

## **MRI Finding versus Arthroscopic Finding Regarding ACL Injury**

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### **Abstract**

25 patients, 20 male patients and 5 female patients with knee joint injury, all of them with single knee joint injury. 25 knee joints are examined during this study, all patients are perform MRI in different centers send with report of the MRI from expert radiologist. They perform arthroscopy in Al Sadder medical city from January 2013 – October 2014. The aim of this study is to confirmed or unconfirmed ACL injury after clinical examination and MRI which they perform to them either in our center or other centers. The majority of ACL injuries 70% occur while playing agility sports, and the most often reported sports are football. About 70% of ACL injuries are sustained through noncontact mechanisms, while the remaining 30% result from direct contact. The aim of this study is to assess the diagnostic value and compare the accuracy (sensitivity and specificity) of MRI to arthroscopic finding regarding the ACL injury.

**Keyword:** MRI; ACL injury; Radiologist

### **INTRODUCTION**

The ACL function as stabilizer of the knee joint [1, 2, 3]. Prevent forward movement of the tibia on the femur and provide an axis around which both medial and lateral rotary movement are assisted. The anterior cruciate ligament (ACL) is a dense fibrous band composed of collagen fibrils. It is 3.5-3.8 cm long and 1 cm in diameter. ACL tears occur with or without contact and with the knee in any position from flexed to fully extend. A common contact mechanism of injury is the valgus- abduction clip injury [4, 5, 6]. These injuries are frequent in football players and occur with a lateral blow to the partially flexed knee. Hyper extension or versus hyper extension from an anterior blow (injury from a motor vehicle accident or contact sports) is the most common contact mechanism of ACL injury. Non-contact mechanism account for 70-80 of ACL injury, the pivot shift mechanism is most commonly implicated: the

slightly flexed knee incurs valgus load, with internal rotation of the tibia or external rotation of the femur. This twisting injury often occurs with rapid simultaneous deceleration and directional movement like in football.

The skilled clinician can diagnose as many as 90% of ACL tear based on history and clinical examination finding [7, 8]. Patient typically reported an audible pop and giving way at the time of injury, a knee effusion usually develop next 24 hours, the tear is confirmed by clinical examination, primary by performing Lachman test [9], anterior drawer test and pivot shift test, then the clinical examination followed by MRI and arthroscopy of the knee joint to assess the integrity of the ACL, sometime obese patient, patient with strong muscular restrain, and in patient with a cut injury, also patient with partial ACL tear may be difficult to diagnose on the base of clinical examination, so MRI and arthroscopic examination of the knee give the exact situation of the ACL. The aim of this study is to declare the accuracy of MRI in ACL injury related to the arthroscopic examination [10, 11, 12, 13].

## MATERIAL AND METHOD

A 25 patients, 20 male patients and 5 female patients with knee joint injury, all of them with single knee joint injury, from January 2013–October 2014, 25 knee joints are examined during this study, we perform arthroscopic examination as a diagnostic procedure to those patients. We perform arthroscopic examination under spinal anesthesia and tourniquet with stryker arthroscopy, USA made, model 2009. We use 2 holes one antero-lateral and the other antero-medial, using normal saline for washing and dilation of the joint and after finishing the procedure we suture the 2 portals. During this study, we classified the result in to four groups of patients:

- 1- **True positive:** where MRI finding diagnose of tear and confirmed by arthroscopic examination.
- 2- **True negative:** where MRI finding diagnose no tear and confirmed by arthroscopic examination as no tear.
- 3- **False positive:** where MRI findings diagnose tear in the ACL but arthroscopic examination confirm there is no tear in the ACL.
- 4- **False negative:** where MRI finding diagnose no tear but arthroscopic examination confirm tear in the ACL.

The majority of this patient, about 70% of them ACL injury occurs while playing agility sports and the most reported injury occurs while playing football, while 30 % of them result from direct trauma. The aim of this study is to assess the diagnostic value and compare the accuracy (sensitivity and specificity) of MRI to arthroscopic finding regarding the anterior cruciate ligament tear. So to benefit from this study one must discuss:

1. **Sensitivity:** sensitivity is the ability of the MRI to detect on abnormality in the ACL. It is determined by the equation:

$$\text{True positive} / (\text{true positive} + \text{false negative}) \times 100\%$$

2. **Specificity:** specificity of MRI is the ability of MRI to give how many detected tears of ACL are accurate. It is determined by the equation:

$$\text{True negative} / (\text{true negative} + \text{false positive}) \times 100\%.$$

3. **Positive predictive value:** it is correlate a positive result of MRI with finding of arthroscopic examination, it is calculated by the equation:

$$\text{True positive} / (\text{true positive} + \text{false positive}) \times 100\%.$$

4. **Negative predictive value:** it is correlate a negative result on MRI with finding of arthroscopic examination. It is calculated by the equation:

$$\text{True negative} / (\text{true negative} + \text{false negative}) \times 100\%$$

## RESULTS

Four groups of patients appear during this study as in table 1:

**Group one:** 18-patients are true positive in this study i.e. where MRI finding diagnosis tear was confirmed by our arthroscopic examination.

**Group two:** 4 patients are true negative where MRI finding, there is no tear and confirmed by arthroscopic examination of no tear.

**Group three:** 2 patients are false positive where MRI showed a tear but arthroscopic examination reveal no tear.

**Group four:** 1 patient is false negative where the MRI reveal no tear but on arthroscopic examination reveal tear.

According to this result we can find:

The accuracy of the MRI to the arthroscopic examination was 82%

Sensitivity was 91%

Specificity 60%

Positive predictive value 84% Negative predictive value 60%

So there is moderate accuracy of the MRI examination correlates to the arthroscopic examination and still the arthroscopic examination is the most accurate diagnostic method to reveal the ACL injuries.

## DISCUSSION

Kappa of agreement between MRI and arthroscopic examination was 0.49  $P < 0.001$ . The accuracy of MRI to arthroscopic examination 82% and this indicate moderate accuracy. The result of this study is in accordance to the literature of Tuny GA [6]. According to this study there is moderate agreement of MRI to arthroscopic examination and on discussion this subject with the radiologist they assess the subject and find that in ACL injury there is an important point must be taken to exam ACL injury, ACL injury must be examined in sagittal view, coronal view, axial view and on flexion

15 degree of the knee joint. Accordingly if the ACL injury negative on sagittal view must take coronal view and axial view to confirmed the injury or unconfirmed the injury. So the radiologist must not depend on one view i.e the sagittalview on diagnose an injury of the ACL, they must take the coronal view and the axial view and must take sagittal view withflexion of the knee joint about 15 degree.

According to this study MRI has a highpositive predictive value but has lownegative predictive value in diagnosing ACL injury. Accordingly accuracy of MRI to arthroscopic examination was 82% and this mean one cannot depend certainly to diagnose ACL injury according to MRI only and still arthroscopic examination is the only method to diagnose ACL injuryaccurately.

**Table 1.** Categories of all patients group.

Category		ACL arthroscopic examination		Total
		Positive	negative	
ACLMRI	Positive	18	2	20
	Negative	1	4	5
Total		19	6	25

### Competing interests

The author declare that there is no conflict of interest.

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