

ORIGINAL RESEARCH

Assessment of Magnetic Resonance Imaging ankle injuries

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ABSTRACT

Background:The present study was undertaken for assessing the benefits of Magnetic Resonance Imaging (MRI) for assessment of ankle injuries. **Materials & methods:**A total of 50 patients presenting with ankle pain were enrolled. Complete demographic and clinical details of all the patients was obtained. All the patients were referred for MRI assessment. Imaging was done with patient in a supine position with ankle by the side in neutral position. After obtaining localiser in all three orthogonal planes, the following sequences included: T1 and T2 weighted sequences in sagittal planes, PD weighted sequences in axial, coronal and sagittal planes and fat suppressed T2 or STIR sequences wherever indicated. After acquisition of images, data collection was done using an observation checklist and data collected was analyzed to achieve the objectives of the study. **Results:**While classifying lesions on the basis of tendon pathologies, it was seen that involvement of Achilles tendon, Flexor tendons, Extensor tendons and Peroneus tendons occurred in 20 percent, 16 percent, 10 percent and 26 percent of the patients respectively. Tendon lesions were evident on MRI in 72 percent of the patients. While assessing MRI findings of the tendon lesions, it was seen that Tenosynovitis, Complete rupture, Encased, Partial thickness tear and Tendinopathy occurred in 30 percent, 10 percent, 4 percent, 8 percent and 16 percent of the patients respectively. While overall distributing the MRI findings of the patients with ankle injuries, ligament injuries, tendon injuries, osseous injuries and joint effusion occurred in 36 percent, 72 percent, 10 percent and 52 percent of the patients respectively. **Conclusion:**MRI provide precise information about cartilage, tendon, ligament, bone marrow, joint effusion, skeletal and extra-skeletal masses. It has superiority in soft tissues over any other modality; this makes it a useful tool for surgeons to diagnose and to make treatment plans.

Key words: Magnetic resonance imaging, Ankle

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INTRODUCTION

Ankle injuries are very common in sports worldwide, with many publications in the medical literature devoted to this topic. Ankle trauma accounts for ten percent to thirty percent of all sports injuries, with ankle sprains representing the most common type. The ankle joint is a hinged synovial joint that is formed by the articulation of the talus, tibia, and fibula bones. The articular facet of the lateral malleolus (bony prominence on the lower fibula) forms the lateral border of the ankle joint while the articular facet of the medial malleolus (bony prominence on the lower tibia) forms the medial border of the joint.^{1,2}

Traumatic injuries of the ankle are one of the most common musculoskeletal injuries. Ankle injuries can happen at any age. Ankle sprains are considered one of the most common lower limb injuries, affecting more commonly young athletes; the most common

mechanism of injury is represented by inversion of the foot (less frequently eversion). When patients present to their specialist with ankle or hindfoot pain, there are a variety of possible etiologies.³ Radiography is a common method used for detecting ankle injury, and can determine the fracture site, type and extent. However, it is difficult to use radiography to discern some ankle fractures, bone fragments, displacement, or ligamentous injury; hence, radiography alone cannot be used to accurately classify ankle fractures or formulate a treatment program.^{4,5}

Magnetic resonance imaging (MRI) has become the diagnostic modality of choice for the evaluation of traumatic ligamentous, tendinous injuries of the ankle and occult bony trauma. MRI is particularly suited for evaluation of the complex bone and soft tissue anatomy of the foot and ankle because of its superior soft tissue contrast and the ability to image in multiple

planes. In addition new fastscan techniques provide improved efficiency and allow dynamic studies to be performed. MR Arthrography technique has improved significantly in recent years resulting in more routine use of this technique.^{6, 7}Hence; under the light of above-mentioned data, the present study was undertaken for assessing the benefits of Magnetic Resonance Imaging MRI for assessment of ankle injuries.

MATERIALS & METHODS

The present study was conducted with the aim of assessing the MRI findings in patients with ankle injuries. A total of 50 patients presenting with ankle pain were enrolled. Complete demographic and clinical details of all the patients was obtained. All the patients were referred for MRI assessment. Imaging was done with patient in a supine position with ankle by the side in neutral position. After obtaining localiser in all three orthogonal planes, the following sequences included: T1 and T2 weighted sequences in sagittal planes, PD weighted sequences in axial, coronal and sagittal planes and fat suppressed T2 or STIR sequences wherever indicated. After acquisition of images, data collection was done using an observation checklist and data collected was analyzed

to achieve the objectives of the study. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software.

RESULTS

Mean age of the patients was 45.1 years. Majority proportion of the patients (64 percent) of the present study were males while the remaining (36 percent) were females. In 66 percent of the patients, the nature of lesion was chronic in nature. While classifying lesions on the basis of tendon pathologies, it was seen that involvement of Achilles tendon, Flexor tendons, Extensor tendons and Peroneus tendons occurred in 20 percent, 16 percent, 10 percent and 26 percent of the patients respectively. Tendon lesions were evident on MRI in 72 percent of the patients. While assessing MRI findings of the tendon lesions, it was seen that Tenosynovitis, Complete rupture, Encased, Partial thickness tear and Tendinopathy occurred in 30 percent, 10 percent, 4 percent, 8 percent and 16 percent of the patients respectively. While overall distributing the MRI findings of the patients with ankle injuries, ligament injuries, tendon injuries, osseous injuries and joint effusion occurred in 36 percent, 72 percent, 10 percent and 52 percent of the patients respectively.

