL injuries most commonly occur during sports that involve sudden stops, jumping or changes in direction – such as basketball, soccer, football, tennis, downhill skiing, volleyball and gymnastics. Many people hear or feel a "pop" in the knee when an ACL injury occurs. Your knee may swell, feel unstable and become too painful to bear weight. Depending on the severity of your ACL injury, treatment may include rest and rehabilitation exercises to help you regain strength and stability or surgery to replace the torn ligament followed by rehabilitation. A proper training program may help reduce the risk of an ACL injury. Symptoms Signs and symptoms of an ACL injury usually include: A loud "pop" or a "popping" sensation in the knee Severe pain and inability to continue activity Swelling that begins within a few hours Loss of range of motion A feeling of instability or "giving way" with weight bearing When to see a doctor Seek immediate care if any injury to your knee causes signs or symptoms of an ACL injury. The knee joint is a complex structure of bones, ligaments, tendons and other tissues that work together. Request an Appointment at Mayo Clinic Causes Ligaments are strong bands of tissue that connect one bone to another. The ACL, one of two ligaments that cross in the middle of the knee, connects your thighbone femur to your shinbone tibia and helps stabilize your knee joint. Most ACL injuries happen during sports and fitness activities that can put stress on the knee: Suddenly slowing down and changing direction cutting Pivoting with your foot firmly planted Landing from a jump incorrectly Stopping suddenly Receiving a direct blow to the knee or collision, such as a football tackle When the ligament is damaged, there is usually a partial or complete tear across the tissue. A mild injury may overextend the ligament but leave it intact. Risk factors Women are more likely to have an ACL injury than are men who participate in the same sports. Studies have suggested some reasons for these differences in risk. In general, women athletes exhibit a strength imbalance in their thighs with the muscles at the front of the thigh quadriceps being stronger than the muscles at the back hamstrings. The hamstrings help prevent the shinbone from moving too far forward – movement that can overextend the ACL. Studies comparing jumping and landing techniques among men and women athletes have shown that women athletes are more likely to land from a jump in a way that increases stress on their knees. Research suggests that training to strengthen muscles of the legs, hips and lower torso – as well as training to improve jumping and landing techniques – may reduce the higher ACL injury risk associated with women athletes. Complications People who experience an ACL injury are at higher risk of developing knee osteoarthritis, in which joint cartilage deteriorates and its smooth surface roughens. Arthritis may occur even if you have surgery to reconstruct the ligament. Multiple factors likely influence the risk of arthritis, such as the severity of the original injury, the presence of related injuries in the knee joint or the level of activity after treatment. Prevention Proper training and exercise can help reduce the risk of ACL injury. A physical therapist, athletic trainer or other specialist in sports medicine can provide assessment, instruction and feedback that can help you reduce risks. Programs to reduce ACL injury include: Exercises that strengthen leg muscles, particularly hamstring exercises, to ensure an overall balance in leg muscle strength Exercises to strengthen the core: If you downhill ski, make sure your ski bindings are adjusted correctly by a trained professional so that your skis will release appropriately when you fall. Wearing a knee brace does not appear to prevent ACL injury or reduce the risk of recurring injury after surgery. See the stories of satisfied Mayo Clinic patients.

Chapter 7 : Anterior cruciate ligament (ACL) injury: MedlinePlus Medical Encyclopedia

The anterior cruciate ligament (ACL) is located within the knee joint and connects the shin (tibia) to the thigh bone (femur) (images). The ACL consists of three separate bundles (anteromedial-medial, anteromedial-lateral and posterolateral) that have an abundant blood and nerve supply.

Nearly half of all individuals with ACL ruptures can cope without surgical intervention, but those with recurrent instability typically undergo reconstruction of the ligament. After ACL surgery, the risk of a second ACL injury is greater in both knees but more likely to occur on the un-operated side. Osteoarthritic changes are common after ACL injury, whether the ligament has been reconstructed or not. Download Anatomy The anterior cruciate ligament ACL is located within the knee joint and connects the shin tibia to the thigh bone femur images The ACL consists of three separate bundles anteromedial-medial, anteromedial-lateral and posterolateral that have an abundant blood and nerve supply. The posterolateral and anteromedial bundles are thought to provide more stability with the knee straight and bent respectively. The native ACL is thought to provide structural stability to the knee via its direct connection between the bones, and functional stability by providing information to the nervous system regarding knee joint position proprioception. From Kennedy et al

