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How Useful is MRI in Diagnosing Isolated Bundle ACL Injuries?

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Where Are We Now?

We now know that the ACL has at least two distinct bundles: anteromedial and posterolateral. Because of this, anatomic two-bundle ACL reconstruction techniques have become an established option [3]. Taking this a step further, some authors have identified partial ACL disruptions (a tear to one of two bundles), and have promoted isolated bundle reconstructions — reconstructing only the torn bundle, leaving alone the bundle that is apparently uninjured. This kind of ACL-remnant preservation with isolated bundle reconstruction is gaining recognition in the orthopaedic community. In fact, several authors have demonstrated clinical outcomes equal to those of standard ACL reconstruction with the use of remnant preservation/isolated bundle reconstructions [1, 2, 6]. Identifying these isolated/

partial ACL tears can be difficult, not only on clinical examination, but also by MRI.

Recently, Van Dyck et al. [5] demonstrated that the accuracy of MRI for the diagnosis of partial ACL tears was 25% to 53%, with only moderate interobserver agreement. The authors found that the partial tears demonstrated MRI features that are indistinguishable from complete ACL tears, mucoid ACL degeneration, and the normal ACL. Additionally, Dejour et al. [4] confirmed these findings by indicating that, in partial tears, there was no correlation between preoperative MRI findings and arthroscopically confirmed type of ACL tear. Partial ACL disruption, compared with complete ACL disruption, is extremely rare. In the Van Dyck study, researchers diagnosed partial ACL disruption on MRI in only 6% of their patient cohort.

This CORR Insights® is a commentary on the article “How Useful is MRI in Diagnosing Isolated Bundle ACL Injuries?” by Chang and colleagues available at DOI:10.1007/s11999-013-3055-y.

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Where Do We Need to Go?

In the current study by Chang et al., the authors sought to determine: (1) the proportion of knees with an intact anteromedial or posterolateral bundle in patients undergoing ACL reconstruction; (2) whether MRI predicted the bundle conditions seen at the time of surgery; and (3) whether the accuracy of the MRI prediction was affected by the timing of MRI after injury. Similar to the Van Dyck series, the authors found only 7% of the patients at the time of arthroscopy had an intact isolated anteromedial or posterolateral bundle. Unlike the Van Dyck series, Chang and authors found an overall diagnostic accuracy of MRI to be 83% for predicting isolated bundle tear. Lastly, an MRI performed earlier than 6 weeks from the time of injury was less accurate compared with an MRI performed later than 6 weeks. The authors

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concluded that MRI “can help surgeons predict bundle injury pattern with satisfactory precision.” There is no question that if we are going to treat these injuries effectively, it is important that we be able to diagnose them accurately. The other issue — perhaps the greater of the two — is how to correlate each injury (whether a partial, one-bundle injury, or a complete ACL rupture) with its physical findings, and interpret these findings in the context of each patient’s needs.

How Do We Get There?

Although MRI is helpful, clinical examination and assessment of the functional needs of the patient ultimately guides treatment in patients considering ACL reconstruction. Therefore, an ideal study examining the efficacy of MRI in diagnosing isolated ACL injuries would compare preoperative physical exam findings with MRI detection of isolated bundle tears, correlating the results to arthroscopic findings. A study of this magnitude could lead to alterations in surgical decision making. In other words, the decision to perform an ACL reconstruction depends on many factors, including patient age, activity level, concomitant meniscal and cartilage lesions, patient goals, and expectations of the patient, just to name a few. Ideally, if we could predict preoperatively, based on MRI and physical exam findings, which patients would

benefit from isolated bundle reconstructions, then the use of MRI to predict isolated bundle tears would be helpful. If the decision to perform isolated bundle reconstruction is made solely at the time of ACL surgery, then the use of MRI to detect isolated tears preoperatively becomes less clinically relevant.

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