Anatomy:
The Anterior Cruciate Ligament of the knee is a strong band of connective tissues, which attaches bone to bone. The ACL is situated within the knee joint and is responsible for joining the back of the femur (thigh bone) to the front of the tibia (shin bone). The ACL is one of the most important ligaments of the knee, giving it stability. The ACL achieves this role by preventing excessive twisting, straightening of the knee (hyperextension) and forward movement of the tibia on the femur.

Ligaments are tough bands of tissue that connect the ends of bones together. The ACL is located in the center of the knee joint where it runs from the backside of the femur (thigh-bone) to the front of the tibia (shinbone).

The hamstrings make up the bulk of the muscles in the back of the thigh. Three muscles and their tendons form the hamstrings: the semitendinosus, semimembranosus, and biceps femoris. The top of the hamstrings connects to the ischial tuberosity, the small bony projection on the bottom of the pelvis, just below the buttocks. The hamstring muscles run down the back of the thigh. Their tendons cross the knee joint and connect on each side of the tibia. The graft used in the ACL reconstruction is taken from the hamstring tendon (semitendinosus) along the inside part of the thigh and knee.

Causes/Mechanism of Injury:
When twisting, straightening of the knee and forward movement of the tibia on the femur occurs in excess and beyond what the ACL can withstand, tearing of the ACL occurs. The tear may range from a small partial tear resulting in minimal pain, to a complete rupture of the ACL resulting in significant pain and disability, and, potentially requiring surgery.

ACL tears typically occur during activities placing excessive strain on the ACL. Generally occurs suddenly due to a specific incident, however, occasionally may occur due to repetitive strain. The three movements that place stress on the ACL are twisting of the knee, hyperextension of the knee, and forward movements of the tibia on the femur.

Tears are frequently seen in contact sports or sports requiring rapid changes in direction; such as football, basketball and downhill skiing. The usual mechanism of injury is a twisting movement when weight-bearing (especially when landing from a jump) or due to a collision forcing the knee to bend in the wrong direction. Generally tears occur suddenly due to a specific incident, however can occur due to repetitive strain.

Symptoms:
Patients with an ACL tear may notice an audible snap or tearing sound at the time of injury. In minor cases of an ACL tear, patients may be able to continue activity only to experience an increase in pain, swelling and stiffness in the knee after activity with rest (particularly first thing in the morning). Often the pain associated with this condition is felt deep within the knee and is poorly localized.
In cases of a complete rupture of the ACL, pain is usually severe at the time of injury, however, may sometimes quickly subside. Patients may also experience a feeling of the knee going out and then going back in as well as a rapid onset of considerable swelling (within the first few hours following injury). Patients with a complete rupture of the ACL generally cannot continue activity as the knee may feel unstable, or may collapse during certain movements (particularly twisting). Occasionally, the patient may be unable to weight bear at the time of injury due to pain and may develop bruising and knee stiffness over the coming days (especially the inability to fully straighten the knee). Patients may also experience recurrent episodes of the knee giving way following the injury.

**Treatment/Management:**
The main goal of ACL surgery is to keep the tibia from moving too far forward under the femur bone and to get the knee functioning normally again. The hamstring tendon graft used for reconstruction often comes from one of the medial hamstrings, the semitendinosus or semimembranosus.

The major benefit of using a hamstring tendon graft for a reconstruction is the decreased trauma to the extensor mechanism of the knee. Since the quadriceps and patellar tendon are not involved in the graft harvest, there is less anterior knee pain and quadriceps function often returns faster. Range of motion may also return faster, again because the anterior knee is not insulted during the surgery.

After surgery patients take part in a formal physical therapy regime. The first few physical therapy treatments are designed to help control the pain and swelling from the surgery. The goal is to help you regain full knee extension as soon as possible.

**Exercises/post op protocol:**
Treatments are aimed at getting the thigh muscles toned and active again. Patients are cautioned about overworking their hamstrings in the first six weeks after surgery. Isometric hamstring exercises are utilized to work the muscle but keep the joint in one position.

As rehabilitation evolves more challenging exercises are chosen to safely advance the knees strength and function. Specialized balance exercises are used to help the muscles respond quickly and without thinking, or neuromuscular training. If you need to stop suddenly, your muscles must react with just the right amount of speed, control, and direction.

Neuromuscular training includes exercises to improve balance, joint control, muscle strength and power, and agility. Agility makes it possible to change directions quickly, go faster or slower, and improve starting and stopping. These are important skills for walking, running, and jumping and especially for sport performance.

When you get full knee movement, your knee isn’t swelling, and your strength and muscle control are improving, you’ll be able to gradually go back to your work and sport activities. Ideally you will be able to resume your previous lifestyle activities. However, athletes are usually advised to wait at least six months before returning to their sports. Most patients are encouraged to modify their activity choices.