Recent studies indicate that non-contact ACL injuries are most likely to be caused by a combination of knee movements when the knee is slightly bent. Koga et al propose the following mechanism for non-contact ACL rupture. When valgus load is applied to the knee, the medial collateral ligament becomes taut and compression occurs in the outside lateral compartment image 3. Combined valgus, anterior displacement and internal rotation of the tibia ruptures the ACL and once this restraint to anterior tibial translation is disrupted, the medial inside femoral condyle also displaces posteriorly on the tibia image 6. Posterior translation of the medial femoral condyle is observed as external rotation of the tibia and is considered a consequence rather than the cause of ACL injury. This proposed mechanism of injury is supported by cadaveric and imaging studies but the exact mechanism of injury is still debatable. Presentation At the time of injury, the individual usually experiences significant knee pain, although some ACL ruptures may not be particularly painful. The person is usually unable to continue the activity, or even weight bear, and notices immediate swelling within the joint i. X-ray is indicated if there is a tense haemarthrosis, to confirm or exclude knee fracture. The torn ACL may also become pinched between the bones causing a physical block to movement or a stump impingement reflex, where the hamstrings contract and prevent the knee from fully straightening. Diagnosis For details on the diagnostic accuracy of clinical tests for ACL injury, please visit the statistics section. As a priority, it is therefore important to perform a thorough vascular assessment in cases of known or suspected knee dislocations. Clinical tests that quantify anterior translation of the tibia, or attempt to reproduce the pivot shift phenomenon, are used to assess the integrity of the ACL. The most commonly used tests are described below. This test is performed with the patient lying supine on their back , with the involved extremity on the side of the examiner. Lachman test Anterior drawer test: The hamstrings tendons are palpated with index fingers to ensure relaxation of the hamstrings muscles and an anterior force is then applied to the proximal tibia video 2. Increased tibial displacement compared with the opposite side is indicative of an ACL tear. It is important to note that the tibia and foot should not be rotated during the anterior drawer test, as this would represent a different clinical test assessing the medial or lateral knee. This test is performed with the patient supine. As the knee is extended, the tibia is supported on the lateral side with a slight valgus strain applied to it. Subluxation can be slightly increased by subtly internally rotating the tibia, with the hand that is cradling the foot and ankle. A strong valgus force is placed on the knee by the upper hand. With the thigh relaxed and leg supported below the knee with slight valgus force, the lateral tibial plateau may sublux partially dislocate anteriorly in an ACL deficient knee. With an intact medial collateral ligament, strong valgus force impinges this subluxed tibial plateau against the lateral femoral condyle, jamming the two joint surfaces together, and preventing easy relocation reduction. As the tibia is flexed on the femur the iliotibial band becomes a knee flexor, pulling the tibia backwards into its normal position, assisted by the geometry of the lateral knee compartment. This pivot shift phenomenon replicates the mechanism of injury proposed for non-contact ACL

injury. The examiner stands at the side of the patient and places a closed fist under the proximal third of the calf. This causes the knee to flex slightly. In an intact knee, the creation of a complete lever by the ACL allows the downward force on the quadriceps to more than offset the force of gravity, the knee joint rotates into full extension, and the heel rises up off the examination table. With a partially or completely ruptured ACL, the ability to offset the force of gravity on the lower leg is compromised and the tibial plateau slides anteriorly with respect to the femoral condyles. In this case, the heel will not lift off the surface. It is important to perform this test on a hard surface to avoid the fist sinking into a soft surface as pressure is applied video 4.

Imaging X Rays are often normal in isolated ACL ruptures and are therefore not indicated unless there is a suspicion of knee fracture. This type of fracture can be seen on X-ray but MRI or CT scans may be required to classify the fracture and plan treatment accordingly. X-ray and MRI images of a tibial eminence fracture. A Segond fracture images is an avulsion pull off fracture of the lateral tibia by the lateral knee soft tissue structures; this type of fracture is synonymous with ACL rupture. X-ray and CT scan images of a Segond fracture. X-ray and MRI scan images of a lateral femoral notch sign. If an MRI scan has been performed, the ACL may appear torn image 14 with bone marrow oedema in the posterolateral tibia and lateral femoral condyle image 15 in keeping with a pivot shift mechanism of injury. MRI is useful for identifying associated injuries e. MRI images of a normal ACL between white lines , ruptured ACL ligament not clearly visible , bone marrow oedema white arrows and anterior tibial translation. Classification Increased displacement of the tibia, as compared to the uninvolved side, is indicative of a partial or complete tear of the ACL. During the Lachman and anterior drawer tests, laxity with an end point is suggestive of a partial tear, while laxity with no end point indicates a full-thickness rupture of the ACL.

Chapter 8 : Anterior cruciate ligament injury - Wikipedia

An ACL sprain is a tear to the anterior cruciate ligament in the knee which runs diagonally from the back of the femur (thigh bone) upwards and forwards to the front of the tibia (shin bone) and prevents the shin bone from moving excessively forward.

