

# Rotator Cuff Repair Improves Clinical Function and Stability in Patients Older Than 50 Years With Anterior Shoulder Dislocations and Massive Rotator Cuff Tears

Xiaoxi Ji,\* MD, PhD, Lingchao Ye,<sup>†</sup> MD, Yinghui Hua,\*<sup>‡</sup> MD, PhD, and Xiaobo Zhou,<sup>†</sup> MD

*Investigation performed at Huashan Hospital, Fudan University, Shanghai, China*

**Background:** Older patients with shoulder instability have a higher prevalence of rotator cuff tears and anterior capsular lesions. Simultaneous rotator cuff repair and labral repair are commonly performed to improve shoulder stability and function.

**Purpose:** To investigate the clinical outcomes of arthroscopic rotator cuff repair for older patients with shoulder dislocations combined with massive rotator cuff tears and intact labral tissue.

**Study Design:** Case series; Level of evidence, 3.

**Methods:** A cohort consisting of 11 patients older than 50 years with shoulder dislocations and massive rotator cuff tears undergoing arthroscopic rotator cuff repair was identified between December 2015 and January 2018. Rotator cuff repair was performed after Bankart, superior labral anterior-posterior, and humeral avulsion of the glenohumeral ligament lesions were excluded during arthroscopic surgery. Preoperative and 12-month postoperative outcomes including modified University of California Los Angeles (UCLA), American Shoulder and Elbow Surgeons (ASES), Western Ontario Shoulder Instability Index (WOSI), and visual analog scale for pain scores as well as range of motion (ROM) were recorded.

**Results:** The supraspinatus tendon was torn in all patients. Also, 36.4% of the patients had 3 rotator cuff tendons torn. For shoulder function, the preoperative UCLA score ( $12.1 \pm 2.5$  [range, 9–16]) and ASES score ( $35.4 \pm 12.7$  [range, 24–44]) significantly improved to  $29.4 \pm 4.3$  (range, 24–35;  $P < .001$ ) and  $79.4 \pm 16.0$  (range, 45–95;  $P < .001$ ), respectively, at 12 months postoperatively. None of the patients experienced shoulder redislocations at 12 months after surgery. For shoulder stability, the postoperative WOSI score ( $156.8 \pm 121.0$  [range, 45–365]) was significantly better than was the preoperative score ( $713.0 \pm 238.6$  [range, 395–1090]) ( $P < .001$ ). For comparisons between preoperative and postoperative ROM, forward flexion, abduction, and external and internal rotation at the side significantly improved.

**Conclusion:** For patients older than 50 years with shoulder dislocations combined with massive rotator cuff tears and an intact labrum, arthroscopic rotator cuff repair alone achieved satisfactory functional outcomes and ROM without the recurrence of dislocations.

**Keywords:** rotator cuff tear; shoulder instability; arthroscopic repair; clinical outcome

<sup>‡</sup>Address correspondence to Yinghui Hua, MD, PhD, Huashan Hospital, Fudan University, 12 Urumqi Road, Shanghai, China (email: hua023@hotmail.com).

\*Huashan Hospital, Fudan University, Shanghai, China.

<sup>†</sup>Zhejiang Taizhou Hospital, Taizhou, China.

Y.H. and X.Z. contributed equally to this article.

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Ethical approval for this study was obtained from Huashan Hospital.

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Anterior shoulder dislocations are known to occur in patients with sports injuries or various traumatic accidents.<sup>4,15</sup> Primary and recurrent anterior shoulder dislocations in patients younger than 20 years usually result in classic Bankart lesions, which can be treated via capsulo-labral repair.<sup>2,16</sup> The incidence of Bankart lesions in patients with acute and chronic shoulder instability ranges from 24.2% to 97.1%, while that of superior labral anterior-posterior (SLAP) lesions ranges from 20.1% to 25.2%.<sup>10,17,20</sup> However, for older patients with shoulder dislocations, arthroscopic surgery might not always enable the surgeon to find labral injuries, such as Bankart or SLAP lesions.

