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NEWS

RSNA Press Release

Ultrasound Shows Abnormalities in Throwing Arms of Major League Baseball Pitchers

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OAK BROOK, Ill. - A professional baseball pitcher dreads nothing more than the popping sound of a ligament tearing in his pitching elbow. But with the help of high-resolution ultrasound, researchers at Thomas Jefferson University Hospital in Philadelphia are identifying abnormalities in athletes' elbow ligaments before the onset of pain-or potentially career-ending injuries. The researchers reported their findings in a study published in the April issue of the journal *Radiology*.

"The image quality produced by sonography has dramatically improved to the point that the wear and tear that occurs in a pitcher's arm is now visible on an ultrasound well before he experiences symptoms," says Levon N. Nazarian, M.D., lead author of the study and professor of radiology at the Jefferson Medical College of Thomas Jefferson University.

For the study, ultrasound exams were performed on both arms of 26 non-symptomatic major league baseball players, ages 21 to 39, during spring baseball training camp in February 2001.

The researchers focused on the ulnar collateral ligament (UCL), which connects the humerus bone in the upper arm to the ulna bone in the forearm. Repetitive stress on the UCL's anterior band--which is largely responsible for providing stability in the elbow joint--can result in a tear that requires surgery to repair. Although UCL injuries are common in pitchers, they are difficult to diagnose. An MRI can detect acute ruptures, but partial tears and chronic injuries require a more invasive and costly MRI procedure.

"Ultrasound is unique because it allows us to measure the thickness of the anterior band of the UCL and to assess the joint's stability under pressure," Dr. Nazarian said.

During each player's ultrasound exam, which lasted about 10 minutes, the thickness of the UCL's anterior band and the width of the joint it spans were measured while the elbow was at rest and under stress. Measurements from the non-pitching arm and pitching arm were then compared.

"Our results showed that when the pitching arms of these professional baseball players were

stressed, the anterior band of the UCL was thicker, was more likely to have micro-tears and calcifications, and had a greater laxity or looseness in the joint when pressure was applied," said Dr. Nazarian, adding that the degree of degeneration in the player's ligament strongly correlated with his years of service in professional baseball.

The researchers found that while under stress, the anterior band of the UCL in the pitching arms remained thick (6.3 mm, about the diameter of a pencil), but decreased in thickness in the non-pitching arm (5.3 mm), which reflects the loss of elasticity in the repetitively used arm. With stress, the joint space in the pitching arm measured 4.2 mm on average, significantly greater than the joint space in the non-pitching arm, which averaged 3 mm.

The ultrasound results also showed micro-tears in the anterior band of the UCL in 18 of the 26 (69 percent) pitching arms. In contrast, only 3 of the 26 (11.5 percent) non-pitching arm ultrasounds revealed micro-tears. Calcifications, which often accompany an injury to the ligament, appeared in 9 of the 26 (35 percent) pitching arms. None of the non-pitching arm exams showed calcifications.

"This preliminary research confirms that ultrasound is a quick means of evaluating the anterior band of the UCL," says Dr. Nazarian. "By studying the UCL in this detail, we have produced new data that is useful not only for these baseball players, but also for physicians diagnosing UCL injuries in other athletes."

Measurements obtained during the ultrasound can be used as a baseline to help the player's physician monitor the status of the ligament and to diagnose future injuries. Additional research is needed to determine whether the UCL abnormalities observed in this study have any predictive value regarding future pitching performance or risk of more serious injury.

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"Dynamic US of the Anterior Band of the Ulnar Collateral Ligament of the Elbow in Asymptomatic Major League Baseball Pitchers." Collaborating with Dr. Nazarian on this paper were John M. McShane, M.D., Michael G. Ciccotti, M.D., Patrick L. O'Kane, M.D. and Marc I. Harwood, M.D.