

# Application of Mri in Meniscus Tear of Knee Joint

Peng Fang

<sup>1</sup>Department of Radiology, Henan Province Hospital of Traditional Chinese Medicine, Zhengzhou, Henan, China

<sup>2</sup>Hospital of Henan University of Traditional Chinese Medicine, Zhengzhou, Henan 450002, China

**Keywords:** Mri diagnosis, Meniscus tear of knee joint, Application value

**Abstract:** Objective: To explore the clinical value of MRI in the diagnosis of meniscus tear. Methods: The objects of this study were 90 patients with meniscus tear of knee joint who were diagnosed and treated in our hospital from January 2018 to January 2020. MRI diagnosis (observation group) and X-ray diagnosis (control group) were performed respectively for all patients. Results: Compared with the control group (83.33%), the positive rate of diagnosis in the observation group (94.44%) was higher ( $P < 0.05$ ). At the same time, MRI has high sensitivity and specificity, 85.00% and 97.78% respectively. Conclusion: MRI diagnosis in meniscus tear of knee joint can effectively improve the detection rate of disease, and it has high diagnostic sensitivity and specificity, which is conducive to the accurate diagnosis of disease.

## 1. Introduction

Torsion force and other related factors are the main causes of meniscus tear of knee joint. The occurrence of the disease is closely related to the living and sports level, living and working conditions, and the main morbidity crowd is young adults. Fixed tenderness of the joint space is the main symptom of meniscus tears, and not all meniscus injuries have typical clinical symptoms. Some meniscus tears lack clinical specificity, and there is a low diagnostic accuracy <sup>[1]</sup>. For meniscus tear of knee joint, the main symptoms of acute injury are flexion and extension dysfunction, knee joint pain and knee joint swelling. After the acute phase, the symptoms of joint effusion and joint swelling will gradually subside. However, the joint pain will still exist in the process of exercise and jumping action. When some patients do knee flexion and extension movements, snapping or interlocking phenomenon will occur <sup>[2]</sup>. The occurrence of the disease has a great impact on patients' health. Therefore, early and effective diagnosis of the disease is of great significance to improve the prognosis of patients. The purpose of this study is to explore the clinical value of MRI in diagnosis of meniscus tear of knee joint.

## 2. Data and Methods

### 2.1 General Data

The objects of this study were 90 patients with meniscus tear of knee joint who were diagnosed and treated in our hospital from January 2018 to January 2020. MRI diagnosis (observation group) and X-ray diagnosis (control group) were performed for all patients respectively. Among them, 52 were male and 38 were female, with an average age of  $(62.31 \pm 9.01)$  years. All patients were confirmed by pathology and operation.

### 2.2 Inspection Methods

All patients were diagnosed by MRI and X-ray. MRI diagnosis was as follows: choose right type of MRI instrument to carry out MRI diagnosis for patients, assist patients to take the supine position, scan the meniscus area of knee joint from multiple angles, rotate the knee to within 10 to 15 degrees and examine patient's cross-section, coronal, and sagittal positions. The scanning parameters should be adjusted reasonably, in which 4mm is the layer thickness and 1mm is the layer interval.

Experienced doctors were needed to process the scanning image or carry out other related work.

The method of X-ray diagnosis was to examine the patient's injury position by CR film machine. Generally, the film distance is 80-90cm, and 80-90kv is the voltage, and 10-12mAs is the electric current. After the examination, it was necessary to judge the meniscus injuries of patients.

### 2.3 Observation Items

The positive rate of diagnosis was compared.

### 2.4 Statistical Analysis

This study used SPSS22.0 as statistical software. The expression method was “[n%]” and the test method was “ $\chi^2$ ”.  $P < 0.05$  means the results had differences.

## 3. Results

### 3.1 Comparison of Diagnostic Detection Rate: the Observation Group Was Higher Than the Control Group ( $P < 0.05$ ), as is Shown in Table 1.

Table 1 Comparison of Diagnostic Detection Rate [n (%)]

Group	Cases	Positive Cases	Negative Cases	Suspicious Cases	Positive Rate of Diagnosis
Observation Group	90	85	4	1	94.44%(85/90)
Control Group	90	75	12	3	83.33%(75/90)
$\chi^2$					15.012
P					<0.05

### 3.2 Analysis of Sensitivity and Specificity of Mri Diagnosis: Sensitivity and Specificity of Mri Diagnosis Were 85.00% (85 / 90) and 97.78% (88 / 90) Respectively, as is Shown in Table 2.

Table 2 Analysis of Sensitivity and Specificity of Mri Diagnosis

MRI Diagnosis	Disease Status	
	Diseased	Non-diseased
Positive	85	2
Negative	5	88
Total	90	90

## 4. Discussion

There is a close relationship between meniscus tear of knee joint and torsion force. When a leg is bearing weight, the leg is in semi flexion position and abduction and external fixation, it will suddenly rotate the body and the thigh. Affected by the rotation pressure between the femoral condyle and the tibial condyle, the medial meniscus will tear. Local pain of knee joint is the main symptom of meniscus tear. Some patients have quadriceps atrophy, knee joint interlocking and other related conditions, seriously affecting their daily life, reducing their quality of life<sup>[3-4]</sup>.