There is also a growing trend that a higher rate of concurrent capsular tears or rotator cuff tears is observed in older people with shoulder dislocations.<sup>12,13</sup> Gumina and Postacchini<sup>8</sup> reported a 61% rate of rotator cuff tears for



**Figure 1.** Preoperative magnetic resonance imaging scans of a patient who had 3 shoulder dislocations after falling. (A) The oblique coronal scan showed a tear and retraction of the rotator cuff. (B) The axial scan showed a partial tear of the subscapularis tendon, an intact teres minor tendon, and medial subluxation of the long head of the biceps tendon. (C) The oblique sagittal scan showed tears of the supraspinatus and infraspinatus tendons.

older patients with anterior dislocations of the shoulder. Ro et al<sup>15</sup> investigated the complications of recurrent shoulder dislocations in patients older than 40 years and found an incidence rate of 18% for concomitant rotator cuff tears and 8% for full-thickness tears. Functional results and range of motion (ROM) were found to be satisfactory when treating these patients with partial-thickness or small-sized rotator cuff repair. It has been reported that a special type of anterior shoulder instability, demonstrating an intact labrum and injured rotator cuff, occurs after a primary traumatic injury.<sup>9</sup> Kanji et al<sup>9</sup> described a patient who had a traumatic anterior shoulder dislocation with an irreparable rotator cuff tear and axillary nerve palsy but without dislocation-related labral lesions. In that case report, superior capsular reconstruction was used to repair the massive rotator cuff tear, which resulted in shoulder stability and improved shoulder function.

In the current study, we retrospectively report on patients older than 50 years with massive rotator cuff tears and an intact labrum after traumatic shoulder dislocations. Surgical procedures as well as preoperative and postoperative functional outcomes were evaluated in this series. The purpose of this cohort study was to introduce the surgical treatment of massive rotator cuff tears without labral injuries after traumatic shoulder dislocations and to investigate its clinical outcomes. Our hypothesis was that direct repair of the rotator cuff could achieve shoulder stability and significantly improve functional outcomes.

## METHODS

This retrospective cohort study was approved by the health science institutional review board of Y.H.'s hospital. A signed consent form was obtained from each patient agreeing to participate. The criteria for inclusion were (1) age >50 years and primary or recurrent shoulder anterior dislocations, (2)  $\geq 2$  torn rotator cuff tendons that were identified using preoperative magnetic resonance imaging and confirmed via arthroscopic surgery, (3) an intact glenoid labrum confirmed via arthroscopic surgery, and (4) a minimum 12-month follow-

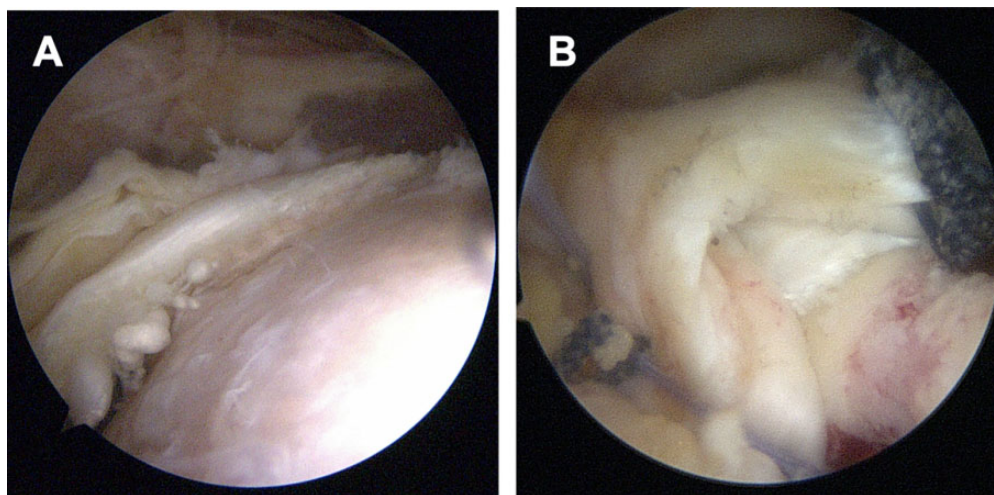
up. The exclusion criteria were (1) concomitant humeral or scapular fractures, (2) neurological deficits on the affected arm, (3) previous surgical procedures on the affected shoulder, and (4) a workers' compensation claim. Between December 2015 and January 2018, a total of 11 patients with primary or recurrent shoulder anterior dislocations met the above criteria for further analyses. Descriptive data including age, sex, occupation, hand dominance, height, weight, workers' compensation claim, previous treatment methods, and injury type were recorded for each patient.

