

# Anatomy of Degenerative Rotator Cuff Tears

## Physical Therapy in San Jose, Los Gatos, Foster City and Burlingame for Shoulder

Thinning and tearing of the rotator cuff is a common problem with aging. Efforts to find out how and why this happens have not pinpointed the exact cause or location of these tears.

In this study from Washington University in St. Louis, ultrasonograms are used to take pictures and measure the location, size, and extent of rotator cuff tears in 360 adults from 36 to 90 years old. They established some fairly narrow inclusion/exclusion criteria (who could be included, who could not).

For example, no one was included who had a previous history of trauma, arthritis, or known injury to either shoulder. They could not be taking any medications (narcotics or antiinflammatories) for shoulder pain. And no one was included who had any surgery done on the shoulders in the past.

Those who were included had pain in one shoulder that turned out to be from a rotator cuff tear but were asymptomatic (no symptoms) in the other shoulder. Ultrasound examination was performed on both shoulders. Patients who had a rotator cuff tear on the asymptomatic side were included.

Out of a potential group of 262 patients (524 shoulders), 233 patients (360 shoulders) qualified for this study. Half the group had pain and other symptoms with the tear, the other half were symptom free. The sonograms showed the majority (272 of the 360) shoulders had a full-thickness (all the way through) tear. The rest (88) had a partial-thickness tear.

Three radiologists with more than 10 years of experience examined and analyzed the sonograms. They were measuring three tear variables: tear width, tear length, and distance from the biceps tendon to the tear margin. This information provided detailed data on tear sizes.

Whether the tear was partial- or full-thickness said more about the extent of the tear. And, of course, the exact location of each tear was recorded. The sonogram machines used (three different ones) allowed them to save the pictures taken using the Picture Archiving and Communication System (PACS).

The exact measurements of length, width, and length might not interest you so much. But a quick summary in broader terms might help in understanding what they found. For example, many of the full-thickness tears were fairly small. Most of them were medium-sized with only a few being massive. The width and length of partial-thickness tears tended to be much smaller than the full-thickness tears.

As for the location of the tears, the full-thickness tears were right next to the biceps tendon. Partial-thickness tears were farther away. The relationship between the location of the tear and the biceps tendon is significant (statistically) meaning there is a link here but the meaning of this relationship is not entirely clear just yet.

Most of the tears were within the tendon, not at the point of insertion on the bone. The majority of tears started behind the biceps tendon where the supraspinatus and infraspinatus tendons (the two most commonly torn rotator cuff tendons) meet.

These findings are significant because they weren't what the researchers were expecting or what is commonly believed about rotator cuff tears. The tears don't start from the front of the biceps tendon and progress posteriorly (back) but rather the other way around. They questioned whether the tears might have started in several places and met in the middle but there really was no evidence to support this idea.

Knowing that the tears seem to start where the two tendons meet helps explain why some people seem to have an infraspinatus tear but their supraspinatus tendon is the one that looks worn out and vice versa. Why the posterior part of the cuff degenerates is still a mystery. There are some theories to explain it but no known facts.

One of those theories presented in this article is called the rotator crescent concept. The rotator crescent is a crescent-shaped area from the biceps tendon to the bottom border of the infraspinatus tendon. Along the edge of this area is a thick arch-shaped bundle of fibers called the rotator cable.

The cable protects the crescent from stress by its shape and design, which is much like a suspension bridge. With aging, the crescent loses blood supply and starts to thin out. The shoulder mechanics start to rely more and more on the cable. The area that starts to tear is right in the middle of that aging, thinning crescent.

The results of this study will be used to help surgeons understand the pathogenesis of rotator cuff tears (i.e., the how and why of these tears). Knowing where the tears start and how they progress over time is an important place to start. The goal is to direct prevention and treatment, especially guiding surgical strategies.

Reference: H. Mike Kim, MD, et al. Location and Initiation of Degenerative Rotator Cuff Tears. An Analysis of Three Hundred and Sixty Shoulders. In *The Journal of Bone & Joint Surgery*. May 2010. Vol. 92-A. No. 5. Pp. 1088-1096.