Dynamic MR Imaging of the Hip in Legg-Calvé-Perthes Disease: Comparison with Arthrography

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Purpose
The purpose of this study was to evaluate dynamic MR imaging of the hip in Legg-Calvé-Perthes Disease (LCPD) with a superconducting, open-configuration system compared to arthrography.

Introduction
Hip arthrography is considered of importance in tailoring treatment in children with LCPD [1-3]. Hip arthrography in children with LCPD is employed for dynamic imaging to determine congruency and containment of the femoral head by the acetabulum as well as to rule out "hinge abduction" [3]. Information obtained by hip arthrography may help in selecting candidates for operative treatment [3].

Dynamic evaluation of the hip with MR imaging is hampered by the closed architecture of conventional MR systems. With the increasing availability of open-configuration MR systems dynamic imaging in various positions has become feasible.

Methods
Ten hips of 9 children (mean age, 7.8 ys.) with advanced LCPD who were referred for evaluation and treatment were included in this study. Arthrographic as well as MR images were performed with the hips in neutral position, maximally abducted and maximally adducted position.

MR imaging was performed with an open-configuration 0.5 T MR system (Signa SP, GEMS) without prior sedation. Two different MR protocols were performed. 6 hips were imaged using a T2w FSE sequence (TR/TE, 5000/133; 5 mm slice thickness with 0.5 mm interslice gap). MR imaging using a GRE sequence (TR/TE, 50/5, 35° flip, 2.5 mm slice thickness) was performed in 4 other hips.

Arthrographic and MR images were reviewed separately with regard to image quality for diagnostic purposes, sphericity of the femoral head, irregularity of the cartilaginous articular surfaces, presence of "hinge" abduction, and containment of the femoral head by the acetabulum.

Results
Dynamic MR imaging was tolerated well by all 9 children. All images using both protocols were of diagnostic quality. MR examination was completed for each patient without sedation and in a single session. MR imaging was as efficient as arthrography in demonstrating non-sphericity of the femoral head, irregularities of the femoral and acetabular articular surface, and identification of best position and fit of the femoral head by the acetabulum (containment). MR imaging was capable to demonstrate "hinge" abduction in all 8 cases where it was visible on arthrography.

Discussion
Dynamic MR imaging of the hip with an open-configuration imager in LCPD allows accurate assessment of the containment and congruity in various positions without exposing the patient to side effects related to irradiation and intraarticular injections. Dynamic MR imaging of the hip appears to be a feasible non-invasive alternative to arthrography in patients with LCPD for operative planning or to evaluate the optimal position of the femoral head for immobilization. Our preliminary study of 10 hips in 9 patients demonstrated promising results.

References
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3. Quain S, Caterall A. JBJS Br 68-B:61-64