Anterior and Posterior Cruciate Ligaments in the human knee

ACL injury
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Introduction

- ACL stands for Anterior cruciate ligaments and its one of the key ligaments in the human knee. It is a strong band of tissue that runs from the center of the knee that connects to the femur to the tibia. ACL injuries are mostly common during sports that involve sudden stop or changes in direction, jumping and landing and sports include soccer, basketball, football and skiing (mayo clinic). During an activity, the ACL can control how far forward the tibia can slide to the femur.
Anatomy of the Knee

• The anterior cruciate ligament is a band of dense connective tissue which courses from the femur to the tibia. The ACL is a key structure in the knee joints since it resists anterior tibial translations and rotational loads. The PCL is also an important ligament since it is also located in the center of the knee forming a cross with the ACL.
Cause of the ACL tear

- An ACL tear happened due to a sudden stop or change of position, jumping and landing. It is most common seen in football, basketball and soccer. When someone experiences this tear, they feel and hear a "pop" or a "snap" (Johns Hopkins medicine). The pain can be severed, and a person will be unable to continue to play or perform physical activity. Not only can it happen in sports it can also happen in everyday activities.
Why are ACL tears common in female athletes?

• Yes, it's true female athletes are more prone to an ACL injury since the anatomy of the female body is different to the male body. According to Macmillan she says, "The female pelvis is wider, which changes the mechanics of how the thigh bone, tibia and the femur function." The article by yale medicine also states that "women have less muscle mass around their knees than men," This can explain why female athletes have a higher chance of tearing their ACL than men. Anatomy of both female and males plays an important role to how the body functions.
Along with feeling and hearing a "pop" some other signs and symptoms include:

- Pain on the outside and back of the knee
- Knee swelling within the first few hours
- Limited knee movement due to pain
- Loss of range of motion
- Discomfort while walking
Diagnosis

• When the doctor is performing a physical exam, they will check for swelling and tenderness and compare the injured to uninjured knee. X-rays may be needed to point out the bone fracture, but they don’t show the soft tissues like ligaments. Magnetic resonance imaging also known as MRI uses radio waves and strong magnetic fields to creates an image of both the hard and soft tissues. Ultrasound uses sound waves to visualize internal structures and check the ligaments, tendons and muscles.
Treatments

- The rice method is used as a treatment.
- Rice stands for
  - Rest
  - Ice
  - Compression
  - Elevation
Grades 1, 2, and 3 of an ACL tear

• A grade 1 ACL tear are the least severe since there has been an overstretch but it is still able to support the knee. The recovery time is faster, and it is treated with a knee brace, anti-inflammatory, and the RICE method.

• Grade 2 tear is about 20-80% of the ligament fibers and the patient will experience a higher level of pain and more obvious symptoms. The recovery time is about 6-8 weeks and RICE method is required.

• Grade 3 tear is a complete tear of the ligament, and the patient will experience severe pain and swelling. In a grade 3 tear surgical repair is necessary and it will take about 6-8 months to fully recover.
Grades of ACL tears

CLASSIFICATIONS OF ACL INJURY

NORMAL

SUFFERED MILD DAMAGE
GRADE 1

PARTIAL TORN
GRADE 2

COMPLETE TORN
GRADE 3

Grade I  Grade II  Grade III
Rehab and recovery

When an athlete experiences an ACL tear physical therapy is a vital role to get them back to their daily activity and sport. There are specific exercises that introduced to the patient to help strengthen the knee. It's important that the patient does their rehab since it helps restore their range or motion, strength and lower extremity biomechanics. PT typically starts 3 days after surgery and this is when the therapist removes the bulky dressing, cleans the wound and a post-operative brace is needed.
Recovery exercises

• Within the first few days the RICE method is needed and after some swelling id down then some exercises are introduced.

• Range of motion exercises

• These include moving the knee up and down and side to side.

• Flexing and extending the knee while being seated

• Riding a stationary bike or gently stretches to the muscle groups around the knee.
Recovery exercises

- Strengthening exercises happen 1-4 weeks after surgery.
- Stretching exercises include:
  - Calf raises
  - Straight leg raises
  - Squats
  - Step ups
  - Balancing exercises are also included.
Preventions

- It's important to strengthen your leg muscles and having good form. According to "ACL injury prevention tips and Exercises" by Theresa Chiaia she states that "successful injury prevention programs may differ in specific exercises and drill, but they share a common focus: improving flexibility, strength (particularly of the core, hip and legs), balance, agility and your ability to jump and land safely." It's important to have a good form when doing any physical activity and able to strengthen the body to prevent any knee injuries.

- Exercises include
- Lunges, squats, single leg balances, heel raises, jump and hold, etc. There are so many exercises that can help prevent any knee injury.
conclusion

• An ACL tear can become a difficult experience if any athlete goes through that pain since it can affect the physically and mentally. Recovering from a torn ACL after surgery is a long process but doing daily exercises after surgery and even doing exercises to prevent an ACL torn is very important for athletes.
Work cited