Indirect Shoulder MR Arthrography: A Novel Technique for Identifying Labral Pathology in Young Patients

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METHODS
An IRB approved retrospective review identified 68 cases of shoulder I-MRI performed at a single pediatric institution from 2010 to 2011. Cases were included if subsequent shoulder arthroscopy findings were available for review, leaving 37 cases in the study. A specific I-MRI imaging protocol was consistently followed in all cases. In accordance with standard practice at the participating institution, I-MRI images were reviewed by the in-house pediatric radiologist and a report generated.

The I-MRI images were then reviewed a second time for labral pathology by a single pediatric radiologist blinded to surgical findings. Operative images were reviewed by an independent orthopedic surgeon. Labral pathology was defined as a labral tear or fraying (Figure 1). The I-MRI findings (original and from the second radiologist) were compared to the arthroscopic findings. Statistics were used to determine the sensitivity, false negative percentage, and positive predictive value of I-MRI for detecting shoulder labral pathology. Further statistical analysis is pending.

INTRODUCTION
Direct magnetic resonance arthrography (D-MRI) is the preferred imaging technique for detecting shoulder labral pathology, with a sensitivity of 88-100% and specificity of 91-93%.

However, its use in the pediatric population has not been widely reported. Indirect magnetic resonance arthrography (I-MRI) has been presented in the adult literature as an alternative to D-MRI, and involves intravenous injection of contrast material, eliminating the need for direct injection and fluoroscopy.

In this study, the sensitivity of I-MRI for detecting labral pathology in young patients was 94%, with a positive predictive value of 90% and a 6% false negative percentage. The sensitivity for the second radiologist was 100%, with a positive predictive value of 94% and a 0% false negative percentage. A comparison of important diagnostic factors of I-MRI and D-MRI is presented in Table 2.

RESULTS
Of the 37 cases included in the study, 32 had labral pathology on arthroscopic examination. Representative I-MRI images of various arthroscopic diagnoses encountered are presented in Figure 2. A comparison of labral pathology findings on I-MRI and on arthoscopic examination is presented in Table 1.

Compared to arthroscopic findings, the sensitivity of I-MRI for detecting labral pathology in young patients was 94%, with a positive predictive value of 90% and a 6% false negative percentage. The sensitivity for the second radiologist was 100%, with a positive predictive value of 94% and a 0% false negative percentage. A comparison of important diagnostic factors of I-MRI and D-MRI is presented in Table 2.

Table 1. Comparison of I-MRI findings (from original radiologist and second radiologist) to arthroscopic findings for shoulder labral pathology. Findings for the second pediatric radiologist (MSK) are presented in parentheses.

Table 2. Comparison of important diagnostic factors of I-MRI and D-MRI.

DISCUSSION and CONCLUSION
I-MRI is a novel imaging technique for detecting labral pathology in young patients. In this study, the sensitivity of I-MRI (94% - 100%) for detecting labral pathology was comparable to that of D-MRI (88-100%), the current gold standard.

In the pediatric population, there are several advantages to I-MRI, most notably the elimination of direct injection into the joint, no radiation exposure, and decreased cost (Table 2). Although rotator cuff pathology (RCP) was not the focus of our study, clinicians need to be aware that there is an increased risk of false positive radiographic reads for RCP with I-MRI.T This is primarily due to enhancement of vascular structures.

In conclusion, this study demonstrates that I-MRI is a valuable and less invasive tool for diagnosing shoulder labral pathology in a younger patient population with comparable sensitivity to D-MRI.

REFERENCES