Anterior cruciate ligament injury An ACL tear is one of the most common knee injuries, with over 2 million tears occurring annually in the US. Most ACL tears are a result of a non-contact mechanism such as a sudden change in a direction causing the knee to rotate inward. As the knee rotates inward additional strain is placed on the ACL, since the femur and tibia, which are the two bones that articulate together forming the knee joint, move in opposite directions causing the ACL to tear. Most athletes will require reconstructive surgery on the ACL, in which the torn or ruptured ACL is completely removed and replaced with a piece of tendon or ligament tissue from the patient autograft or from a donor allograft. Conservative treatment has poor outcomes in ACL injury since the ACL is unable to form a fibrous clot as it receives most of its nutrients from the synovial fluid which washes away the reparative cells making it difficult for new fibrous tissue to form. The two most common sources for tissue are the patellar ligament and the hamstrings tendon. The patellar ligament is often used, since bone plugs on each end of the graft are extracted which helps integrate the graft into the bone tunnels, during reconstruction. The surgery is arthroscopic, meaning that a tiny camera is inserted through a small surgical cut. The camera sends video to a large monitor so that the surgeon can see any damage to the ligaments. In the event of an autograft, the surgeon will make a larger cut to get the needed tissue. Once the graft is pulled through the bone tunnels, two screws are placed into the tibial and femoral bone tunnel. Recovery time ranges between one and two years or longer, depending if the patient chose an autograft or allograft. This is dangerous as some athletes start resuming some of their activities such as jogging which, with a wrong move or twist, could damage the bones as the graft has not completely become integrated into the bone tunnels. It is important for the injured athlete to understand the significance of each step of an ACL injury to avoid complications and ensure a proper recovery. Non-operative treatment of the ACL[edit] The ACL can be treated non operatively with strengthening and rehabilitation when the ACL is not completely torn and the knee is still stable or if the patient is not doing activities requiring cutting and pivoting or similar actions. The mainstay of ACL non-operative treatment is strengthening of the muscles around the knee, especially the hamstrings. Focused therapy supervised by a physical therapist can be an effective way to accomplish this. Graft choice could be confusing, requiring expert counseling from a doctor. Revision ACL surgery will often take nine months to more than a year. During this time, the physical therapist should guide the patient through the rehabilitation process. The early rehab, usually lasting around six weeks, focuses on maintaining full knee motion and preventing scar tissue. The second phase of rehab is directed toward regaining knee strength. Finally, activity-specific rehabilitation is administered. The rehabilitation program can also be composed of aggressive motions and weight-bearing exercises. One study found that children under 14 who had ACL reconstruction fared better after early surgery than those who underwent a delayed surgery. But for adults 18 to 35, patients who underwent early surgery followed by rehabilitation fared no better than those who had rehabilitative therapy and a later surgery. ACL injuries in children are a challenge because children have open growth plates in the bottom of the femur or thigh bone and on the top of the tibia or shin. An ACL reconstruction will typically cross the growth plates, posing a theoretical risk of injury to the growth plate, stunting leg growth or causing the leg to grow at an unusual angle. Times piece focused on adults. It found no significant statistical difference in performance and pain outcomes for patients who receive early ACL reconstruction vs. This would suggest that many patients without instability, buckling or giving way after a course of rehabilitation can be managed non-operatively. However, the study points to the need for more extensive research, was limited to outcomes after two years and did not involve patients who were serious athletes. The randomized control study was originally published in the New England Journal of Medicine. Current research attributes this finding to multiple factors that are still being studied. The synovial joint through which the anterior cruciate ligament passes, along with the length of the anterior

cruciate ligament, is significantly smaller in women than in men. This makes it more susceptible to damage since the ACL is exposed to a higher level of strain in comparison to men. Along with these aspects, women tend to use their quadriceps muscle more often than their hamstring muscles which place additional strain on the ACL. Women also more commonly land with their knees bent inward when landing after a jump, adding more strain on the ACL to maintain stability in the knee. In addition, the quadriceps angle, or Q-angle, between the anterior superior iliac spine and patellar ligament may contribute to the predisposition of ACL tears, as females often have wider hips compared to males. There is some evidence that suggests since women are known to have larger Q-angles than their male counterparts, causing their knee to already be bent inward making them more susceptible to ACL tears. Left knee-joint from behind, showing interior ligaments. Head of right tibia seen from above, showing menisci and attachments of ligaments. Capsule of right knee-joint distended. MRI shows normal signal of both cruciate ligaments arrows.