In this paper, the clinical value of MRI in the diagnosis of meniscus tear of knee joint was studied. The results showed that the positive rate of the observation group (94.44%) was higher than that of the control group (83.33%) ( $P < 0.05$ ). At the same time, the MRI diagnosis had higher sensitivity and specificity, 85.00% and 97.78% respectively. The main reasons are as follows: (1) Although the X-ray examination method is simple and easy, the X-ray can not comprehensively analyze and check the joint soft tissue and joint space. Therefore, it can't judge the condition accurately, which leads to a high rate of missed diagnosis and misdiagnosis. By comparison, MRI diagnosis method can check the continuity and integrity of bone tissue, effectively analyze the arrangement uniformity and density of soft tissue and bone tissue, and make the examination of lesion location clearer, so as to ensure the accuracy of examination. (2) In middle and late stage of

the disease, X-ray examination can show significant clinical value, but it can not comprehensively judge the early stage of fluid accumulation. However, for MRI diagnosis method, it can sensitively display subtle structure of bone tissue, so that the patient's condition can achieve early diagnosis. At the same time, it can achieve a comprehensive and clear understanding of changes of injured parts, so as to make appropriate treatment methods for patients, which is helpful to promote the recovery of patients. (3) X-ray will ignore the examination of related symptoms and can't realize accurate judgment, but MRI can observe every tissue structure carefully and has a high diagnostic accuracy. The MRI features mainly include: The meniscus of the knee joint is between the intercondylar of the femur and the tibial plateau of the human body, which can present a half-moon shaped fibrocartilage plate. The outer edge of the meniscus is connected with the joint capsule, which is divided into three parts, namely, the posterior angle, the body and the anterior angle. The lower part of meniscus is relatively flat and the upper part is relatively concave. The outer side of meniscus is small and the inner side is large. By observing the coronal plane, the acute triangle can be reflected. During the sagittal imaging of meniscus, T2WI and T1WI will show the low signal state, and the low-density signal image is uniform. In the middle part of the meniscus, the posterior angle and the anterior angle of the plane are separated from each other. When the meniscus is torn or degenerated, the synovial fluid can be absorbed, so that the concentration of local hydrogen atoms can be changed. Adjusting the time of T2 and T1 can ensure that the meniscus will present the high signal state. Therefore, the pathological changes of the meniscus are closely related to the morphological changes and size of the high signal MRI images of the meniscus. Careful observation of MRI images can determine whether the meniscus is damaged or not, and can clearly observe the characteristics and tear degree of the meniscus. In terms of morphology, MRI can also judge the reduction of the posterior angle of the meniscus, the displacement of meniscus fragments and whether the meniscus is blunt. At the same time, MRI can also determine whether there is a tear in the meniscus. Therefore, the clinical value of MRI is very important in the diagnosis of meniscus tear of knee joint. Its operation method is simple and easy, taking a short time to obtain the results. It can provide important reference basis and data in the clinical diagnosis process. Therefore, MRI plays an increasingly important role in the diagnosis of meniscus tear of knee joint <sup>[5-6]</sup>.

To sum up, applying MRI diagnosis in meniscus tear of knee joint can effectively improve the detection rate of disease, and its diagnostic sensitivity and specificity are high, which can achieve effective and comprehensive diagnosis and monitoring of patients' condition.

## References

- [1] Lu Hefeng, Wu Renchang, Wang Wei. Application of MRI in Diagnosis of Anterior Cruciate Ligament Injury and Meniscus Tear [J]. Journal of Imaging research and medical application, vol.4, no.1, pp.64-65, 2020.
- [2] Jin Honghui, Nie Guojun, Zhang Chenhai, et al. MRI Scan Characteristic Signs of the Radial Meniscal Tears [J]. Chinese Journal of CT and MRI, vol.17, no.7, pp.144-146,152, 2019.
- [3] Chen Liding. MRI diagnosis and arthroscopic comparative analysis of meniscus injury [J]. Journal of Imaging research and medical application, vol.4, no.8, pp.62-63, 2020.
- [4] Qian Yuenan, Liu Fang, Dong Yilong, et al. Diagnostic value of MRI for posterior root tear of medial and lateral meniscus [J]. China Journal of Orthopaedics and Traumatology, vol.31, no.3, pp. 263-266, 2018.
- [5] Li Yanqiu, Yang Daxiong, Wu Keyu. The value of MRI in diagnosing bucket handle tear of knee meniscus [J]. Chinese Journal of Medical Device, vol.31, no.8, pp.31-32, 2018.
- [6] Bai Yige, Xie Kang, Fu Xinfei. Analysis of Imaging Features of Arthroscopy Combined with MRI in the Diagnosis of Meniscus Injury of Knee Joint [J]. Chinese Journal of CT and MRI, vol.17, no.12, pp.133-135, 2019.