

Diagnostic Value of Early Magnetic Resonance Imaging After Acute Lateral Ankle Injury



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ABSTRACT

We report a retrospective study of 171 consecutive patients with a lateral ankle sprain. All the patients with direct or blunt force trauma were excluded. Within 21 days of injury, 115 (67.25%) patients had undergone magnetic resonance imaging to evaluate for more serious or significant injuries. The average patient age was 44.09 years. Of the 115 patients, 75 (65.23%) had findings noted to be “significant.” MRI can serve as a valuable and underused tool in the evaluation of acute lateral ankle injuries. The underuse of MRI might explain the high degree of variability in patients recovering from a lateral ankle sprain.

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Ankle sprains are a common occurrence in the United States, with an estimated 23,000 to 27,000 acute sprains occurring each day (1,2). Of all ankle sprains, 80% to 90% can be attributed to the lateral ankle complex, with involvement of the anterior talofibular ligament the most affected (3). In a recent review of the published data for acute ankle sprains, ≤33% of patients presented because of continued ankle pain at 1 year after injury (4). Also, within a period of 3 years, ≤34% of the patients reported ≥1 repeat sprain (4).

The clinical examination of patients presenting after an acute lateral ankle injury is commonly limited secondary to the pain. In addition to injury of the lateral ankle ligament complex, the syndesmosis, medial ankle ligament complex, peroneal tendons, and adjacent osseous structures can also be compromised. Diagnostic tools such as plain film and stress radiographs used to evaluate the lateral ankle complex have inherent flaws and cannot accurately depict the extent of soft tissue damage (5). Some investigators have advocated the use of diagnostic arthroscopy to evaluate the severity of injury; however, costs associated with the procedure and the potential surgical risks have made this modality less favorable (6).

Magnetic resonance imaging (MRI) is an excellent tool in the evaluation of the lateral ankle after injury. MRI is known to have the greatest specificity and sensitivity of the imaging modalities, with a high degree of interobserver agreement (7). MRI is not routinely performed in the acute setting, and most investigators have focused on its use only for chronic conditions. Others have only recommended MRI in the acute setting to diagnose a syndesmotom disruption (5). We believe that the incidence of concomitant damage to the adjacent bony and soft tissue structures is greater than previously reported and unnecessary delay in determining the proper diagnosis will increase the morbidity to the patient.

Materials and Methods

Data were obtained through an electronic medical record review at the senior authors' (J.R.M., L.J.C.) practice. The patients were identified retrospectively using the International Classification of Diseases, Ninth Revision, Clinical Modification diagnosis codes (845.00, 845.02, and 845.03) during the 2-year period (June 30, 2012 to July 1, 2014). A total of 196 consecutive patients were identified. The inclusion criterion was patients who had sustained an acute lateral ankle injury or inversion “sprain.” The exclusion criteria were direct or blunt trauma to the lateral ankle, a documented history of recurrent ankle sprains or complaints of ankle instability, and acute nonavulsion fractures of the foot and ankle not readily diagnosed using plain film radiographs. Of the 196 patients, 25 (12.8%) met ≥1 exclusion criterion and were excluded (Fig. 1).

The remaining 171 patients met the initial criterion for analysis. The variables recorded included age, sex, and body mass index (BMI). The performance of MRI within 3 weeks of the injury was deemed within the acute phase of injury (Table 1). If MRI had been performed >3 weeks after the injury, the patients were included for analysis, but

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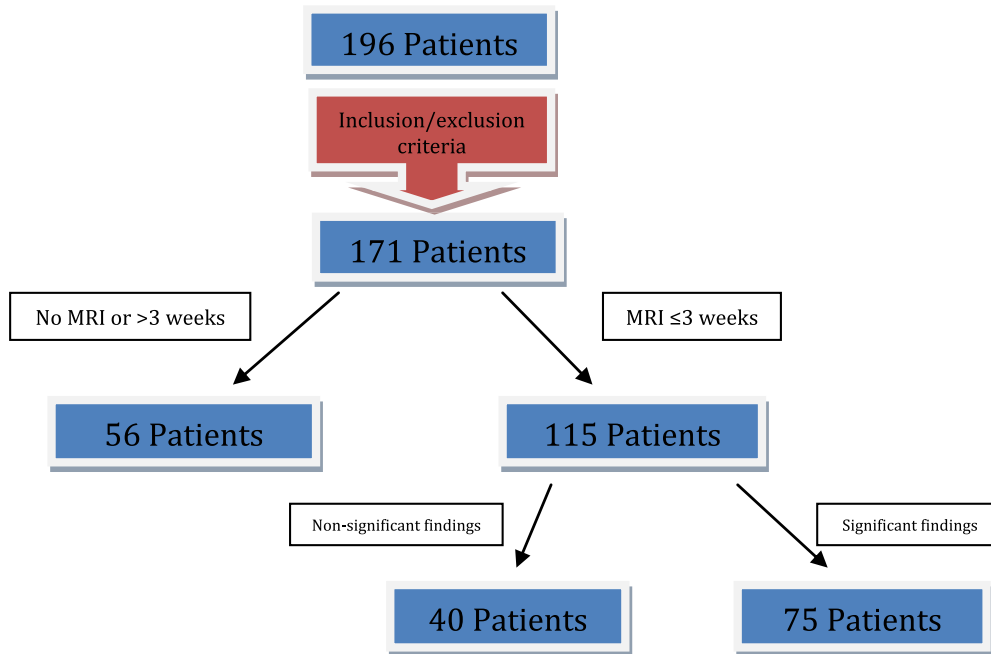