Table 1: Distribution of patients according to site of tendon pathologies

Site of tendon pathologies	Number of patients	Percentage
Achilles tendon	10	20
Flexor tendons	8	16
Extensor tendons	5	10
Peroneus tendons	13	26

Table 2: Magnetic resonance imaging findings - tendon lesions

MRI Findings-tendon lesions	Number of patients	Percentage
Tenosynovitis	15	30
Complete rupture	5	10
Encased	2	4
Partial thickness tear	3	6
Tendinopathy	8	16
No lesion	14	28

Table 3: Overall-distribution of patients according to MRI findings

MRI Findings	Number of patients	Percentage
Ligament injuries	18	36
Tendon injuries	36	72
Osseous injuries	5	10
Joint effusion	26	52

DISCUSSION

Ankle injuries is a common clinical problem, that may be due to a variety of soft tissue and osseous abnormalities. Standard first line investigations include assessment of osseous structures with plain radiograph and common soft tissue problems with high frequency ultrasonography. However due to inherent limitation of assessment of deeper soft tissue and subtle soft tissue and osseous abnormalities with

these imaging modalities, MR imaging is gold standard problem solving non-invasive imaging tool.^{8, 9}

Ankle joint has a complex three-dimensional anatomy, so magnetic resonance imaging (MRI) is considered the modality of the choice in evaluating patients with ankle problems due to its multiplanar capabilities, excellent soft-tissue contrast, bone marrow imaging capability, non-invasiveness, and

lack of ionizing radiation. Plain radiographs are still the initial and most valuable imaging study of any patient with a musculoskeletal injury. Lack of familiarity of radiologists with local pathology and complex anatomy of this region may explain the less popularity of MRI of the ankle.¹⁰⁻¹²

Mean age of the patients was 45.1 years. Majority proportion of the patients (64 percent) of the present study were males while the remaining (36 percent) were females. In 66 percent of the patients, the nature of lesion was chronic in nature. While classifying lesions on the basis of tendon pathologies, it was seen that involvement of Achilles tendon, Flexor tendons, Extensor tendons and Peroneus tendons occurred in 20 percent, 16 percent, 10 percent and 26 percent of the patients respectively. Barini M et al reviewed with meta-analysis analyzes the diagnostic accuracy of MRI on acute ATFL injury. Relative studies were retrieved after searching three databases (MEDLINE, SCOPUS, and Cochrane Central Register of Controlled Trails). Eligible studies were summarized. The quality of the included articles was assessed using the revised Quality Assessment of Diagnostic Accuracy Studies (QUADAS-2) tool. Data were extracted to calculate pooled sensitivity and specificity of MRI. Seven studies met the inclusion and exclusion criteria. For MRI, the pooled sensitivities and specificity in diagnosing acute ATFL injury were respectively 1.0 (95% CI: 0.58–1) and 0.9 (95% CI: 0.79–0.96). Pooled LR+ and LR– were respectively 10.4 (95% CI: 4.6–23) and 0 (95% CI: 0–0.82). This systematic review with meta-analysis investigated the accuracy of imaging for the diagnosis of acute ATFL injury. The results demonstrated that MRI shows high diagnostic accuracy in the diagnosis of acute ATFL lesions. These results suggest that routine MRI in the case of suspected ATFL acute injury may be clinically useful, although this is not done in clinical practice due probably to high cost.¹³ Rao F verified the influencing factors of magnetic resource imaging (MRI) diagnosis based on the linear regression algorithm model. The experimental group was diagnosed by MRI, while the control group was diagnosed by plain X-ray. After that, the mathematical model of the linear regression algorithm was constructed. It could be concluded that the MRI detection rate was 85.71%, and the X-ray plain film detection rate was 77.14%. The linear regression model analysis showed that the P-value of cartilage injury, tendon fracture, bone contusion, and soft tissue swelling was greater than 0.05. MRI has more advantages in the application of ankle joint diagnosis. And ligament injury and joint effusion are the influencing factors of MRI diagnosis, which can highly indicate the authenticity of the injury in the ankle joint.¹⁴

Tendon lesions were evident on MRI in 72 percent of the patients. While assessing MRI findings of the tendon lesions, it was seen that Tenosynovitis, Complete rupture, Encased, Partial thickness tear and

Tendinopathy occurred in 30 percent, 10 percent, 4 percent, 8 percent and 16 percent of the patients respectively. While overall distributing the MRI findings of the patients with ankle injuries, ligament injuries, tendon injuries, osseous injuries and joint effusion occurred in 36 percent, 72 percent, 10 percent and 52 percent of the patients respectively. Turkey AA et al evaluated the role of magnetic resonance imaging (MRI) in the detection of abnormalities and injuries associated with post-traumatic ankle joint. Sixty patients with post-traumatic ankle joint complaints underwent MRI examination during this period. All patients performed MRI examination in the Radiology Department, Menoufia University Hospital after signing informed consent. MRI is the modality of choice in evaluating ankle injuries because of its high soft tissue contrast resolution and multi-planar capabilities. It is an ideal modality for global evaluation of the osseous and soft tissue structures of the ankle.¹⁵

CONCLUSION

MRI provide precise information about cartilage, tendon, ligament, bone marrow, joint effusion, skeletal and extra-skeletal masses. It has superiority in soft tissues over any other modality; this makes it a useful tool for surgeons to diagnose and to make treatment plans.

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