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Paper #3

Diagnostic Accuracy of MRI Detection of Ramp Lesions of the Knee

Justin W Arner, MD, UNITED STATES
Elmar Herbst, MD, GERMANY
Jeremy M Burnham, MD, UNITED STATES
Amir Ata Rahnemai-Azar, MD, UNITED STATES
Ashish Soni, MD, FRCS, UNITED KINGDOM
Jan-Hendrik Naendrup, BS, GERMANY
Adam Popchak, DPT, PhD, UNITED STATES
Freddie H. Fu, MD, UNITED STATES
Volker Musahl, MD, UNITED STATES

University of Pittsburgh Medical Center
Pittsburgh, Pennsylvania, UNITED STATES

Summary:
Diagnostic accuracy of MRI detection of ramp lesions of the knee

Abstract:
Purpose:
Meniscal tears are commonly found in conjunction with anterior cruciate ligament (ACL) injury, most frequently occurring in the posterior horn of the medial meniscus. Some believe tears in the posterior meniscocapsular zone, coined ramp lesions, are especially critical to knee stability. However, these lesions are easily overlooked, and under-diagnosis of these seemingly inconspicuous injuries may have significant implications on post-ACL reconstruction joint stability. Due to the presumed importance of the posterior horn of the medial meniscus in ACL deficient knees, identification of ramp lesions pre-operatively may allow surgeons to more consistently address these lesions intraoperatively, leading to better outcomes, particularly during concomitant ACL reconstruction. Thus, the purpose of this study was to determine if pre-operative MRI evaluation was able to accurately and reproducibly identify ramp lesions. It was hypothesized that identification of ramp lesions on MRI would be possible with high sensitivity and specificity.

Methods:
Consecutive ACL injured patients from 2013-2015 who had preoperative 1.5-Tesla (1.5T) MRIs and underwent ACL reconstruction were eligible for inclusion in this study. Three independent reviewers blinded to the arthroscopic results retrospectively reviewed the MRIs twice, with two months between evaluations, for the presence of ramp lesions. Sensitivity, specificity, negative predictive value, and positive predictive value for MRI were reported. These were calculated based on arthroscopic diagnosis for presence of ramp lesion as the gold standard. Intraclass correlation coefficient (ICC) was calculated to assess intra- and interobserver reliability of the MRI assessment between the three examiners. Significance was set at $p<0.05$.

Results:
A total of 90 patients met inclusion criteria (45 males, 45 females, mean age 28.0 years) and were included in the final analysis. All cases had complete acute ACL disruptions intra-operatively and on MRI evaluation. Thirteen of these patients had arthroscopy-confirmed ramp lesions, while the other 77 had other meniscal pathology. The average time interval between MRI and surgical intervention was 51.8 days.

Sensitivity of detecting a ramp lesion on MRI ranged from 53.9-84.6%, while specificity was 92.3-98.7%. Negative predictive value (NPV) was 91.1-97.4% while positive predictive value (PPV) was 50.0-90.0%. Inter-rater reliability between three reviewers was moderate at 0.56. The observers had excellent intra-rater reliability ranging from 0.75-0.81.

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Conclusions:
This study demonstrates high sensitivity and excellent specificity in detecting meniscal ramp lesions on MRI. While MRI is effective in identifying posterior medial meniscocapsular injuries, arthroscopic evaluation remains the gold standard. Ramp lesions are likely more common and may have greater clinical implications than previously appreciated, and the implications of untreated meniscocapsular injuries should be further investigated. The data from this study may aid clinicians in detecting ramp lesions in preparation for ACL reconstruction surgery.