

# Outcome and Predictors for Surgery for Nonoperative Treatment of Atraumatic Symptomatic Full Thickness Rotator Cuff Tears: 10-Year Follow Up of the MOON Shoulder Cohort

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## INTRODUCTION:

The MOON shoulder multicenter prospective cohort study enrolled 452 patients with symptomatic atraumatic full thickness rotator cuff tears from January 17, 2007- September 23, 2010 to determine the effectiveness of physical therapy as a treatment<sup>1</sup>, and to determine the features predicting the decision for surgery<sup>2</sup>. We are reporting the 10-year follow up of this cohort to determine if surgery rates increased with time, what surgeries had been performed, and determine if those that had surgery >6 months had different predictors for surgery than those who had early surgery.

## METHODS:

Patients with symptomatic, atraumatic, full thickness rotator cuff tears were enrolled in a multicenter prospective cohort study to assess the effectiveness of physical therapy as treatment. Patients performed a standard evidence based physical therapy protocol<sup>3</sup> for 6-12 weeks. After the initial 6-12 weeks of therapy, we contacted patients at 1, 2, 5, 7, and 10 years and collected data on whether they had surgery and the details of that surgery.

## RESULTS:

Of the 452 patients in original cohort, 31 patients withdrew before the 10-year follow up leaving 421 available for analysis. Thirty-seven patients (9.1%) died before 10 years, and 40 others (9.0%) were lost to follow up. A total of 116 patients (28%) were known to have had surgery at some point in the 10-year follow-up period (Figure 1). Of this group, details regarding surgery were available for 104 patients.

Rotator cuff repair was performed in 101 (97%) (one partial repair and one augmented with graft). Biceps surgery was performed on 37 patients (36%) (23 tenodesis, 12 tenotomy, 2 debride ruptured tendon stump). Twenty patients (19%) had distal clavicle excisions. Four had lysis of adhesions and manipulation under anesthesia. One patient had a reverse total shoulder arthroplasty.

Indications for surgery were listed in 89 of the 104 surgical reports. Ten patients reported a traumatic event injuring the rotator cuff. Other indications listed included failure of nonsurgical treatment (67), pain (42), weakness or functional loss (11), biceps problems (3), adhesive capsulitis (2), and tear enlargement (2).

The majority (65 or 56.5%) of the patients who had surgery did so within 6 months of enrollment (Figure 1). Patient expectations regarding the effectiveness of nonoperative treatment was the most important feature influencing the decision to have surgery for this group (Figure 2). The other (50 or 43.5%) patients had surgery between 6 months and 10 years after enrolling in the study. In this group workers compensation status and shoulder activity were more important than patient expectations in predicting the need for surgery (Figure 3).

## DISCUSSION AND CONCLUSION:

In patients with symptomatic atraumatic full thickness rotator cuff tears, physical therapy is successful in >70% at 10 years. Patients who decided to have surgery within 6 months were driven primarily by their expectations of the effectiveness of physical therapy. For patients who had surgery after 6 months workers' compensation status and shoulder activity were stronger predictors than patient expectations for the need for surgery. The risk of death in this cohort of older individual was 9.1% over 10 years, whereas the risk of needing a reverse arthroplasty was 0.2%.

## References:

1. Kuhn JE, Dunn WR, Sanders R, An Q, Baumgarten KM, Bishop JY, Brophy RH, Carey JL, Holloway BG, Jones GL, Ma CB, Marx RG, McCarty EC, Poddar SK, Smith MV, Spencer EE, Vidal AF, Wolf BR, Wright RW; MOON Shoulder Group. Effectiveness of physical therapy in treating atraumatic full-thickness rotator cuff tears: a multicenter prospective cohort study. *J Shoulder Elbow Surg.* 2013 Oct;22(10):1371-9. doi: 10.1016/j.jse.2013.01.026. Epub 2013 Mar 27. PMID: 23540577; PMCID: PMC3748251.

2. Dunn WR, Kuhn JE, Sanders R, An Q, Baumgarten KM, Bishop JY, Brophy RH, Carey JL, Harrell F, Holloway BG, Jones GL, Ma CB, Marx RG, McCarty EC, Poddar SK, Smith MV, Spencer EE, Vidal AF, Wolf BR, Wright RW; MOON Shoulder Group. 2013 Neer Award: predictors of failure of nonoperative treatment of chronic, symptomatic, full-thickness rotator cuff tears. *J Shoulder Elbow Surg.* 2016 Aug;25(8):1303-11. doi: 10.1016/j.jse.2016.04.030. PMID: 27422460.

3. Kuhn JE. Exercise in the treatment of rotator cuff impingement: a systematic review and a synthesized evidence-based rehabilitation protocol. *J Shoulder Elbow Surg.* 2009 Jan-Feb;18(1):138-60. doi: 10.1016/j.jse.2008.06.004. Epub 2008 Oct 2. PMID: 18835532.

