**Smith T, Drew B, et al . Diagnostic accuracy of magnetic resonance imaging and magnetic resonance arthrography for triangular fibrocartilaginous complex injury: a systematic review and meta-analysis. J Bone Joint Surg Am. 2012 May 2;94(9);824-32.**

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Design: meta-analysis of studies of the accuracy of diagnostic tests

Purpose of study: to compare the diagnostic accuracy of MRI versus MR arthrography (MRA) for triangular fibrocartilaginous complex injury (TFCC)

PICOS:  
 - Patient population: patients with wrist pain clinically suspected of having TFCC

* Intervention: MRI
* Comparison : MRA
* Outcomes: sensitivity, specificity
  + Reference test for both MRI and MRA were the findings at open or arthroscopic surgery
* Study types: studies in which either MRI or MRA were compared with the reference test of surgical findings

Study selection:

* Literature search was done on August1, 2010 using multiple databases: the Cochrane Bone, Joint, and Muscle Trauma Group Specialized Register, MEDLINE, EMBASE, CIAHL, BioMed Central, and others
* Titles of potentially eligible studies were reviewed independently by two authors, and the full texts of these studies were reviewed by two other authors for inclusion
* Study quality was assessed by two authors with QUADAS, a reliable and valid instrument for assessing the methodological quality of diagnostic test accuracy studies
* Sensitivities and specificities were pooled across studies, and an analysis was planned to assess whether magnet field strength had an effect on diagnostic accuracy

Results:

* 74 full text articles were assessed for eligibility, and 21 studies were included in the meta-analysis
* The majority of the studies were methodologically satisfactory
  + All but four studies recruited consecutive patients typically seen in orthopedic practices
  + In 19 studies, the researchers had ensured that all patients who received the test (MRI or MRA) underwent the same arthroscopic assessment as the gold standard
  + 13 studies ensured that the reviewers of the MRI/MRA were unaware of the results of the arthroscopic findings, but only three documented that the arthroscopic examiners were unaware of the MRI/MRA findings
  + Only 8 studies documented that the readers of the MR studies had access to the clinical information which would normally be available to physicians who ordinarily would be looking at the MR studies in practice
* The 21 studies included 982 patients (982 wrists) available for analysis
* The diagnostic accuracy of MRI was assessed in 17 papers, and that of MRA in 8 papers; both MRI and MRA were assessed in 4 papers
* The field strength was 1.5 T in 14 papers, 1.0 T in one paper, 0.5 T in two papers, 3.0 T in one paper, and was not clear in 3 papers
* The test accuracy of MRA was superior to that or MRI
  + For MRI, the pooled sensitivity was 0.75 and the pooled specificity was 0.81
  + For MRA, the pooled sensitivity was 0.84 and the pooled specificity was 0.95
* A receiver operating characteristic (ROC) curve was prepared which appeared to show a greater area under the curve (an indicator of test accuracy) for MRA than for MRI, but there were too few data points to give a quantitative measurement of the actual areas
* Increased field strength appeared to improve test accuracy, but there was only one study of a 3 T magnet, which showed perfect sensitivity and specificity for full thickness TFCC tears
* There was no data to allow for an assessment of the accuracy of MR for partial thickness TFCC tears

Authors’ conclusions:

* MRA is superior to MRI for the investigation of full thickness TFCC tears
* One important limitation was the lack of blinding of the arthroscopies to the results of the MR findings, and many studies failed to document the time elapsed between the performance of the MR and the arthroscopy, meaning that the potential for deterioration of the tear between imaging and surgery could not be excluded
* Although MRA is more accurate than MRI for the diagnosis of TFCC, there are considerable additional costs, and MRA is more technically complicated and time consuming than MRI; given the small difference between MRA and MRI with respect to test accuracy, the improvements in accuracy may not be large enough to lead to an improvement in clinical outcomes if MRA is substituted for MRI

Comments:

* Some of the included studies are small and have sensitivities and specificities which are difficult to calculate because of empty cells; e.g., for one study, all 28 patients had TFCC, and there were no patients without TFCC (there were no true negatives and no false positives)
  + In the online data supplement to the article, there is a table which makes it clear that the study in which all 28 patients had TFCC did not satisfy the criterion that patients enrolled in a study should be representative of all the patients who will receive the test in practice
* Four studies used both MRI and MRA on patients, but none of these four appear to have used both MRI and MRA on the same patients; this would have given extremely valuable information regarding the incremental value of MRA over MRI
* The authors make an important point in the discussion section, namely that the additional accuracy of MRA over MRI is not very large, and that the additional resources required to substitute MRA for MRI should be considered by practitioners attempting to diagnose TFCC in their patients
  + In the pooled analysis, the superiority of MRA over MRI is more pronounced in the comparison of specificities (95% versus 81%), for false positive rates of 5% versus 19% respectively; this could be helpful in deciding whether resources will be saved by identifying patients who do not have TFCC

Assessment:

Adequate meta-analysis to support good evidence that MRA is a more sensitive and more specific diagnostic test for TFCC than MRI, and that many patients who do not have TFCC can be more accurately identified with MRA rather than MRI