## Operative Technique

The surgical procedures were performed with the patients under general anesthesia in the lateral decubitus position by 2 senior surgeons at our hospital (Y.H. and X.Z.). The arthroscope was inserted for visualization through a standard posterior portal into the glenohumeral joint. Bankart lesions, SLAP lesions, and humeral avulsion of the glenohumeral ligament lesions were excluded after a careful inspection. Rotator cuff tears involving  $\geq 2$  tendons were identified and then repaired (Figure 1). Briefly, the size of the rotator cuff tear was measured during arthroscopic surgery. According to the tear size and shape, different techniques including the single-row, double-row, and suture bridge techniques were used to repair the torn tendons directly using suture anchors (Corkscrew [Arthrex] and Healix [DePuy Synthes]) (Figure 2). Rotator cuff tears could not be repaired completely in some cases because of poor tissue quality or significant retraction. If severe degeneration or a partial tear of the long head of the biceps tendon was present, biceps tenotomy or tenodesis was performed according to the surgeon's decision, as no significant difference in clinical outcomes has been found in previous publications.<sup>5,6,11</sup>

## Rehabilitation

Each patient was asked to wear an abduction sling after arthroscopic surgery. Passive shoulder flexion, external rotation, and isometric strengthening exercises were



**Figure 2.** (A) A massive rotator cuff tear including the supraspinatus and infraspinatus tendons and severe degeneration of the long head of the biceps tendon (LHBT) were detected in a patient. (B) The rotator cuff was partially repaired using 2 anchors, and tenodesis of the LHBT was performed.

started on the second day postoperatively. At 6 weeks postoperatively, the sling was removed, and active shoulder motion and strengthening exercises were started. Patients visited the clinic at 2 weeks, 6 weeks, 3 months, 6 months, and 12 months postoperatively. The same evaluations including ROM and functional examinations were performed again at the last visit.

### Clinical Evaluation

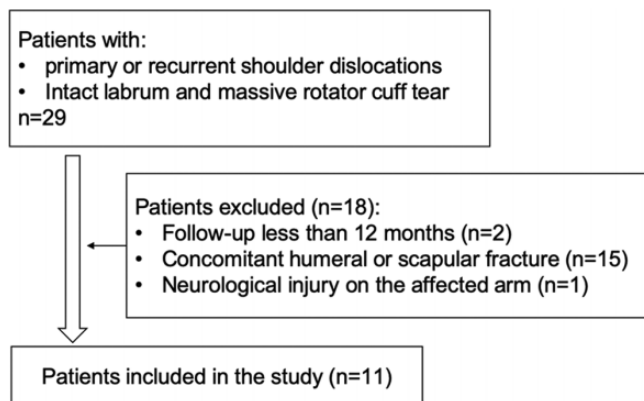
Preoperative and 12-month postoperative functional assessments were performed using the modified University of California Los Angeles (UCLA) score, the American Shoulder and Elbow Surgeons (ASES) score, and the visual analog scale for pain. Shoulder stability evaluations were conducted preoperatively and at 12 months postoperatively using the Western Ontario Shoulder Instability Index (WOSI). In addition, a physical examination was conducted by a sports medicine resident (L.Y.) and included shoulder ROM (forward flexion, abduction, and external and internal rotation at the side) at these 2 time points. At the last visit, any recurrence of shoulder instability and its treatment methods were recorded.

### Statistical Analysis

The Wilcoxon rank sum test was used to compare preoperative and postoperative functional outcomes. Preoperative and postoperative ROM were compared using the paired *t* test. A *P* value <.05 was considered to be statistically significant. Statistical analyses were conducted using SPSS software (IBM Corp).

