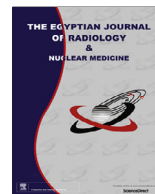




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Original Article

## Triangular fibrocartilage and ligamentous injury of the wrist joint: Does MR arthrography improve diagnosis over standard MRI? ☆

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## ABSTRACT

**Objective:** To detect the added value of magnetic resonance arthrography (MRA) over MRI in different triangular fibrocartilage complex (TFCC) and intrinsic wrist ligament lesions.

**Patients and methods:** MRI and MRA were achieved in 57 patients presented with wrist pain. Another symptomless Ten control individuals with negative MRI and MRA findings were included. Images were assessed for the presence of TFCC, scapholunate ligament (SCL) and lunotriquetral ligament (LTL) lesions. Imaging findings were compared with arthroscopic findings in all cases.

**Results:** Out of fifty-seven patients, 38 males (66.6%) and 19 females (33.3%) (age range 19–61 years (mean = 34.3 years) were included in the study, The sensitivity, specificity and accuracy of MRI and MRA for TFCC peripheral tears were 79.16%, 100%, 85.29% and 91.66%, 100%, and 94.11% respectively, the sensitivity, specificity and accuracy of MRI and MRA for TFCC central tears were 60%, 100%, 80% and 90%, 100%, and 95% respectively. Sensitivity, specificity and accuracy of MRI and MRA for SCL partial tears were 63.15%, 100%, 75.86% and 94.73%, 100% and 96.55%, respectively. For LTL partial tears, the values were 20%, 100%, 73.33% and 80%, 100%, and 93.33% respectively.

**Conclusion:** MR arthrography is highly accurate for the evaluation of TFCC and ligamentous injury of the wrist joint.

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### 1. Introduction

MRI is used to diagnose wrist joint lesions, such as triangular fibrocartilaginous complex (TFCC) and intrinsic ligaments injury. MRI is accurate for showing complete tears of the TFCC and intrinsic ligament [1–7]. When attention is required for evaluation of triangular fibrocartilage

complex (TFCC), other ligamentous, or capsular injury, direct MR arthrography has become a progressively applied imaging modality, allowing for improved visualization of the closely related ligamentous structures following the direct injection of contrast [8–10]. Intra-articular contrast allows for visualization of contrast leakage/extravasation and has been shown to be useful in detection of partial TFCC and ligamentous tears [11–14]. The aim of this work was to detect the added value of MRA over MRI in detection of TFCC and ligamentous tears and to compare the results with arthroscopy as the gold standard.

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## 2. Patients and methods

57 patients with age ranging from 19 to 61 years (mean = 34.3) complained of wrist pain and/or instability with clinical suspicion of having TFCC or wrist ligament tears were involved in this study. The study was approved by the scientific and ethical committee of the hospital. Informed written consent was obtained from all patients. Forty patients complained of right wrist pain while seventeen of left wrist pain. There were 38 male (66.6%) and 19 female (33.3%) patients. Twenty-seven patients had a previous history of trauma. The right wrist was imaged in 40 (70.17%) cases and the left wrist in 17 (29.82%) cases.

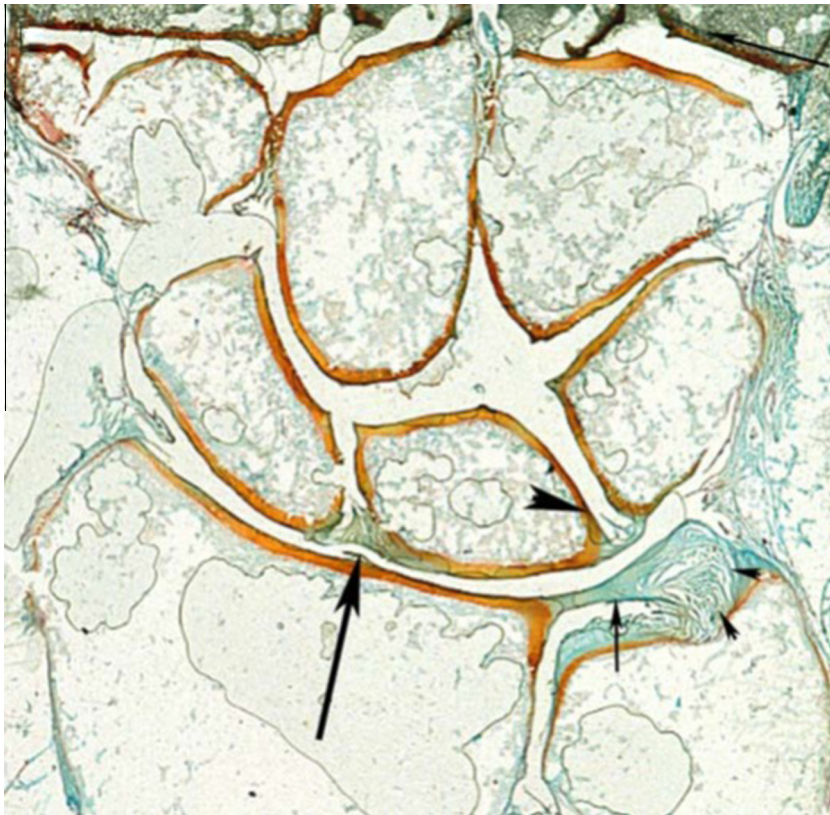
Patients were subjected to full clinical history. Plain radiography of the wrist was done in the following positions: postero-anterior view, lateral view, and scaphoid view. Three main regions were examined: TFCC, SCL, and LT ligament tears using a combination of conventional MRI, MRA and arthroscopy as a gold standard. Arthroscopy was achieved within 2–3 weeks of MR arthrography.

All patients were examined by conventional MRI. The MRI machine used was Philips gyros can enterAT scanner. Using dedicated wrist coil the examination protocol included coronal, sagittal, and axial planes. Coronal and sagittal fast spin-echo T1-weighted (TR/TE, 400/15), coronal and axial fast spin-echo T2-weighted (TR/TE,

2000/60), coronal gradient (TR/TE, 450/20) and coronal STIR (TR/TE, 2000/65) sequences with a field of view of 12 cm were used. Slice thickness was 2.5 mm with 2 mm interslice gap. Coronal plane is the most important image for detecting ligament tears. Normal intrinsic ligaments, normal TFCC appearance and the corresponding coronal MRI appearance are mentioned in Figs. 1 and 2.

## 3. Technique

MR arthrography is performed with single-compartment radiocarpal joint arthrogram with intra-articular injection of diluted gadolinium under fluoroscopic guidance, and 2–5 ml solution from 0.1 ml of diluted gadolinium in 20 ml solution from the combined 15 ml of normal saline and 5 ml of iodinated contrast (diatrizoate meglumine) (370 mg iodine/ml) was used. If connection with midcarpal or distal radioulnar joint was noted, we added 2–3 ml of contrast. The mid carpal compartment was punctured, and the solution was injected. If the distal radioulnar joint did not fill spontaneously, an injection was administered only to this joint when a TFCC tear was suspected. In the absence of radiocarpal connection, an injection was administered to the radiocarpal compartment, and 5 ml of contrast solution was injected. Radiocarpal



**Fig. 1.** Coronal section of normal anatomy of the scapholunate ligament (black arrow) and the lunate triquetral (arrowhead). The triangular fibrocartilage complex (TFCC), with the more fibrocartilage-like articular disk (small black arrow) and the more ligamentous-like peripheral ulnar attaching portion (smaller arrowheads) [32].

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