

## CLINICAL INQUIRIES

Evidence-based answers from the  
Family Physicians Inquiries Network

**Matthew Hoyt, DO;**  
**Patricia Goodemote, MD**  
Eglin Air Force Base  
Family Medicine Residency,  
Eglin Air Force Base, Fla

**Jackie Morton, MLS**  
Amgen, Inc, Thousand Oaks,  
Calif



**MRI is highly accurate in diagnosing injury to the anterior and posterior cruciate ligaments.**

## Q / How accurate is an MRI at diagnosing injured knee ligaments?

### EVIDENCE-BASED ANSWER

**A** / IT IS HIGHLY ACCURATE in diagnosing injury to the anterior cruciate ligament (ACL) (strength of recommendation [SOR]: A, prospective blinded cohort studies) and posterior cruciate ligament (PCL) (SOR: B, limited number of prospec-

tive blinded cohort studies).

Insufficient data are available to evaluate the effectiveness of magnetic resonance imaging (MRI) for diagnosing injuries to the medial collateral ligament (MCL) and lateral collateral ligament (LCL).

### Evidence summary

Ligamentous knee injuries from trauma are common. In 2003, patients made about 19.4 million visits to the doctor because of knee problems.<sup>1</sup> The ACL is the most often injured knee ligament. The incidence of ACL injury is approximately 200,000 annually in the United States; 100,000 ACL reconstructions are performed each year.<sup>2,3</sup> A complete tear of the ACL can lead to significant knee instability and, unless repaired, may limit physical activity and quality of life.

In contrast, PCL injuries don't often cause significant instability and generally respond to nonsurgical treatment; they have less impact on a patient's quality of life. Surgery for PCL injury is usually reserved for elite athletes and unstable injuries. MCL and LCL injuries also are generally treated nonsurgically with rehabilitation and bracing; they normally don't require arthroscopic evaluation and repair.

### An effective alternative to arthroscopy

Arthroscopy with direct visualization of the ligamentous structures is considered the gold standard for diagnosing intra-articular ligamentous knee injuries, but it's invasive and costly. Although clinical examination is helpful in identifying injured ligaments, it may lead to unnecessary arthroscopies when used

alone because of the high false-positive rate. MRI has been shown to be an effective tool for accurately diagnosing ligamentous knee injury.<sup>2,3</sup>

### MRI offers high sensitivity for detecting ACL, PCL tears

Several prospective studies have compared MRI with arthroscopy for diagnosing ACL and PCL tears (TABLE).<sup>4-8</sup> All enrolled patients had sustained knee trauma and had had a clinical exam that suggested ligamentous injury. MRI and arthroscopy were performed regardless of MRI findings. The surgeons performing arthroscopy were blinded to the MRI results.

Although MRI equipment and techniques varied in all the studies, the sensitivity and specificity remained consistently high for detecting ACL injuries. Thin-slice views, special oblique views, and a fast spin-echo technique didn't improve either the sensitivity or specificity compared with conventional techniques or views, nor did decreasing the time interval from injury to imaging.<sup>5,9,10</sup> Prospective studies of PCL injuries also revealed high sensitivity and specificity with MRI.

### No data on MRI for MCL and LCL injuries

No prospective studies are available to assess the accuracy of MRI for suspected MCL and

# CLINICAL INQUIRIES

TABLE

## Sensitivity and specificity of MRI for ACL and PCL injury

Study	Year	Patients	ACL		PCL	
			SN	SP	SN	SP
<b>Rubin<sup>4</sup></b>	1997	340				
Isolated tear			94%	88%	N/A	N/A
Multiple tears			99%	84%	N/A	N/A
<b>Katahira<sup>5</sup></b>	2000	62				
Conventional oblique sagittal and coronal images			92%-96%	76%-79%	N/A	N/A
TSOCT			96%	97%	N/A	N/A
<b>Munshi<sup>6</sup></b>	2000	23	90%	67%	N/A	N/A
<b>Vaz<sup>7</sup></b>	2005	300	99%	95.4%	100%	99.7%
<b>Winters<sup>8</sup></b>	2005	67	92%	94%	80%	97%

ACL, anterior cruciate ligament; N/A, not available; PCL, posterior cruciate ligament; SN, sensitivity; SP, specificity; TSOCT, thin slice oblique coronal technique.

LCL injuries; however, MRI would likely not affect treatment or clinical outcomes, as both of these injuries are typically treated nonsurgically.

### Recommendations

The American Academy of Orthopaedic Surgeons supports MRI as an effective tool for evaluating knee injury,<sup>1</sup> and offers recom-

mendations and guidelines for treating ligamentous knee injury based on the findings of clinical examination and MRI. The Academy states that MRI is invaluable in preventing unnecessary surgery, and recommends it whenever ligamentous injury is suspected. **JFP**

### ACKNOWLEDGEMENTS

The opinions and assertions contained herein are the private views of the authors and are not to be construed as official or as reflecting the views of the US Air Force Medical Service or the US Air Force at large.

### References

1. American Academy of Orthopaedic Surgeons. Common knee injuries. 2007. Available at: <http://orthoinfo.aaos.org/topic.cfm?topic=A00325>. Accessed November 9, 2009.
2. Miyasaka KC, Daniel DM, Stone ML. The incidence of knee ligament injuries in the general population. *Am J Knee Surg.* 1991;4:43-48.
3. Brown CH Jr, Carson EW. Revision anterior cruciate ligament surgery. *Clin Sports Med.* 1999;18:109-171.
4. Rubin DA, Kettering JM, Towers JD, et al. MR imaging of knees having isolated and combined ligament injuries. *AJR Am J Roentgenol.* 1998;170:1207-1213.
5. Katahira K, Yamashita Y, Takahashi M, et al. MR imaging of the anterior cruciate ligament: value of thin slice direct oblique coronal technique. *Radiat Med.* 2001;19:1-7.
6. Munshi M, Davidson M, MacDonald PB, et al. The efficacy of magnetic resonance imaging in acute knee injuries. *Clin J Sport Med.* 2000;10:34-39.
7. Vaz CE, Camargo OP, Santana PJ, et al. Accuracy of magnetic resonance in identifying traumatic intraarticular knee lesions. *Clinics (São Paulo).* 2005;60:445-450.
8. Winters K, Tregonning R. Reliability of magnetic resonance imaging of the traumatic knee as determined by arthroscopy. *NZ Med J.* 2005;118:U1301.
9. Boric I, Pecina M, Bojanic I, et al. Comparison of conventional spin-echo and fast spin-echo magnetic resonance imaging with fat suppression in cruciate ligament injury. *Croat Med J.* 2004;45:195-201.
10. Yoon YC, Kim SS, Chung HW, et al. Diagnostic efficacy in knee MRI comparing conventional technique and multiplanar reconstruction with one-millimeter FSE PDW images. *Acta Radiol.* 2007;48:869-874.

## We want to hear from you!

Have a comment on an article, editorial, or department? You can send a letter 1 of 3 ways.

1. **E-MAIL:** [jfp@famned.uc.edu](mailto:jfp@famned.uc.edu)
2. **FAX:** 973-206-9251
3. **MAIL:** The Journal of Family Practice, 7 Century Drive, Suite 302, Parsippany, NJ 07054

Letters should be addressed to the Editor, The Journal of Family Practice, and be 200 words or less. They will be edited prior to publication.

THE JOURNAL OF  
**FAMILY  
PRACTICE**