## RESULTS

A total of 29 patients were identified for inclusion in this study between December 2015 and January 2018. Of these,



**Figure 3.** Flowchart showing patient inclusion and exclusion.

18 patients were excluded for having a short follow-up, concomitant fractures, or nerve injuries. This left 11 patients in our cohort to be studied. The flowchart of patient inclusion and exclusion is shown in Figure 3. Descriptive data are presented in Table 1. All the patients had sustained a traumatic accident that resulted in a primary or recurrent shoulder anterior dislocation. Moreover, 63.6% (7/11) of patients were involved in an automobile or motorcycle accident, and the others (36.4%; 4/11) had a fall while walking. Among all the patients, 2 patients had 3 shoulder dislocations after their index injury. The mean follow-up period was  $26.0 \pm 10.7$  months (range, 12-36 months).

Intraoperative rotator cuff integrity and other intra-articular findings are shown in Table 2. The supraspinatus tendon was torn in each patient, and the infraspinatus tendon was torn in 90.9% of patients. In particular, 27.3% of the patients had 3 tendons torn (supraspinatus, infraspinatus, and subscapularis tendons). The teres minor tendon was intact in all 11 patients.

For shoulder function, the preoperative UCLA score ( $12.1 \pm 2.5$  [range, 9-16]) and ASES score ( $35.4 \pm 12.7$  [range, 24-44]) significantly improved to  $29.4 \pm 4.3$  (range,

TABLE 1  
Patient Descriptive Data<sup>a</sup>

	Value
Age, y	$63.3 \pm 6.9$
Sex, male:female, n	4:7
Laterality, left:right, n	4:7
Time from injury to surgery, mo	$5.1 \pm 4.1$
No. of dislocations before surgery	$1.4 \pm 0.8$

<sup>a</sup>Data are shown as mean SD  $\pm$  unless otherwise indicated.

TABLE 2  
Intraoperative and Intra-articular Findings

	n (%)
Supraspinatus tendon tear	11 (100.0)
Infraspinatus tendon tear	10 (90.9)
Teres minor tendon tear	0 (0.0)
Subscapularis tendon tear	4 (36.4)
Severe degeneration or tear of the long head of the biceps tendon	7 (63.6)
Bankart lesion	0 (0.0)
Hill-Sachs lesion	0 (0.0)
Capsular tear	11 (100.0)

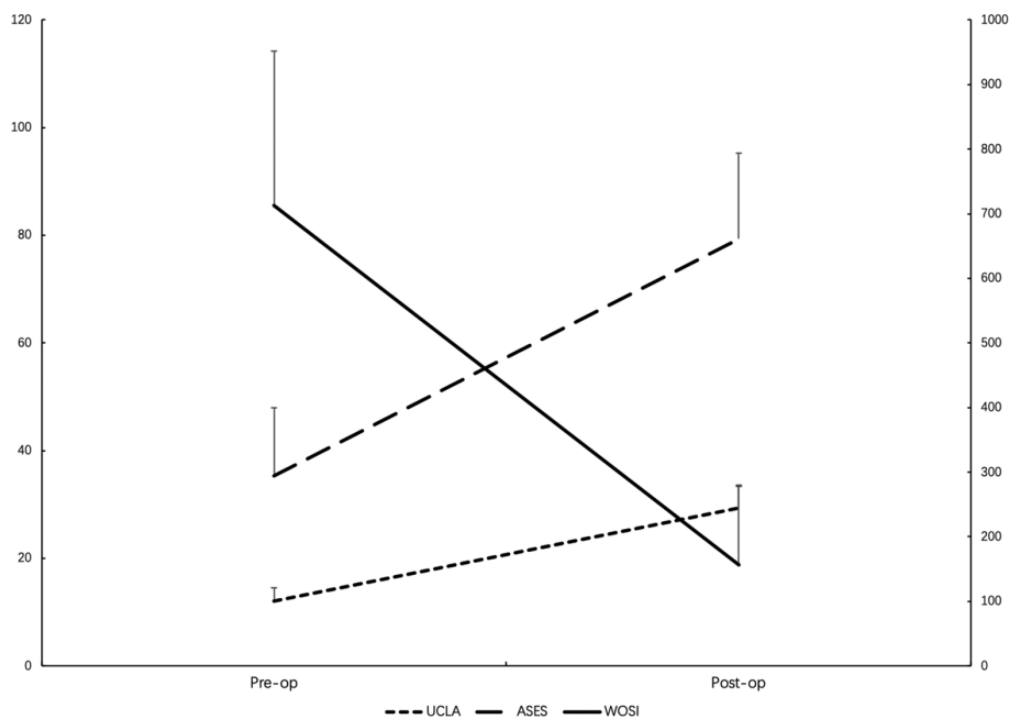
24-35;  $P < .001$ ) and  $79.4 \pm 16.0$  (range, 45-95;  $P < .001$ ), respectively, at 12 months postoperatively. For shoulder stability, the postoperative WOSI score ( $156.8 \pm 121.0$  [range, 45-365]) was significantly better than was the preoperative score ( $713.0 \pm 238.6$  [range, 395-1090]) ( $P < .001$ ) (Figure 4).

