



S12 - MRI AS THE GOLD STANDARD FOR EVALUATING ACL INJURIES IN SOCCER PLAYERS



OBJECTIVES

- Define the role of Magnetic Resonance Imaging (MRI) in diagnosing ACL injuries in soccer players.
- Compare MRI with X-ray, ultrasound, and CT imaging for ACL evaluation.

THESIS STATEMENT

Among available imaging modalities, Magnetic Resonance Imaging (MRI) is widely recognized as the gold standard for evaluating ACL injuries because of its superior soft tissue contrast and diagnostic accuracy.

KNEE ANATOMY AND VULNERABILITY

The knee joint consists of the femur, tibia, and patella, stabilized by four major ligaments: the ACL, PCL, MCL, and LCL. The ACL runs diagonally through the center of the knee and prevents anterior translation and excessive rotation of the tibia relative to the femur. Soccer-specific movements such as pivoting, cutting, and awkward landings generate high shear and rotational forces, making the ACL particularly vulnerable to injury (Zeng et al., 2025).

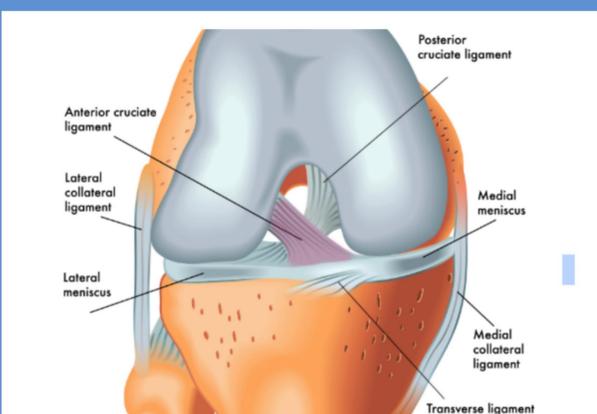


Figure 1. ACL Knee Anatomy (Source: Shelbourne Knee Center)

IMAGING MODALITIES COMPARISON



X-ray: Primarily evaluates bone; useful for ruling out fractures but unable to visualize ACL or soft tissues (Embertson & Nissman, 2016).



Ultrasound: Evaluates superficial soft tissues and effusions; limited for ACL assessment due to deep intra-articular location (You, C et al, 2019).



Computed Tomography (CT): Excellent bone detail and surgical planning utility; limited soft tissue contrast for ligament evaluation (You, C et al, 2019).



Magnetic Resonance Imaging (MRI): Provides multiplanar, high-resolution visualization of ligaments, menisci, cartilage, and bone marrow edema. MRI allows direct assessment of ACL fiber continuity and associated injuries (Nelson, R. 2025).



ACL injury demonstrated across MRI (left), Ultrasound (center) & X-Ray (right) modalities

Sources: Emberton & Nissman, 2016; You, C et al, 2019 & Al Mohammad & Gharaibeh, 2024

WHY MRI IS THE GOLD STANDARD?

MRI demonstrates superior diagnostic performance for ACL injuries, with reported sensitivity of 83–100% and specificity of 96–100% for complete tears. It also identifies associated injuries such as meniscal tears and bone contusions, making it essential for treatment planning and return-to-play decisions (Al Mohammad & Gharaibeh, 2024).

ACL INJURY GRADES

Grade 1 (Mild Sprain): Microscopic fiber damage; knee stability preserved; conservative management.

Grade 2 (Partial Tear): Partial fiber disruption with moderate instability; treatment individualized.

Grade 3 (Complete Tear): Full ligament rupture with significant instability; often requires surgical reconstruction.

Source: Physio-Pedia, n.d

CLASSIFICATIONS OF ACL INJURY



Source: Klisiewicz, S. (2025, January 15)

ACL INJURY CLINICAL CASE

As the fastest-growing sport in North America, soccer is associated with an increasing incidence of injuries, with anterior cruciate ligament (ACL) rupture being among the most common and severe.

One clinical case was of a 21-year-old female NCAA soccer player with left ACL rupture sustained during a cutting maneuver. MRI confirmed complete ACL tear.

Clinical findings supported classification as a potential copper, and non-surgical rehabilitation was initiated. The athlete returned to competitive soccer within four weeks. MRI was essential in diagnosis and management decision-making (Gray et al., 2017).

CONCLUSION

MRI is the most comprehensive and reliable imaging modality for evaluating ACL injuries in soccer players. Its superior soft tissue visualization and diagnostic accuracy support both surgical and non-surgical management, optimizing athlete outcomes and safe return to play.