

New probe could help determine severity of rotator-cuff injuries

January 31 2014

A new ultrasound probe that has been developed at Clemson University could take some of the guesswork out of determining the severity of rotator-cuff injuries, making it easier for doctors to decide whether patients need surgery.

David M. Kwartowitz is leading a team that has been working on a probe that provides tissue measurements down to the millimeter. The device is harmless, and he expects it will be inexpensive enough for just about any doctor to buy.

While injuries are highly common, much remains unknown about the rotator cuff, the group of muscles that hold the upper-arm bone to the ball-and-socket joint.

Doctors already are using ultrasound images to determine the extent of rotator-cuff injuries. But current technology doesn't offer any way to quantify the extent of the injury or the quality of the tissue, so diagnosis depends on expensive MRIs that delay treatment.

"Two [patients](#) can walk in with similar injuries," Kwartowitz said. "One may need surgery and one doesn't. There is no definitive way to know which is which. We're looking at how to change this."

The Kwartowitz team has developed a pressure-sensing probe that measures the extent of the rotator-cuff tear and the quality of the surrounding tissue. The team's probe has the potential to decrease costs

by 60 to 70 percent and give patients real-time information for their diagnoses.

While misdiagnosing injuries can have devastating effects, better measurement can improve patient outcomes, said Chuck Thigpen, a Proaxis Therapy clinical research scientist who is collaborating on the Clemson research. Recent evidence suggests physical therapy may help some patients get better without surgery, he said.

Surgery requires a six-month commitment to rehabilitation; limited activity; direct medical costs and indirect costs, such as time off from work and travel for care, Thigpen said. However, delaying surgery in some patients may complicate surgery later and limit long-term shoulder function, he said.

Kwartowitz, an assistant professor of bioengineering, is collaborating with Steadman Hawkins Clinic of the Carolinas, including Dr. Richard Hawkins. Also collaborating is Dr. Mike Kissenberth, Greenville Health System vice chairman of orthopedics.

Rotator-cuff injuries are the second highest-costing disease in the country, behind only back injuries, Kwartowitz said. About 90 percent of people over 60 years old have rotator-cuff disease, he said.

"As the population ages, this will get to be worse," Kwartowitz said.

"Most people think about this in terms of athletes, but athletes are only part of the problem."

The statistics are troubling, with 30 to 90 percent of [rotator-cuff](#) repairs failing in two years. The statistics are most grim for the most complex repairs, with as many as 90 percent failing.

Thigpen said he hopes the advanced probe measurements he is helping

develop will "provide patients accurate, timely and cost-effective care that delivers the right care at the right time for every patient."

A patient who seeks treatment now often gets MRI scans, then has to wait as long as two weeks for results, he said. It can be a month until they have a complete diagnosis, establish their treatment plan and know their chances of success, Thigpen said.

Thigpen has been using the probe to gather the images from patients who agree to participate in the research. He has also been interpreting the images.

"One patient was so excited I could give him information right then," Thigpen said. "This improves our ability to deliver the high-quality, cutting-edge information that helps patients faster."

The team's probe has been tested on youth and professional baseball players, Kwartowitz said.

No needles or scalpels are involved. Ultrasounds are harmless, so tests can be done repeatedly with no worries, Kwartowitz said.

"We have tons of data, but we're still working on how we can make this definitive so that we can go to a surgeon and say with 85 or 90 percent probability this is the right answer."

Kwartowitz said the device his team is developing could be sent to high school baseball camps where doctors could offer advice on whether pitchers should alter their throwing motion. It could also be used in regular screenings for patients over 60 years old.

Once the technology is proven, it could also be used on other joints, Kwartowitz said.

He anticipates that the device would be relatively inexpensive.

"This is something every doctor can afford," Kwartowitz said. "And if they can't, a few doctors together can afford it."

Students are doing some of the research as part of Creative Inquiry, a Clemson program that encourages hands-on learning. They are working on fabric pads that help measure force.

"Their technology has to be debugged a little bit, but it's coming," Kwartowitz said.

Much of the team's work has been done at the Clemson University Biomedical Engineering Campus (CUBEInC). The lab complex opened two years ago at Greenville Health System's Patewood Medical Campus to help develop the Upstate's medical-technology industry.

The Kwartowitz team is about five years from seeking FDA approval, he said. Kwartowitz said he believes it will move quickly once researchers know patients are getting proper diagnoses from the device.

"I don't think it's a hard sell to the FDA to say, 'Hey, we've got this extra tool,'" he said. "It's non-invasive and substantially equivalent to other devices."

Provided by Clemson University

Citation: New probe could help determine severity of rotator-cuff injuries (2014, January 31) retrieved 12 May 2024 from <https://medicalxpress.com/news/2014-01-probe-severity-rotator-cuff-injuries.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private

study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.