High Resolution MR Arthrography in Patients with Mechanical Symptoms of the Hip: Association with Labral Tears and Cartilage Loss

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OBJECTIVE. Magnetic resonance arthrography (MR arthrography) provides accurate delineation of intraarticular structures. The purpose of this investigation was to determine the association between mechanical symptoms in the hip and labral tears and cartilage loss seen on high-resolution MR arthrography.

METHODS. 60 patients with mechanical symptoms in the hip such as pain, clicking, locking and giving underwent MR arthrography of the hip to rule out a labral tear.

Sagittal, coronal and axial fat saturated T1 weighted spin echo (repetition time 650 ms, echo time 20 ms) with 4 mm-thick sections, a 0.5 mm intersection gap, 15.63 kHz bandwidth (BW), 2 excitations (NEX), a 16 - 18 cm field of view (FOV), 512 x 256 matrix) and fast spin echo inversion recovery sequences (repetition time 3000 ms, echo time 8 ms) with 4 mm-thick sections, a 1 mm intersection gap, 31.25 kHz BW, 2 excitations (NEX), a 16 - 18 cm FOV, 256 x 192 matrix) were obtained.

Cartilage loss was graded in the anterior, posterior, central, medial, and lateral hip compartments. The frequency and severity (0 = normal, 1 = signal heterogeneity, 2 = fissuring, 3 = thinning < 50%, 4 = thinning > 50%, 5 = full thickness cartilage loss, 9 = not evaluable) of cartilage changes in the anterior, posterior, central, medial and lateral acetabulum, and anterior, posterior, central, medial and lateral femoral head were evaluated. Hip joints were also evaluated for labral tears, bone marrow edema, and other pathology. For 6 patients MR images were compared with arthroscopic findings. Data were analyzed using contingency tables, Fisher's exact test for discrete outcomes (based on grade scores), Spearman's rank correlation for continuous outcomes, and both pooled and stratified analysis.

RESULTS. All imaging studies were of diagnostic quality. Labral tears were found in 35 patients. 10 patients had involvement of more than one region. The locations of the labral tears were lateral (8 simple, 3 complex tears), anterior (14 simple, 12 complex), posterior (7 simple), inferior (1 simple).

The prevalence of cartilage loss on MR arthrography in patients with mechanical hip symptoms was 75%. 45 patients showed cartilage changes, 35 of these demonstrated multiple changes (Figure 1).

The most common abnormal finding was cartilage thinning < 50% in 80 regions in 31 patients (9 anterior, 7 posterior, 8 central, 8 medial, 9 lateral acetabulum; 5 anterior, 8 posterior, 7 central, 7 medial, 12 lateral femoral head). Cartilage thinning > 50% was shown in 42 areas in 23 patients, (6 lateral, 4 medial, 5 anterior, 6 posterior, 2 central acetabulum; 6 lateral, 2 medial, 5 anterior, 4 posterior, 2 central femoral head). Full thickness cartilage loss was observed in 29 regions in 18 patients (areas of damage measuring < 1 cm in 26 regions, and 1 - 2 cm in 3 regions) most prominently in the lateral acetabulum. We saw 4 areas of fissuring and 27 of signal heterogeneity.

When we correlated the grade of cartilage abnormality with the grade of labral tear we found a statistically significant correlation (Fisher's exact test: $P \leq 0.01$; Two Sample-*t*-test $P \leq 0.05$). When we correlated the size of cartilage abnormality with the grade of labral tear we found a correlation (Fisher's exact test: $P \leq 0.02$; Two Sample-*t*-test $P \leq 0.42$).

When we correlated the grade of cartilage loss with the grade of bone marrow edema we found a significant correlation ($P \leq 0.0175$).

CONCLUSION. MR arthrography shows a high prevalence of cartilage abnormalities in patients with hip pain and with suspected labral tears. Patients with mechanical symptoms in the hip frequently demonstrated labral tears and cartilage loss both of which may contribute to the patients' symptoms. Moreover, labral tears and cartilage loss may be directly related. Cartilage loss shows also a high association with bone marrow edema, which has been reported [1] as an important prognostic factor in osteoarthritis of the knee joint. The same may be the case in the hip joint.

Reference: [1] Felson, D.T., et al. Ann Intern Med, 2001. 134(7): 541-9.

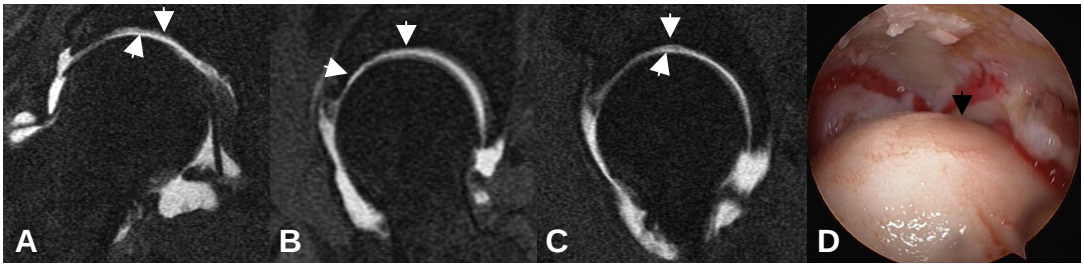

Figure 1: 52 year old woman with cartilage thinning and areas of fissuring in the dome of the femoral head, and cartilage loss in the anterior and central acetabular surfaces (arrows). A. coronal, B. sagittal oblique, C. sagittal plane, and D. arthroscopic presentation.