For comparisons between preoperative and postoperative ROM, forward flexion ( $75.5^\circ \pm 30.8^\circ$  vs  $160.0^\circ \pm 30.0^\circ$ , respectively;  $P < .001$ ), abduction ( $60.5^\circ \pm 24.1^\circ$  vs  $86.4^\circ \pm 12.9^\circ$ , respectively;  $P = .001$ ), external rotation at the side ( $28.6^\circ \pm 10.5^\circ$  vs  $45.9^\circ \pm 7.0^\circ$ , respectively;  $P = .001$ ), and internal rotation at the side ( $31.8^\circ \pm 13.7^\circ$  vs  $75.5^\circ \pm 13.7^\circ$ , respectively;  $P < .001$ ) significantly improved (Figure 5). At 12 months postoperatively, all 11 patients did not experience a recurrence of shoulder dislocations.

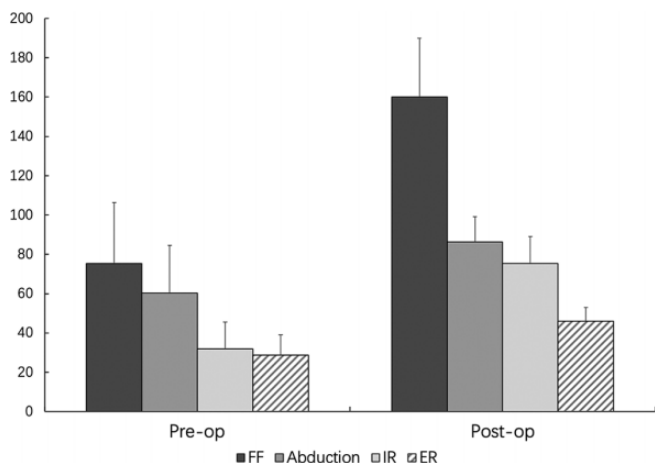
## DISCUSSION

To our knowledge, this is the first study to report on the outcomes in a cohort of patients who underwent rotator cuff repair with an intact glenoid labrum after an anterior shoulder dislocation. No patient had recurrent dislocations after rotator cuff repair, with improved functional outcome scores and ROM at a mean follow-up of  $26.0 \pm 10.7$  months.

Anterior shoulder dislocations are commonly seen in a young patient population, with most having a Bankart lesion. However, the mechanism of anterior instability for older patients differs from that of a young population.



**Figure 4.** Postoperative (Post-op) functional scores including University of California Los Angeles (UCLA), American Shoulder and Elbow Surgeons (ASES), and Western Ontario Shoulder Instability Index (WOSI) scores were significantly improved compared with preoperative (Pre-op) scores.



**Figure 5.** Preoperative and postoperative range of motion. All range of motion variables improved significantly from preoperatively (Pre-op) to postoperatively (Post-op). ER, external rotation at the side; FF, forward flexion; IR, internal rotation at the side.

