

# Magnetic Resonance Imaging Comparison of Arthroscopic and Open Repair of Triangular Fibrocartilage Complex Tears of the Wrist

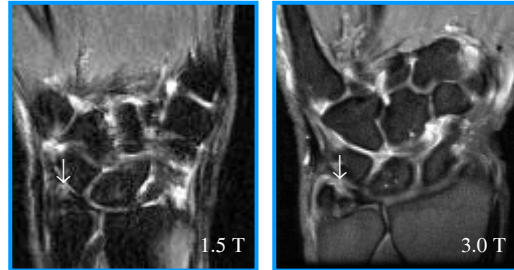
M. L. Anderson<sup>1</sup>, A. Larson<sup>2</sup>, P. A. Utter<sup>3</sup>, D. R. Larson<sup>4</sup>, R. A. Berger<sup>2</sup>, S. L. Moran<sup>5</sup>, W. P. Cooney<sup>2</sup>, and K. K. Amrami<sup>1</sup>

<sup>1</sup>Department of Radiology, Mayo Clinic, Rochester, MN, United States, <sup>2</sup>Department of Orthopedic Surgery, Mayo Clinic, Rochester, MN, United States, <sup>3</sup>Department of Neurologic Surgery Research, Mayo Clinic, Rochester, MN, United States, <sup>4</sup>Department of Biostatistics, Mayo Clinic, Rochester, MN, United States, <sup>5</sup>Department of Plastic & Reconstructive Surgery, Mayo Clinic, Rochester, MN, United States

**Introduction:** The triangular fibrocartilage complex (TFCC) is the primary stabilizer of the distal radioulnar joint. Traumatic injury leads to wrist instability, pain, and dysfunction (Fig. 1). Magnetic resonance imaging (MRI) with 1.5T is commonly used to assess these patients preoperatively. Controversy exists in the optimal surgical repair: open or arthroscopic. Furthermore, correlation between arthroscopic findings and preoperative MRI findings has not been systematically performed. Characterization of the injury by MRI has limited data comparing 1.5T to 3.0T (Fig. 2).

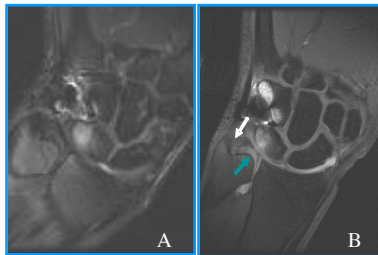


**Figure 1:** Arthroscopic TFCC Tear



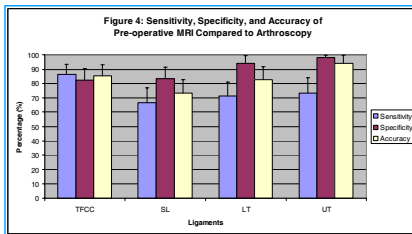
**Figure 2:** Preoperative 1.5T and 3.0T MRI in the same patient demonstrating improved sensitivity of TFCC injury with 3.0T MRI which demonstrates the peripheral tear of the TFCC (arrows) with greater confidence along with a tear of the meniscal homologue.

Open surgical repair is advocated because of the more anatomic reconstruction and presumed improved durability. Arthroscopic proponents claim less scarring and improved range of motion postoperatively because of minimal disruption of the joint capsule and surrounding structures. No studies have objectively compared these techniques using both clinical and radiographic outcomes. The purpose of this study was to compare pre- and post-operative MRI findings to arthroscopic findings in patients with suspected TFCC injuries. In patients who underwent TFCC repair, postoperative MRI findings, which include discontinuity of the TFCC, subcutaneous edema, fibrosis in the joint capsule, and anatomic alignment of the TFCC, will be correlated with the clinical outcomes. In this way, open and arthroscopic repair can be compared based on radiographic outcomes (Fig. 3) and clinical outcomes.



**Figure 3:** Patient with continued pain & instability following arthroscopic TFCC repair. Postoperative MRI (B) shows enlargement of the foveal tear (white arrow) of the TFCC and a new radial sided tear (blue arrow) compared to preoperative MRI (A).

**Methods:** From 1997 to 2006, 83 patients who presented with ulnar-sided wrist pain and diagnostic MRI were evaluated retrospectively. Preoperative MRI findings of these patients were compared to arthroscopic findings; limited 3T and postoperative data was also evaluated. Postoperative wrist MRI's at 1.5 and 3T will be obtained in the rest of the cohort and compared to preoperative MRI findings and surgical outcomes. The radiographic evaluators were blinded to the surgical findings and procedures.



**Results:** Eighty-three (83) diagnostic wrist MRI's were reviewed, 80 at 1.5T and 3 at 3T. 68 of the preoperative MRI's of the wrist were completed at the Mayo Clinic and 15 completed at an outside facility. From the 83 patients evaluated, 66 patients had a confirmed TFCC tear, 15 patients had a scapholunate ligament (SL) tear, 14 patients had a lunotriquetral (LT) tear, and 14 had an ulnotriquetral (UT) tear confirmed by arthroscopy.

The sensitivity, specificity, and accuracy of MR findings to arthroscopic findings was 86.4% (95% CI 79.1 to 93.7%), 82.4% (95% CI 74.2 to 90.6%), and 85.5% (95% CI 77.7 to 93.3%) with a kappa 60.7% for a TFCC tear; 66.7% (95% CI 56.5 to 76.9%), 83.6% (95% CI 75.6 to 91.6%) and 73.2% (95% CI 63.6 to 82.8%) with a kappa of 43.5% for the SL ligament; 71.4% (95% CI of 61.6 to 81.2%), 94.1% (95% CI 89.0 to 99.2%) and 82.9% (95% CI 73.9 and 82.9%) with a kappa of 27.3% for the LT ligament; 73.3% (95% CI 62.6 to 84.0%), 98.1% (95% CI 84.9 to 100%), and 94.0% (95% CI 88.3 to 99.7%) with a kappa of 76.5% for the UT ligament (Fig. 4). Out of the 66 patients with confirmed TFCC tear, 60 patients underwent repair, 31 had an open approach and 29 by arthroscopy. Evaluation of postoperative 1.5T and 3.0T MRI is currently underway for outcome assessment between open and arthroscopic TFCC repair compared to postoperative MRI findings.

**Conclusions:** MRI is useful to evaluate TFCC injuries preoperatively with high sensitivity, specificity and accuracy in this highly selected group of patients. Only patients who met criteria for arthroscopy were included which may introduce a bias toward positive imaging findings. Limited data from postoperative MRI shows good correlation with clinical outcomes, suggesting a role for postoperative MRI in following patients after TFCC repair. Continued data collection and correlation of radiographic findings pre- and post-operatively to clinical outcomes may provide additional data to substantiate appropriate management and treatment of patients with ulnar-sided wrist pain.