

# Editorial Commentary: Progression of Degenerative Full-Thickness Rotator Cuff Tears: Are We Finally Using Natural History Data to Define At-Risk Tears?



Jay D. Keener, M.D.

**Abstract:** Defining and understanding natural history data for any disease is paramount to developing effective treatment strategies: degenerative rotator cuff disease is no different. The natural history defines disease progression without treatment or intervention. Given the persistent variable indications for surgical intervention for painful rotator cuff tears, a more thorough understanding of the rate of progression of full-thickness rotator cuff tears can help to refine surgical indications and potentially define the risks of nonoperative treatment. This systematic review synthesizes existing literature and takes the surgeon one step closer to understanding the rates of tear progression for untreated tears—one small step.

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I believe that Kwong, Ono, Carroll, Fruson, More, Thornton, and Lowe,<sup>1</sup> authors of “Full-Thickness Rotator Cuff Tears: What’s the Risk of Tear Progression? A Systematic Review,” should be commended for their thoughtful article. This review not only serves the purpose of synthesizing clinically meaningful literature but also highlights the need for a better understanding of the natural history of untreated rotator cuff tears, thus establishing a foundation for proper surgical indications. Perhaps there is no other clinical problem in the shoulder for which surgical indications are so variable and debated with the exception of the dreaded SLAP tear.

The authors have done a good job of choosing high-quality studies with strong methodology, validated methods examining rotator cuff tear size, and accepted clinically relevant definitions of tear size changes (5 mm). One thing that clearly stands out is the relative consistency in the rate of tear progression for full-thickness tears seen in multiple studies when similar follow-up intervals are examined. The authors do an exceptional job of identifying the limitations of these studies, which primarily relate to heterogeneity of the subjects. The risk of

tear enlargement for full-thickness degenerative cuff tears seems to range from 30% to 40% of shoulders at the 3- to 4-year follow-up, with no difference between painful and asymptomatic tears. These data alone are helpful for counseling patients because a common question in the clinic is “What’s going to happen to my tear over time?” The answer for most is that progression does occur; however, the process is slow, and there is generally time for conservative treatment without burning bridges.

I believe that we must take a closer look at specific risk factors for various degenerative tears to truly identify those that may be at higher risk of clinically relevant progression. Simply stated, not all full-thickness cuff tears are the same. Although the concept of number needed-to-treat calculation is interesting, it may represent a gross simplification of the data by considering all full-thickness rotator cuff tears as being the same. Research examining the incidence and risk of progression of muscle fatty degeneration has better elucidated higher-risk full-thickness tears. Given the known relationship of tear size and the severity of fatty infiltration on the potential for healing after surgery, a deeper dive into natural history data may be more helpful for identifying higher-risk full-thickness tears. Many degenerative cuff tears are small to medium and contained within the rotator crescent and thus are somewhat protected by the surrounding cable attachment.<sup>2</sup> When the tear width exceeds 15 to 20 mm, the infraspinatus becomes disrupted and we begin to see early proximal humeral migration.<sup>3</sup> More importantly, infraspinatus fatty muscle

Washington University

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changes occur.<sup>4,5</sup> Advanced infraspinatus muscle atrophy<sup>6</sup> and proximal humeral migration have been linked to poorer cuff healing and are difficult to reverse with cuff repair surgery. In addition, smaller tears that disrupt the anterior cable attachment of the supraspinatus have been shown to be an independent risk factor for supraspinatus muscle degeneration.<sup>5</sup> Tears with these characteristics that do not demonstrate any degenerative muscle changes, especially after a recent tear enlargement event, may represent an opportunity to intervene with surgery.

There is good evidence that not all atraumatic full-thickness cuff tears are the same when the influences of tear size and location are considered. Further research is needed to better define the natural history of tears in relation to these factors for more meaningful refinement of surgical intervention. This article is a positive step toward defining the natural history of these tears; however, a deeper look into the data may provide us a more clinically relevant understanding of degenerative cuff disease.

## References

1. Kwong CA, Ono Y, Carroll MJ, et al. Full-thickness rotator cuff tears: What's the rate of tear progression? A systematic review. *Arthroscopy* 2018;35:228-234.
2. Kim HM, Dahiya N, Teefey SA, et al. Location and initiation of degenerative rotator cuff tears: An analysis of three hundred and sixty shoulders. *J Bone Joint Surg Am* 2010;92:1088-1096.
3. Keener JD, Wei AS, Kim HM, Steger-May K, Yamaguchi K. Proximal humeral migration in shoulders with symptomatic and asymptomatic rotator cuff tears. *J Bone Joint Surg Am* 2009;91:1405-1413.
4. Kim HM, Dahiya N, Teefey SA, Keener JD, Galatz LM, Yamaguchi K. Relationship of tear size and location to fatty degeneration of the rotator cuff. *J Bone Joint Surg Am* 2010;92:829-839.
5. Hebert-Davies J, Teefey SA, Steger-May K, et al. Progression of fatty muscle degeneration in atraumatic rotator cuff tears. *J Bone Joint Surg Am* 2017;99:832-839.
6. Jeong HY, Kim HJ, Jeon YS, Rhee YG. Factors predictive of healing in large rotator cuff tears: Is it possible to predict retear preoperatively? *Am J Sports Med* 2018;46:1693-1700.