Araghi et al<sup>3</sup> observed that anterior capsular lesions included capsular tears, rotator cuff interval defects, and humeral avulsion of the glenohumeral ligament lesions in patients older than 40 years after shoulder dislocations. Mizuno et al<sup>13</sup> found that 55.6% of patients older than 50 years with shoulder dislocations had complete capsular tears. Older patients with shoulder instability had a higher prevalence of anterior capsular lesions than isolated Bankart lesions. In the current study, subsequent shoulder dislocations were caused by massive rotator cuff tears. After rotator cuff repair, no further shoulder dislocations were observed.

Regarding treatment options, it has been suggested that both anterior stabilizing structures and rotator cuffs should be repaired simultaneously. Porcellini et al<sup>14</sup> repaired both capsular and rotator cuff lesions in a series of 50 patients, and postoperative outcomes improved significantly. Voos et al<sup>19</sup> retrospectively reviewed patients with rotator cuff and labral lesions, and arthroscopic repair of both injuries yielded good clinical outcomes, ROM, and patient satisfaction. However, in a randomized controlled trial, the authors showed that rotator cuff repair combined with type 2 SLAP repair did not produce clinical advantages compared with simple rotator cuff repair.<sup>7</sup> Abbot et al<sup>1</sup> found that, in patients older than 45 years, arthroscopic repair of the rotator cuff with debridement of SLAP lesions could provide better functional outcomes and patient satisfaction compared with simultaneous rotator cuff repair and SLAP repair. In our case series, most patients presented with shoulder stiffness and pain after the primary traumatic instability event instead of recurrent dislocations. Only 2 patients experienced a second or third dislocation, which might have been caused by massive rotator cuff tears. Arthroscopic repair of the torn rotator cuff alone produced satisfactory functional outcomes and joint ROM.

In the current study, there were 2 patients who experienced 3 recurrent shoulder anterior dislocations after an accident. For the subsequent 2 dislocations, the patients did not suffer from any traumatic force. During arthroscopic surgery, no labral lesions but supraspinatus and infraspinatus tendon tears were detected. The primary dislocation might have been caused by a tear of the rotator cuff itself or enlargement of the size of the rotator cuff tear. For these particular cases, we believe that the latter 2 shoulder dislocations were caused by a structural deficit of the rotator cuff instead of a labral lesion or a bony deficit of the glenoid. After repairing the rotator cuff, the patients achieved improved shoulder ROM and satisfactory joint function without the recurrence of shoulder instability at 1 year postoperatively. In previous publications, 1 case report was found to discuss this uncommon situation. Tajika et al<sup>18</sup> reported a case of recurrent shoulder dislocations with a massive rotator cuff tear. Repair of the labrum and superior capsular reconstruction resulted in significant improvement of ROM without the recurrence of dislocations. The authors attributed the subsequent dislocations to the irreparable rotator cuff tear. In our study, the recurrently dislocated shoulders might have had a similar mechanism. The primary accident might have been a cause or promoting factor of the massive rotator cuff tear, while the rotator cuff tear jeopardized shoulder stability and caused the subsequent dislocations.

This study has several limitations. A significant one is that the study retrospectively reviewed the patient cohort without comparing with other surgical procedures, including repairing the anterior capsular complex. For the included patients, no labral repair was needed, as no Bankart lesions were present. Yet, the results would be more promising if they could be compared with those of capsular repair and rotator cuff repair at the same time. Another limitation is the small patient numbers. However, recurrent shoulder dislocations with massive rotator cuff tears are relatively rare compared with those with labral lesions. More data should be collected in the future to compare these 2 patient groups. Comparisons between operative treatment and nonoperative treatment are also needed to examine the effect of rotator cuff repair. An additional limitation is that the mean 26.0-month follow-up of this patient series was relatively short; further observations are needed to evaluate long-term clinical outcomes. Finally, the function and ROM of the contralateral shoulder are needed to provide comparisons between postoperative and healthy shoulders.

## CONCLUSION

For patients older than 50 years with shoulder dislocations combined with massive rotator cuff tears and intact labral tissue, arthroscopic rotator cuff repair achieved satisfactory functional outcomes and ROM without a recurrence of dislocations. Future studies are needed to explore the potential biomechanical reasons of these outcomes using the current procedure.

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