ADVANCED IMAGING FOR SUSPECTED SCAPHOID FRACTURES USING THE MRI WRIST 2 SYSTEM

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• Scaphoid fractures are common injury but may be missed on initial radiographs

• Advanced imaging modalities such as bone scan, computed tomography (CT) and magnetic resonance imaging (MRI) have improved diagnostic accuracy but at an increased initial cost

Not always available.
Diagnosis of Occult Scaphoid Fractures
A Cost-Effectiveness Analysis

John W. Karl, MD, MPH, Eric Swart, MD, and Robert J. Strauch, MD

Investigation performed at the Columbia University Medical Center, New York, NY

• **Given its relatively low cost and high diagnostic accuracy, advanced imaging for suspected scaphoid fractures in the setting of negative radiographs represents a cost-effective strategy for reducing both costs and morbidity.**

J Bone Joint Surg Am. 2015;97:1860-8
• Occult fractures are present in almost two fifths of patients with suspected scaphoid fracture and normal initial plain films.

• Half of these are scaphoid fractures.

• MRI allows an early definitive diagnosis to be made, changing patient management in over 90% of cases and should be regarded as the gold standard investigation in this population.

Br J Radiol 2014
• MRI 2 SYSTEM IS AN OFFICE BASE 1 T MRI SYSTEM.
• MAGNETIC FIELD IS PRODUCED BY MAGNET
• THERE IS NO RF SHIELD FACILITIES.
• FRIENDLY TO USE AND HANDLE.
• DATA SAVED IN PACS.
• NON CLAUSTROPHOBIC TEST.
Active implants/devices should not be exposed to fields greater than 5 Gauss unless so labeled.

The 5 G line of the Wrist II is approx 0.75 m (2.5 feet) from isocenter.
• The purpose of this study was to evaluate the clinical application of MRI WRIST 2 System in the setting of suspected scaphoid wrist fractures.
• MRI WRIST 2 SYSTEM WAS OPERATED IN ASAF HAROFEH MEDICAL CENTER WITH APPROVAL OF LOCAL IRB.

• ALL PATIENTS WHO WERE INVESTIGATED WITH MRI WRIST 2 SYSTEM SIGNED AN INFOMED CONSENT FORM.

• NO DISCLOSURES
<table>
<thead>
<tr>
<th>30 pts susp scaphoid fracture</th>
<th>ASBT and Negative radiographs</th>
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</thead>
<tbody>
<tr>
<td>25 pts - Early Wrist 2 MRI</td>
<td>5 pts - std protocol</td>
</tr>
<tr>
<td>2-4 d from injury</td>
<td>Cast &amp; repeat radiographs in 10 d</td>
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<tr>
<td>Hand surgeon &amp; musculoskeletal radiologist evaluation</td>
<td>Repeated radiographs Negative +ASBT</td>
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<tr>
<td></td>
<td>ASBT Positive Wrist CT scan</td>
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WRIST 2 - MRI INTERPETITION

- Discrete linear low signal intensity through the scaphoid, with surrounding bone marrow edema, was consistent with fracture.
- Edema involves half of scaphoid or more (la hei) was considered as severe bone contusion and treated as fracture.
RESULTS
Patients

10-14 days evaluation

4 pts ASBT with negative radiographs

CT scan

1 pts negative ASBT & radiographs

Plaster removal

4 patients negative scan for scaphoid fracture

1 hairline scaphoid waist fracture

The average time to plaster removal was 5 weeks, in patient whom scaphoid fracture was ruled out.
25 MRI wrist scans

- 5 Acute scaphoid fracture
  - 2 cases associated distal radius bone edema
- 15 normal MRI scan
  - 3 bone edema gr 2
  - 1 capitate bone edema
  - 1 hook hamate bone edema
MRI Findings

- Acute scaphoid fracture
- Capitate, hook hamate bone edema
- Normal MRI San
- Gr 2 Bone Edema

Counts: 15, 5, 2, 3
MRI wrist 2 scan compared to standard protocol

- DAYS TO ADVANCED SCAN
- DAYS TO PLASTER REMOVAL IN NO FRACTURE GROUPS

* p<0.05
SUMMARY

• Occult scaphoid fractures were presented in 20 PERCENT of patients with suspected scaphoid fracture and normal initial plain films.

• MRI Wrist 2 System - Enables early detection and appropriate treatment of scaphoid and associated occult wrist injuries

• MRI Wrist 2 scan for suspected scaphoid fractures gain high availability — average time to scan and appropriate treatment - 2.4 days !

• It reduce an unnecessary immobilization time compared to the conventional occult scaphoid fracture management .
Authors’ conclusions

Although quality of the included studies is moderate to good, findings are based on only 11 studies and the confidence intervals for the summary estimates are wide for all three tests. Well-designed direct comparison studies including CT, MRI and BS could give valuable additional information.

Bone scintigraphy is statistically the best diagnostic modality to establish a definitive diagnosis in clinically suspected fractures when radiographs appear normal. However, physicians must keep in mind that BS is more invasive than the other modalities, with safety issues due to level of radiation exposure, as well as diagnostic delay of at least 72 hours. The number of overtreated patients is substantially lower with CT and MRI.

Prior to performing comparative studies, there is a need to raise the initially detected prevalence of true fractures in order to reduce the effect of the relatively low specificity in daily practice. This can be achieved by improving clinical evaluation and initial radiographical assessment.
The Benefit of Magnetic Resonance Imaging for Patients With Posttraumatic Radial Wrist Tenderness

Peter Jørgsholm, MD, Niels O. B. Thomsen, PhD, Jack Besjakov, PhD, Sven-Olof Abrahamsson, PhD, Anders Björkman, PhD

Conclusions  Low-field MRI showed a high incidence of fractures in patients with posttraumatic radial wrist tenderness and demonstrated more fractures than radiographs and CT. A scaphoid fracture was by far the most common injury. However, it is not clear whether diagnosis of subtle injuries only demonstrated on MRI improves outcomes. (J Hand Surg 2013;38A:29–33. Copyright © 2013 by the American Society for Surgery of the Hand. All rights reserved.)