Duke Sports Medicine

Looking at How ACL Risk is Increased if You Have a Straight Knee While Jumping

Average ACL strain increased as the leg straightened, with the greatest strain at the straight leg position.

Why and How We Did This Study

Your ACL (anterior cruciate ligament) plays an important role to make sure the knee is stable. It allows your body to carry out movements such as jumping or twisting on your knee. If it is gets torn it must be treated by physical therapy or surgery. This treatment will allow normal functioning to return. To best prevent ACL injuries in the future, we have to know the factors that lead to an increased risk of injury. This study used imaging to look at strain on parts of the knee. A jump can mimic how most ACL injuries occur. The participants in the study jumped in front of some cameras to look at the motion of the knee. They also had MRI's to look at the structures of the knee. The goal was to learn where the most stress was in the ACL during a jump.

Questions? Contact us at sportsmed_research@dm.duke.edu.

17 healthy people
Average age of 27
No history of leg injury

Complete a single leg jump with special cameras to create pictures of how the knee moves during jumping

MRI the knee to look at the knee structures

Determine relationship between ACL strain and knee position

What We Learned Through the Results

ACL strain increased as the knee straightened, with the greatest strain occurring when there was no bend of the knee and the leg was completely straight.

There is increased thigh muscle activity before landing, which increases strain on the ACL when landing with a straight leg.

Despite historical support, this study found minimal impact on the angle of the leg at the hip on ACL strain.

What These Results Mean

The findings of this study support that having a straight leg when landing puts the most strain on the ACL. Landing in this position increases risk of ACL injury. This study may be useful in designing and enhancing ACL injury prevention programs. Focus can be put on learning ways to land with a bent leg to reduce the risk of ACL injury. These results may not affect or apply to each person. This study is one "piece of the puzzle" for this injury; additional information may be available from other studies now or in the future.

Read more about this study at the
The American Journal of Sports Medicine.