

# A Better Imaging Position for Injured Joints of the Hand

Danqing Xiao<sup>1</sup>, PhD and Mari Englehardt<sup>2</sup>, RT(R)(MR)

<sup>1</sup>Massachusetts College of Pharmacy and Health Sciences, Boston, USA; <sup>2</sup>Shields MRI, Boston, USA

## BACKGROUND

- Hand injuries have contributed to nearly 10% of emergency hospital visits (1).
- The hand consists of intricate and complex networks of bones, muscles, nerves, vasculature, ligaments and tendons, which has prompted MRI hand studies on normal and abnormal structures for accurate diagnosis, such as ganglion cyst, tissue mass, and arthritis (2,3).
- Reports of injuries of the hand joints are very limited. Previous studies show that MRI has the greatest potential in diagnosis of complex injuries of the carpus (4).

We aim to report an effective hand (closed) positioning method for optimum visualization of joint effusion, tendon edema and tear by the metacarpal joint.

## TEACHING POINTS

### Methods

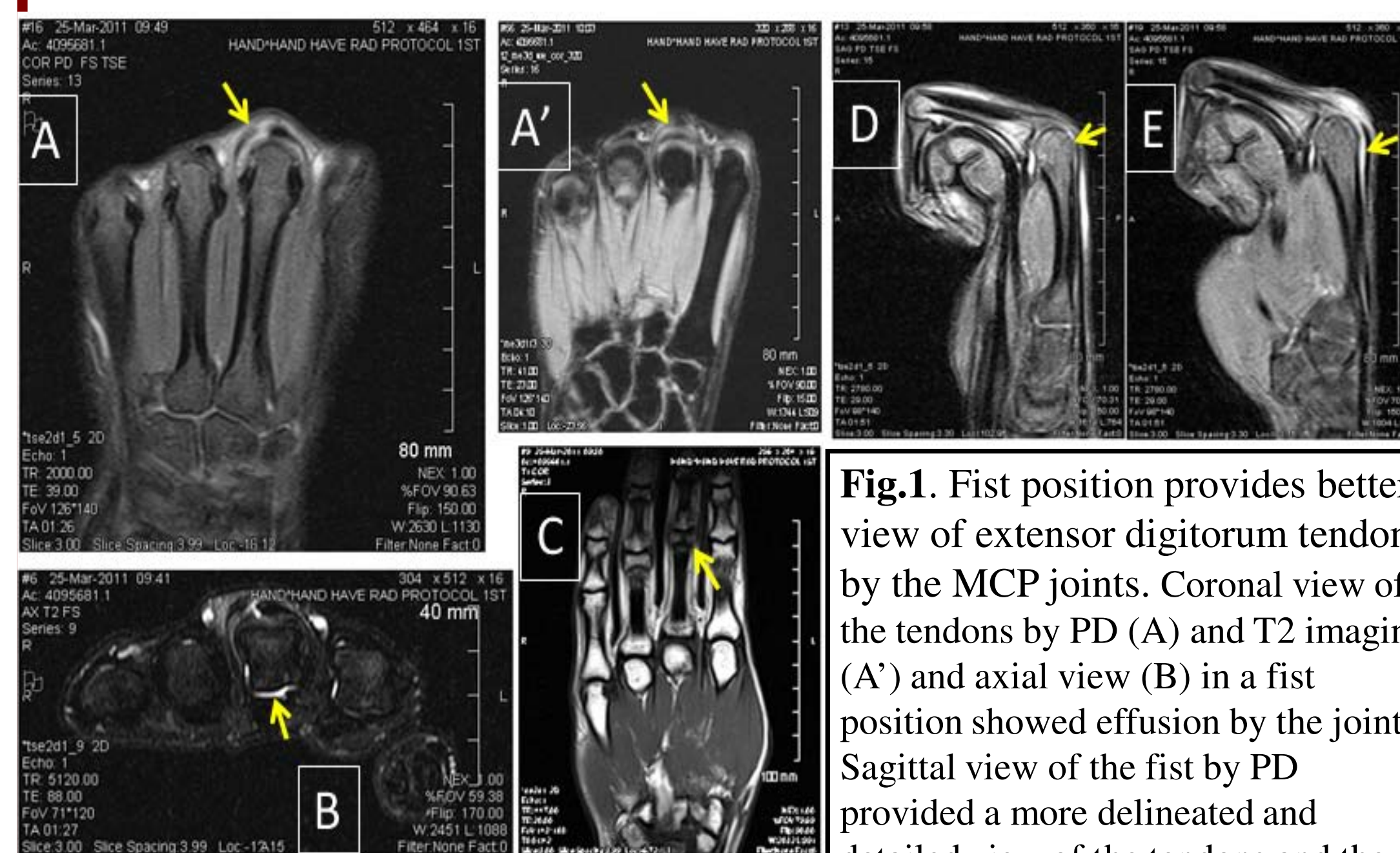
- Typical hand MRI imaging includes axial, sagittal and coronal views, with the palm open and the fingers stretching out (C). For cases when a joint lesion is suspected, we utilized a fist (hand closed) position in a high-resolution wrist coil to better view the anatomy of the joints (A,A') by proton density (PD) imaging and T2 three-dimensional imaging.
- The patient is in “superman” prone position with the hand and head first into the Siemens Magnetom Espree 1.5 T scanner.

### Patient

A 19 years old man who has pain on his third digit, with a history of a “punching” injury two months ago.

## Results

- When the fist position is assumed, hyper sensitivity is clearly visualized at the MCP joint on the coronal view, suggesting a small amount of third MCP joint effusion and soft tissue edema along the third extensor digitorum tendon (A,A' and B). The tear is best seen on panel B involving a band in the ulnar aspect at MCP joint.
- T1 imaging shows a vaguely darkened area at carpo-metacarpal joints (MCP, panel C).



**Fig.1.** Fist position provides better view of extensor digitorum tendons by the MCP joints. Coronal view of the tendons by PD (A) and T2 imaging (A') and axial view (B) in a fist position showed effusion by the joint. Sagittal view of the fist by PD provided a more delineated and detailed view of the tendons and the joints at the second (D) and third (E) digit, compared to palm opened position (C, T1-weighted image).

- In particular, the sagittal PD analysis with fat saturation and turbo spin echo sequence shows the stretched tendon by the knuckle of the fist, which gives rise to the best view of the dorsal tendon groups including extensor digitorum tendon. In this case, there is no evidence of extensor digitorum tendon tear and retraction (D,E, the second and third digit respectively).
- “The closed hand” position also helps to clearly rule out any tear of the radial aspect of MCP joint, collateral ligaments, and abnormality of muscles.

## SUMMARY

- The “closed hand” position allows improved visualization of the tendon, which is not otherwise seen clearly and therefore supports its use for MRI diagnostic imaging of joint related injuries.
- This method will further extend the potential of MRI as a diagnosing tool in hand imaging. For example, this positioning may also be applied to phalanges joints imaging this area anatomy to better view the pathology.

## References

- 1). [Http://www.emedicinehealth.com/hand\\_injuries/article\\_em.htm](http://www.emedicinehealth.com/hand_injuries/article_em.htm).
- 2). Stein, J.M. Magnetic resonance imaging clinics of North America 2011; 19(3).
- 3). Grey, M and Ailani, J. CT & MRI Pathology 2003.
- 4). Trail, I.A. et al. Journal of Hand Injury (European Vol). 2007; 32(240).

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