Fig. 1. Flowchart showing inclusion and exclusion of patients.

the MRI findings were not included because the results were considered subacute. Of the 171 patients, 115 (67.25%) had undergone MRI within 3 weeks after the acute lateral ankle injury. The determination of the MRI findings was performed by board-certified radiologists or board-certified or fellowship-trained foot and ankle surgeons. Significant findings included injury to all 3 lateral ligaments (anterior talofibular, calcaneofibular, and posterior talofibular ligaments), syndesmosis injury, osteochondral lesions of the talus (OLTs), significant bone marrow edema, a full-thickness peroneal tendon tear, concurrent lateral ligament and deltoid ligament involvement, and acute fracture (nonavulsion of the fibula).

Results

The 171 patients included 106 females and 65 males. The average patient age was 44.09 years, and the average BMI was 27.17 kg/m². Of the 115 patients who had undergone MRI within 3 weeks after injury, 75 (65.23%) had findings noted to be “significant” (Table 2).

Discussion

In the United States, an estimated 2.15 ankle sprains occur per 1000 person-years (8), constituting ≤10% of all emergency department visits (9). Possibly because of the high rate of occurrence, ankle sprains are often dismissed as an innocuous injury; however, a high degree of variability in the outcomes after an ankle sprain has been reported (4). Despite the variability in the clinical course of these patients, primary care facilities and emergency departments in the acute setting generally offer a “one size fits all approach.”

Table 1

Patient characteristics stratified by magnetic resonance imaging findings ≤3 weeks after injury (N = 115)

Characteristic	Nonsignificant	Significant
Patients (n)	40	75
Average age (y) mean ± SD (range)	37.28 ± 21.23	45.93 ± 18.75
Sex		
Female (count [%])	28 (70.0%)	51 (68.0%)
Male (count [%])	12 (30.0%)	24 (32.0%)
BMI (kg/m ²) (mean ± SD [range])	27.24 ± 7.23	27.06 ± 6.58

Abbreviation: BMI, body mass index.

Antiinflammatory measures are begun and standard radiographs taken. If the findings are negative, protected weightbearing is permitted. Typically, follow-up care is recommended within 1 week after the injury. Physical examination best practice is to offer reassessment 3 to 5 days after injury (10); however, current published studies have reported that early assessment of ankle sprains is unable to predict the long-term outcomes (11). Prognostic studies have attempted to identify the risk factors and key physical findings at short and subacute assessment periods; however, the data from such studies have provided a “poor guide for clinicians who are planning treatment and predicting recovery in the acute phases after ankle sprain” (12,13).

Previous studies have demonstrated certain demographic features associated with a poor prognosis after an ankle sprain. A correlation has been reported between patient age and prognosis for short- and medium-term recovery after an ankle sprain, with worse outcomes seen in older individuals (12). Age-related muscle atrophy might be

Table 2

Findings on magnetic resonance imaging considered significant (n = 75)

Injury	Patients (n[%])
Isolated significant injury	
Syndesmosis injury	6 (8%)
OLTs	9 (12%)
Significant bone marrow edema	13 (17.33%)
Lateral and medial ligament disruption	12 (16%)
Acute fracture	9 (12%)
Full-thickness peroneal tendon tear	12 (16%)
All 3 lateral ligaments injured	1 (1.33%)
Total	62 (82.67%)
Concomitant significant injuries	
Syndesmosis injury and acute fracture	2 (2.67%)
Syndesmosis with lateral and medial ligament disruption	2 (2.67%)
OLTs and acute fracture	2 (2.67%)
OLTs and all 3 lateral ligaments injured	3 (4%)
All 3 lateral ligaments injured with significant bone marrow edema	2 (2.67%)
Full-thickness peroneal tendon injury and lateral and medial ligament tendon disruption	2 (2.67%)
Total	13 (17.33%)

Abbreviation: OLTs, osteochondral lesions of the talus.

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