

# Tear Progression of Symptomatic Rotator Cuff Tears with a Mean 57-Month Follow Up

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**INTRODUCTION:** It is important for orthopaedic surgeons to know the natural course of tear progression when nonsurgical management is to be chosen. We, in a prospective study of 174 shoulders, reported that the tear size of symptomatic rotator cuff tears progressed in 47% of the shoulders during a mean of 19 months, and the risk factors for tear progression were 1) a medium sized tear, 2) a full-thickness tear, and 3) smoking. There are some reports on tear progression, but these are retrospective studies, or the follow-up period is short. The purpose of this study was to investigate 72 shoulders with a mean 57-month follow up in the same population.

**METHODS:** Two-hundred-twenty-five consecutive patients with symptomatic rotator cuff tears visited our institute between 2009 and 2015. Seventy-two shoulders with a mean age of 65 years who were followed up at least 3 years were prospectively enrolled. This group of patients consisted of 37 full-thickness tears and 35 partial thickness tears (Table 1). Basically, nonsurgical treatment was chosen for all patients except for traumatic cases and younger patients (<50 years old). Surgery was recommended when no improvement was seen at the end of at least 6 months of nonsurgical treatment. During the follow-up period, 7 patients of 72 (9%) underwent surgery because of unsuccessful nonoperative treatment in this study. For all patients, MRI of the shoulder was performed with use of a 1.5-T high-resolution imaging unit equipped with a microscopy coil or a 3.0-T imaging unit. There were 40 small, 27 medium, 4 large, and 1 massive tears. The mean follow-up period was 57 months (range, 36-120 months). MRI examinations were performed every 6 months until 2 years and every 1 year after that. Tear progression was defined as positive when the tear size increased by 2 mm or greater. Pain was evaluated with use of a visual analog scale (VAS). MRI examinations were performed, on average, 6.1 times (range, 4-9).

**RESULTS:** Of the 72 shoulders, 46 shoulders (64%) had a progression of the tear, whereas the tear size remained unchanged in 20 shoulders (28%) (Table 2). The mean ( $\pm$  SD) tear length and width in the progression group on final MRI were  $21.4 \pm 13.0$  mm and  $15.7 \pm 9.8$  mm, respectively; the tear size progressed by a mean  $8.4 \pm 5.6$  mm in length and  $5.0 \pm 5.2$  mm in width (Table 3). The mean time from the first visit to the tear progression was 32 months. In the progression group, pain increased in 17 shoulders (38%), and pain did not change or decreased in 29 shoulders (62%) at the final follow up. In the non-progression group, pain significantly decreased from  $44 \pm 15$  to  $19 \pm 17$ .

**DISCUSSION AND CONCLUSION:** The tear size of symptomatic rotator cuff tears progressed in 64% during a mean period of 5 years. The tear size progressed at 2.5 years from the first visit. Pain increased in 40% of the progression group, and pain did not change in 60% in this population of relatively mild symptoms, who had been satisfied with conservative treatment.

Table 1 Patient demographics at the time of initial MR examination

Number of shoulders	72
Mean age (range)	65 (47-83)
Sex	
Male	38
Female	34
Follow-up (range)	57 (36-120) months
Tear size at first MRI	
Length (mm)	$12.3 \pm 9.9$
Width (mm)	$10.3 \pm 7.9$
Tear size	
Small	40
Medium	27
Large	4
Massive	1
Tear type	
Full-thickness	37
Partial-thickness	
Bursal side	20
Articular side	12
Intratendinous	5
Shoulder pain (VAS)	$46.6 \pm 27.4$

Table 2 Comparison of Baseline Data for Both Groups at the Initial Follow-up

	Tear progression		P value
	(+)	(-)	
Number of subjects	45	20	
Mean age (range)	66.2 (49-82)	65.1 (47-83)	NS
Sex			NS
Male	27	6	
Female	18	14	
Follow-up (range)	57.7 (36-120) months	53.3 (36-96) months	NS
Tear size at first MRI			
Length (mm)	$13.0 \pm 19.7$	$12.5 \pm 12.3$	NS
Width (mm)	$10.8 \pm 8.3$	$10.1 \pm 8.8$	NS
Tear size			
Small	40	11	$P < 0.001$
Medium	27	7	$P < 0.05$
Large	4	1	NS
Massive	1	1	NS
Tear type			
Full-thickness	22	8	NS
Partial-thickness			$P = 0.022$
Bursal side	15	5	NS
Articular side	5	5	NS
Intratendinous	4	2	NS
Shoulder pain (VAS)	$46.6 \pm 32.7$	$44.1 \pm 15.2$	NS

Table 3 Comparison for Tear Progression Group at the Initial and Final Follow-up

	Initial follow-up	Final follow-up	P value
	Tear size at MRI		
Length (mm)	$13.0 \pm 9.7$	$21.4 \pm 13.0$	$P < 0.05$
Width (mm)	$10.8 \pm 8.3$	$15.7 \pm 9.8$	$P < 0.05$
Tear size			
Small	24	11	$P < 0.05$
Medium	19	22	NS
Large	3	1	NS
Massive	0	1	NS
Tear type			
Full-thickness	22	18	NS
Partial-thickness			
Bursal side	15	11	$P < 0.05$
Articular side	5	5	NS
Intratendinous	4	4	NS
Shoulder pain (VAS)	$46.6 \pm 32.7$	$28.0 \pm 19.7$	NS